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# REHABILITATION OF PATIENTS WITH CARDIOVASCULAR DISEASES

## Report of a WHO Expert Committee

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## WHO EXPERT COMMITTEE ON REHABILITATION OF PATIENTS WITH CARDIOVASCULAR DISEASES

Geneva, 23-29 July 1963

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# **REHABILITATION OF PATIENTS WITH CARDIOVASCULAR DISEASES**

## **Report of a WHO Expert Committee**

An Expert Committee on Rehabilitation of Patients with Cardiovascular Diseases met in Geneva from 23 to 29 July 1963. Professor G. Björck was elected Chairman, Dr J. K. Maddox, Vice-Chairman, and Dr H. K. Hellerstein, Rapporteur.

Dr F. Grundy, Assistant Director-General, opened the session and welcomed the members of the Committee and representatives from the International Labour Organisation, the International Society of Cardiology and the International Society for Rehabilitation of the Disabled. In his opening address, Dr Grundy stressed that during the past two or three decades the medical profession has been concerned not only with diagnosis and treatment, but increasingly with prevention and rehabilitation. He drew the attention of the Committee to the fact that although this Committee would concern itself primarily with the medical aspects of rehabilitation of patients with cardiovascular diseases, the vocational and socio-economic aspects, including administrative and legislative implications, would also be discussed. Patients with cardiovascular diseases should as far as possible be reintegrated into society as useful and happy citizens, bearing in mind that this is of equal concern to the individual, the family and the community in which they live.

### **1. INTRODUCTION**

The whole problem of rehabilitation of patients with cardiovascular diseases is so vast and complex that the discussions of the Committee can only provide a skeleton basis for future work. There is a considerable lack of factual information, particularly with regard to the long-term prognosis of patients in relation to various factors (results of tests, return to work, etc.), and there are also controversial schools of thought with regard to scientific and technical items. Furthermore, rehabilitation is an area in which natural sciences, behavioural sciences and social sciences

meet. There are, therefore, different frames of reference into which the subject to be rehabilitated and his problems have to be fitted. This is difficult enough within the more uniform conditions in a single country, with its established cultural values and social system. It becomes extremely complicated when the task is to elaborate recommendations which should be internationally acceptable and useful. This report represents only a first attempt to summarize present knowledge, and the whole problem must be further elaborated with more precisely designed questions.

As stated in the first report of the Expert Committee on Medical Rehabilitation,<sup>1</sup> developments in rehabilitating patients with cardiovascular diseases have been somewhat slow in comparison with those with other types of disability. The same observation has also been repeatedly made by representatives of cardiological societies. It is thus important that further work should be initiated without delay. Because rehabilitation of patients with cardiovascular diseases must be an integral part of all medical work with such patients, this is not a problem for a limited number of medical specialists, but extends into the area of professional education and training of physicians and nurses, as well as non-medical personnel, such as educational, vocational and social workers, involved in rehabilitation work.

In considering the *scope of cardiovascular diseases for discussion* the Committee found it necessary to restrict itself to rheumatic heart disease, arterial hypertension, ischaemic heart disease, chronic cor pulmonale, and congenital heart diseases. Cerebral-vascular and peripheral-vascular diseases were not discussed for practical reasons.

The Committee considered the suggestion that neuro-vegetative dystonia (neuro-circulatory asthenia, or the equivalent) be also discussed. Although such subjects present to the physician symptoms suggestive of cardiovascular disease, in the strictest sense, these symptoms are not a manifestation of organic heart disease. The term, moreover, may include several separate etiological groups. For these reasons neuro-vegetative dystonia was not included for discussion. It was noted, however, that some of the procedures used in the assessment and rehabilitation of patients with organic heart disease have application to patients with neuro-vegetative dystonia.

The Committee felt that age should not be a limiting factor in regard to eligibility for rehabilitation since in the broader sense rehabilitation is not merely vocational but includes social, family and other facets. Furthermore, many subjects are near retirement age at the time they develop heart disease, and, while the goal of rehabilitation in such cases may not always be the return to competitive work, successful rehabilitation to activities of daily living may free others in the family so that they can return to work.

<sup>1</sup> *Wld Hlth Org. techn. Rep. Ser.*, 1958, **158**, 33 (Recommendation 8).

It should be recognized that all the above-mentioned cardiovascular diseases which were considered by the Committee are of a chronic nature, characterized by instability and progression, and varying in rate according to age, sex, nature and severity of the disease, environment, etc. Effective rehabilitation of these patients will require regular observation, periodic reviews and close follow-up in order that adjustments to daily living activities and to work can be made as necessary. Emphasis is therefore placed on regular functional assessment and prognostic evaluation of individual patients.

## 2. PRINCIPLES OF REHABILITATION APPLICABLE TO PATIENTS WITH CARDIOVASCULAR DISEASES

### 2.1 General considerations

The Committee agreed that a broad *definition* of rehabilitation of patients with cardiovascular diseases be adopted, accepting in essence the description given in the first report of the Expert Committee on Medical Rehabilitation<sup>1</sup> with some modifications. The Committee was of the opinion that the dignity and the right to security of patients with cardiovascular diseases is not less than that of the normal individual or individuals with other major disabilities, and that everything possible must be done to rehabilitate such patients in order to restore them to as normal a life as possible in the society in which they live.

Rehabilitation is an integral part of the total medical treatment of the sufferer from a disease, who should be treated as a whole and not as an assortment of organs. The success of rehabilitation is directly dependent upon the accuracy of medical diagnosis and the adequacy of medical treatment. The process of rehabilitation has an important preventive aspect — i.e., the prevention of further incapacity due to the primary disease, which can be equally applied to the disease-prone individual. However, for practical purposes this Committee was primarily concerned with rehabilitation aspects only.

The concept of rehabilitation should be in the physician's mind from the moment he first comes into contact with the patient. This would counteract the development of unnecessary anxiety in the patient and the deleterious effect of prolonged bed-rest with its associated deconditioning and psychological disturbances.

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<sup>1</sup> *Wld Hlth Org. techn. Rep. Ser.*, 1958, 158, 4.

The *aim* of rehabilitation is not only to restore the patient with cardiovascular disease to his previous capacity, but to develop his physical and mental functions to the optimum. This means :

- (1) to restore him to self-reliance in his daily life;
- (2) to restore him to his former work activities, or, if not possible,
- (3) to prepare him for other full-time employment compatible with his present working capacity, or, if not possible,
- (4) to prepare him for part-time or sheltered employment, or non-remunerative activities.

Regardless of the goal, attention should be directed to those physical and mental resources upon which the patient can still draw. Emphasis should therefore not be placed on the cardiovascular defect alone but on his remaining assets and their reintegration into effective dynamic action.

The provisions of the International Labour Organisation Recommendation concerning Vocational Rehabilitation of the Disabled<sup>1</sup> are compatible with the importance of recognizing that rehabilitation begins so early. They indicate that among other things, subject to medical advice, vocational rehabilitation should start at the time of medical treatment and that there should be the closest co-operation between the bodies responsible for medical and vocational rehabilitation.

One of the basic aims of rehabilitation — namely, to return the patient with cardiovascular disease to gainful and satisfying employment — is often not attainable, particularly in those countries where there is mass unemployment and where indeed even the fit and healthy cannot get gainful employment. However, with progressive social, economic and educational development it is hoped that this object will ultimately become attainable.

The Committee was fully aware that *in developing countries* the types of heart disease, the avenues and opportunities of employment, the attitude of the employer to the disabled and that of the patient to work, frequently differ from those of more developed countries.

Whereas ischaemic heart disease is by far the commonest type in the highly developed countries, rheumatic heart disease is often the predominant cardiovascular disease in many of the areas now under consideration, followed by arterial hypertension. Chronic cor pulmonale probably occurs frequently in some parts of Asia, as well as in some European countries.

In the developing countries, cardiovascular disease is often modified by associated influences such as anaemia, malnutrition, pulmonary disease,

<sup>1</sup> International Labour Office (1955) *Recommendation 99, Section VI, paragraphs 26, 27, Geneva.*

etc. Heat, humidity, dust and smoke are often constant accompaniments. Overcrowding and bad housing have undesirable effects on heart disease through increasing the incidence of respiratory infections. The chronic cardiac invalid survives for a shorter period because the services which would improve his situation are not yet available on an adequate scale. The development of improved health and medical services and improved standards of living will progressively bring the problems of degenerative heart disease and their rehabilitation more and more to the fore.

In some communities and cultures chronic illness is accepted passively, even fatalistically. There is often a shortage of medical and social workers or general social assistance. Physical rehabilitation must therefore largely depend upon the patient himself and his own incentives to return to work.

The nature, duration and peak stresses of work in these countries also differ radically from those in other parts of the world. Agriculture is still the commonest vocation, with exposure to extremes of weather and hard physical exertion.

The Committee was conscious of the efforts now being made for the control of epidemic and endemic diseases, and of the expenses involved, but believed that this should not interfere with the early adoption, where possible, of machinery for the rehabilitation of sufferers from cardiovascular disease. It applies particularly to the preservation and early *return to work of the relatively few skilled workers* in these countries.

## 2.2 Clinical aspects

The chronic and usually progressive course of the cardiovascular diseases under discussion requires that special attention be given to the possibilities of how and when to return the patient to his previous life activities and in particular to his previous employment, and also to the need for evaluating the advantages and risks of such employment for the patient as well as for his family and social environment.

The functional restoration of the patient with cardiovascular disease would depend upon the type and severity of his malady, the application of available medical and surgical procedures, and the complementary or supplementary use of all physical measures.

The advantages of physical work require special justification, and its particular character must be defined, because many patients and their families firmly believe that physical activity may immediately, or in due time, aggravate the cardiac condition. This is unlikely to be true except in some cases where the work is more strenuous than that recommended by an experienced physician for the particular type and severity of cardiovascular disease, or in certain individuals who are on the verge of cardiac decompensation. On the other hand, total inactivity of a subject far removed from retiring age is unwarranted for psychological and socio-

economic reasons, and work activity well suited to his particular status of cardiac disease is frequently less harmful and requires a smaller caloric expenditure than, say, gardening or the continuous activity of the housewife.

*Thus long medical experience has shown that work appropriate to the cardiac status results in the long run in less harm than inactivity itself, of which the psychological and socio-economic consequences may be disastrous for the family and for the community as a whole.*

However, when the question of cardiac rehabilitation is under consideration certain general characteristics of these particular patients whereby they differ from other physically handicapped persons must be borne in mind.

(1) The recognition of the importance of fear or despair as common accompaniments of a sudden heart attack. Whether obvious or not, they are always present and become manifest according to the previous psychological make-up, the threat to future security, and the attitude of the family and medical attendants.

(2) Progressive deterioration in chronic cardiovascular disease occurs at a variable rate, depending upon age, sex, etiology, anatomical severity, intercurrent infection, environment, etc. But improvements in therapeutic procedures may counteract this tendency in certain disease states, and therefore regular observation and reassessment is essential so that work requirements and environmental conditions can be modified as necessary, or rest periods provided.

The remarkable advances, including surgical intervention, in therapy of certain types of heart disease in recent years have created a difference in rehabilitation of sufferers from heart disease as compared to those with more static types of impairment.

(3) Particular account must be taken of physical conditions existing at the place of work, difficulties of transport, stairs at home or en route, emotional atmosphere at work, exposure to respiratory irritants, etc., presence or absence of work "deadlines", etc. If a cardiac sufferer is given a task in which he is happy, is not unduly hurried, and in which his employer has confidence in his ability, he can adapt himself to avoid peak stresses and learn new work techniques for accomplishing his tasks without distress. Such factors are not fully assessed by the laboratory tests of cardiac function, and the importance of a mature judgement of the physician must be emphasized in this respect.

(4) In recent years women have increasingly taken up professions which before were specific to men. However, their reactions to disease and the progress of rehabilitation may be different from those of men.



The effect of professional work on healthy and sick women has not yet been sufficiently studied. This subject could therefore be of interest for further research.

Since it must be realized that the problems of work and rehabilitation vary in different etiological types of cardiac diseases, one must refer separately to at least some of them.

### 2.2.1 *Congenital and rheumatic heart disease*

These cardiovascular diseases are usually recognized in childhood and adolescence. Therefore, the choice of an appropriate occupation, and corresponding education of both sexes, are of predominant importance.

From the medical point of view, these patients should be directed as far as possible towards doing sedentary work, intellectual work or handicraft. The years of apprenticeship should be spent in the best prevailing conditions, at a slow tempo gradually increasing to full capacity. It is better to do some work with some effort or fatigue during the apprenticeship in order to learn a "skilled" job than to do nothing for years and have then to resort to "unskilled" jobs which may be unsuitable, and will prematurely exhaust the cardiac reserves, thus leading sooner or later to a difficult situation (dependence on family, etc.).

Cardiac surgery may temporarily improve the state of many patients with congenital or rheumatic heart disease. However, only in a minority of patients with congenital heart disease can surgical intervention return the heart to normal condition for an indefinite time. The patients therefore require continued observation even after operation.

### 2.2.2 *Rheumatic heart disease in individuals beyond the age of childhood*

It is generally agreed that patients with well-compensated valvular disease of the heart are capable of normal workloads, but they become liable to break down during episodes of respiratory infection or rheumatic reactivation. For this reason they require periods of bed-rest at such times. Sufferers from aortic valve disease are frequently unusually vigorous as distinct from those with mitral valve disease, who at the early stage often complain of chronic fatigue. However, once symptoms and signs of congestive heart failure appear, e.g., gradually increasing fatigue, a change of rhythm, pulmonary thrombo-embolism, acute pulmonary oedema or left ventricular failure, the patients with aortic valve disease rarely undergo a complete restoration to their former level of cardiac reserve and have a low potential for physical rehabilitation. It is consequently desirable to reduce the demands of physical work before the first symptoms appear. Consideration must frequently be given to assistance in transportation and lighter workloads, and attempts at graduated physical reconditioning must be continuous and closely supervised.

### 2.2.3 Arterial hypertension.

The group of subjects with arterial hypertension is obviously not homogeneous, either etiologically or from the point of view of rehabilitation. The same levels of blood pressure may be found in subjects with quite dissimilar prognoses. For example, a level of 200/120 mm Hg may be found in a neurotic woman (whose arterial pressure returns to normal during sleep or a quiet period, and who years later, in spite of occasional shifts of systolic pressure to 250-260 mm Hg, has not shown signs of hypertrophy of the left ventricle on electrocardiography), and a young man whose life is in danger six months later from malignant hypertension. In respect of capacity for work (excluding those patients with arterial hypertension which can be surgically treated), it is necessary to distinguish the stages of essential hypertension as discussed in the report of an Expert Committee on Arterial Hypertension and Ischaemic Heart Disease,<sup>1</sup> which states :

- "Stage 1 High blood pressure without evidence of organic changes in the cardiovascular system.
- "Stage 2 High blood pressure with cardiovascular hypertrophy but without other evidence of organ damage.
- "Stage 3 High blood pressure with evidence of organ damage attributable to the hypertensive disease."

Stage 1 and Stage 2 patients show a significant degree of successful vocational adjustment, with no deterioration of the cardiac condition as the result of working in a suitable occupation. For patients in Stage 3, modification of work activities and/or environmental conditions may be indicated.

### 2.2.4. Ischaemic heart disease

Patients with ischaemic heart disease represent a special group because:

- (1) when doing work to which they are not adapted (or which is not suitable for them) serious consequences may follow immediately or after an interval;
- (2) violent emotion may be noxious, and stress of all types has to be taken into consideration;
- (3) work in which the risk of injury is frequent is not suitable for patients on continuous anticoagulant therapy.

On the other hand, functional restriction following the acute episode (myocardial infarction) must, of necessity, be adequately defined in order

<sup>1</sup> *Wld Hlth Org. techn. Rep. Ser.*, 1962, **231**, 7.

to guard against unforeseen accidents. If resumption of work is delayed too long for a subject with myocardial infarction of uncomplicated course, one runs the risk of a more difficult physical rehabilitation and of a disturbance of the psychic equilibrium. Physical reconditioning and occupational rehabilitation should begin within three months after the acute episode. The full working capacity possible should be aimed at within six months. The reconditioning before the occupational rehabilitation would comprise approximately three weeks in bed, three weeks of light activity in the home, and three weeks of normal everyday activity.

When it is necessary for medical reasons for a patient with ischaemic heart disease to change his former occupation, one should try to avoid the loss of several months arising from administrative formalities. Such unnecessary delay is a frequent source of discouragement to a subject who is older than 50 years of age and who, because of this, finds it very difficult to resume his former work.

#### 2.2.5. *Chronic cor pulmonale*

As mentioned in the report of an Expert Committee on Chronic Cor Pulmonale in 1960,<sup>1</sup> the prevention and treatment of cardiac complications of a pulmonary patient depend above all on the treatment of the underlying causal illness. The ability to work will depend for the most part on the functional pulmonary disturbance, and must be thus studied by the specific tests suggested in the report of that Committee.<sup>1</sup>

Physical activity in these patients markedly increases pulmonary hypertension and thus the load on the right ventricle; therefore it seems that greater restriction of physical effort in these particular patients than in other types of heart disease is desirable in order to reduce the risk of cardiac complications. Complete inactivity being inadvisable, as in other cardiovascular diseases, the judicious choice of a new occupation not demanding very strong physical effort could be of great importance in the rehabilitation of patients with chronic cor pulmonale. The determination of such an occupation can be difficult. In particular, the early diagnosis of chronic cor pulmonale is known to present problems. Tests devised for the evaluation of the working capacity of patients with cardiovascular diseases — those tests which are based on measurement of the pulse rate during exercise — are, in chronic pulmonary conditions, of less value for determining the cardiac state and the working capacity because of disturbances of the respiratory function. The ability for work should therefore be determined by experts in heart and lung diseases, taking into account all the possible factors such as infection or atmospheric conditions (temperature, dust, tobacco).<sup>1</sup>

<sup>1</sup> *Wld Hlth Org. techn. Rep. Ser.*, 1961, 213.

### 2.2.6 *Cardiomyopathies*

A heterogeneous group of cardiomyopathies, sometimes clearly defined — e.g., Chagas' disease or beri-beri — but frequently less well etiologically defined — e.g., endomyocardial fibrosis, Fiedler's myocarditis and others — include some adults with obscure hypertrophy and dilatation of the heart, with or without arrhythmias, heart block, etc. This group is usually discovered among adults who have chosen their vocation at a time when they were in full health. Sometimes their vocation is sedentary or semi-sedentary, and the necessary adaptation required by the state of the disease can be easily effected. However, when sometimes the occupation requires more physical energy, as with agricultural workers, this is incompatible with the restrictions imposed by this type of heart disease. In some areas (South America and Africa) the prevalence of certain types of cardiomyopathies reaches an unusually high level, but such patients usually take a rapidly downhill course and are unfit for any form of physical rehabilitation even if the necessary services for rehabilitation were available.

### 2.2.7 *Neuro-vegetative disturbances*

These are very special groups of patients because they are not true cardiacs and their impaired functional ability does not affect their life expectancy. In the majority of these subjects more physical activity is desirable. However, the patient should not be overloaded with disproportionate work at the beginning, and physical activity should be slowly increased. Psychotherapy is, of course, of particular importance. Gradual improvement in functional tests may in itself have a useful additional psychotherapeutic effect.

## 2.3 *Physiological aspects*

In assessing the working activity and capacity for work of patients with cardiovascular diseases, several factors have to be taken into account. The fitness of a cardiac patient for work varies with the type and severity of the disease, age, sex, previous experience and training as well as mental adjustment and attitude to the disease and to work. It can be assessed (1) by a rough clinical evaluation of working capacity, separating those who are completely fit on the one hand from those with varying degrees of cardiac reserve and those with cardiac failure, and (2) by an actual measurement of working capacity.

Functional classification of the New York Heart Association<sup>1</sup> has frequently been used in practice, and has been shown to have a good correlation with the measured physical fitness.

<sup>1</sup> New York Heart Association Inc., Criteria Committee (1955) *Nomenclature and criteria for diseases of the heart and blood vessels*, 5th ed., New York.

## MEAN ENERGY EXPENDITURE ACCORDING TO ACTIVITY

(kcal/minute) \*

Activity	kcal/minute **
1. Sleeping .....	0.8-1.2
2. Awake, lying at ease .....	0.9-1.3
3. Certain daily living activities	
A. Toilet—washing, dressing, shaving .....	2.3-4.0
B. Sitting at ease .....	1.6
C. Standing at ease .....	1.7-1.9
4. Exercise	
A. Walking on level at 3 km/hr .....	2.9-3.5
B. Walking uphill (5% grade) at 3 km/hr .....	4.5
C. Walking upstairs .....	8.4-9.3
D. Cycling .....	6.6
E. Swimming (breast stroke) .....	5.0-7.5
F. Ski-ing (cross-country) .....	9.9-15.9
5. Occupation	
A. Clerical work .....	1.2-2.5
B. Domestic work	
Light (bootblack, etc.) .....	2.2-2.4
Medium (window-cleaning, etc.) .....	3.0-3.5
Heavy (gardening, etc.) .....	3.8-5.6
C. Industrial work	
Light machine work, etc. ....	1.6-2.4
Sheetmetal work, etc. ....	2.1-3.9
Loading, unloading, etc. ....	3.6-6.8
D. Agricultural work .....	3.3-6.9
E. Heavy manual labour (digging, etc.) .....	5.5-10.5

\* Figures taken from those quoted by Passmore & Durnin.<sup>1</sup>\*\* Adult male standardized to 1.8 m<sup>2</sup> body surface area.

As these figures represent data from several studies by different investigators they are not strictly comparable and serve only to illustrate a range of energy expenditure figures.

Measurements of caloric requirements of many human activities have been made and are available <sup>1</sup> (see table). Requirements for a given type of activity seem to be of the same order for cardiacs as for other subjects. Any work activity can be assessed by analysing the work performed and energy expended for it in a defined environmental situation (temperature, humidity, dust, noise, etc.) (see page 21). The reaction of the subject is, of course, influenced by his mental attitude as discussed below.

## 2.4 Psychological aspects

Psychological reactions are an integral accompaniment of heart disease and are frequently the most important determinant of successful

<sup>1</sup> Passmore, R. & Durnin, J. V. G. A. (1955) Human energy expenditure. *Physiol. Rev.* 35, No. 4, 801-839.

rehabilitation. This is the reason why the question is dealt with at some length in this report.

The psychological condition of the patient with cardiovascular disease is the result of a set of factors operating before, during and after the development of cardiovascular disease and having an influence of varying significance on the end result.<sup>1</sup> These factors are:

- (1) *duration and age of onset of cardiovascular disease*;
- (2) *condition before the development of cardiovascular disease*:
  - (a) the patient's pre-morbid personality and psychological status;
  - (b) the patient's previous physical condition;
  - (c) cultural patterns of emotional expression;
- (3) *condition after the development of cardiovascular disease*:
  - (a) characteristics of the cardiovascular disease:
    - type and severity of cardiovascular dysfunction (congestive failure, pulmonary oedema, angina pectoris and arrhythmias);
    - clinical course, response to therapy, specificity of therapy and development of new methods of treatment;
  - (b) attitude of attending physician, nurses and other members of the health team;
  - (c) the patient's understanding and acceptance of illness and its implications for the future;
  - (d) social situation:
    - family and friends;
    - work situation (attitude of employer and fellow workers);
    - the time interval between disability and rehabilitation;
    - prevailing laws and social attitudes, and economic status.

#### 2.4.1 *Duration and age of onset of cardiovascular diseases*

Cardiovascular diseases manifested in early childhood, such as congenital and rheumatic heart diseases, may impair mental as well as physical development. The emotional maturity of such subjects may not be disturbed, or it may be retarded and result in excessive dependency and passivity due to physical inferiority and inability to participate in normal childhood activity. Failure to provide suitable educational opportunities, including technical education, may impose further difficulties.

The development of the same degree of cardiovascular impairment later in life, for instance, just before retirement, may have catastrophic effects or may have a much lesser consequence owing to previous full and successful life experiences.

<sup>1</sup> *Wld Hlth Org. techn. Rep. Ser.*, 1958, 158.

#### 2.4.2 *Condition before the development of cardiovascular disease*

(1) *The patient's personality and psychological status prior to his or her illness.* This involves intellectual factors, emotional maturity, stability, type of motivation and temperament. The development of significant cardiovascular dysfunction and the attendant changes in life pattern may produce a situation too complex and frustrating for the patient to accept. Emotional instability and intolerance of frustrations and restrictions may influence a patient's capacity for the adjustment to the impairment. Prolonged hospitalization of patients with underlying emotional immaturity and neuroses also may result in increasing dependancy and lead to depression. The enforced passivity during acute and chronic illnesses may be distasteful and unacceptable, resulting in a regression towards childish behaviour, or a denial of the presence of illness with consequent hostility and aggression.

In some people with maladjustments in the past (personal, family and social conflicts, psychosomatic illnesses, alcoholism, divorce, etc.), the onset of disease may be a partial solution of a conflicting situation, or even a welcome development.

(2) *The patient's physical condition.* Adjustment to cardiovascular impairment will be affected by the past physical condition and level of function and the physical condition after the development of heart disease. The magnitude of the loss of function and the fear of recurrence and sudden death will naturally affect the patient's psychological reaction to his physical disability.

#### 2.4.3 *Condition after the development of cardiovascular disease*

##### (1) *Characteristics of the cardiovascular disease.*

(a) *Type and severity of cardiovascular dysfunction.* The varied symptom complexes associated with congestive failure, pulmonary oedema, angina pectoris and arrhythmia may elicit different psychological effects, e.g., pain, sense of impending death, etc. The psychological adjustment may be disproportionate to the reduction of the total capacity and reserve of the cardiovascular system, especially when the patient is unable to retain his previous position in society.

(b) *The length of the hospital stay, the clinical course of the heart disease (exacerbations, remissions, relapses) and response to treatment.* The specificity and satisfactory response to therapy have a positive psychological effect. Alternatively, the lack of specific treatment or the absence of any treatment may contribute to despair and

depression. The possibility of the development of new methods of treatment may offer hope to patients with slowly progressive diseases.

(2) *Attitude of attending physicians and other members of the health team.* Psychological problems may originate from the attitude, remarks or even silence of the first attending physician who comes into contact with the patient. Other members of the health team, including nurses and laboratory technicians, may unwittingly play a similar role. Emotional disability often arises from lack of communication or latent or overt tension between the patient and his physician. The patient's contribution to iatrogenic disability may be considerable. There may be purposeful misinterpretation of the physician's remarks or advice in order to fulfil what the patient wishes to hear. Heart disease may provide a fulfilment of the patient's pre-illness basic needs—for example, an excuse to withdraw or flee from life's demands. However, the physician's shortcomings may be more important. The physician or other members of the health team, such as nurses, technicians, etc., may be unwittingly careless in words, attitudes and management, and thus contribute further to the disability. The physician may restrict the patient unnecessarily or misinterpret or place undue emphasis on the results of isolated laboratory procedures.

The physician can prevent or minimize the future disability due to fear by presenting a positive, realistic and hopeful attitude, based upon the knowledge that most patients do recover from acute episodes of infarction and heart failure and then live a useful and happy life. The physician can help the patient to develop insight into his disease and encourage an attitude of active co-operation in future rehabilitation. The rationale of such care as rest, diet control, and cardiac medication should be presented to the patient in suitable terms. During the process of education of the patient and his family an optimistic attitude should be maintained. The physician should encourage the patient to talk, think and act constructively about his illness and to participate actively in his own rehabilitation. The rationale of temporary restrictions of physical activity should be explained, and the great capacity of the heart to recover should be stressed. If the patient has rheumatic heart disease the nature of the rheumatic process and the importance and feasibility of controlling streptococcal infections and rheumatic recurrences should be discussed. In other heart disease the benefits of control of weight, diet, tranquillity, activity and happiness should be explained if necessary. Throughout the illness the emotional status of the patient should be continually re-evaluated. The patient may conceive of himself as being more severely incapacitated than he really is. This misconception should be sought out and corrected. As the patient successfully increases his physical activity, the need for psychological support may diminish. Usually this need is fulfilled by the attend-



ing physician but in a small number of cases the physician may solicit additional help from psychiatrists.

(3) *The patient's actual psychological situation.* The patient's understanding and acceptance of his illness may vary during the clinical course and be modified by an interreaction of the factors mentioned above. In addition, his psychological reactions may show exacerbations and remissions during the acute or initial episode, when he may be temporarily overwhelmed and depressed. During the convalescent period in the hospital or on return to home the full impact of the illness on the patient often suddenly becomes apparent. Psychopathogenic effects of heart disease may suddenly appear in the form of anxiety, depression with anxiety, regression, paranoid reactions, hypochondriasis, dependency or denial of illness. Physicians and nurses particularly should be aware of the frequency of these reactions in order to deal adequately with them. It should be emphasized that there is not necessarily any correlation between the onset and severity of psychological symptoms and the degree of the organic disease. Thus, during convalescence, when healing is proceeding uneventfully, psychological effects may become more apparent or indeed may reappear during the work adjustment phase. On the other hand, many neurotic complaints may subside as congestive failure increases.

Chronic heart disease is usually considered to be relentlessly progressive with age, and therefore the patient often considers that his illness is not stationary, but continuing. Unlike an injury to the heart, the physical loss of a part of the body, such as a limb, has a different significance because it can be replaced. The physician can emphasize that progress in understanding the pathogenesis of heart disease and the development of new forms of treatment are steadily making it possible to halt, reverse, or cure specific impairments in spite of their progressive nature.

The fear of permanent invalidism with economic and physical dependency varies in different social cultures. The universal fear of death is difficult to dispel.

(4) *Social situation.*

(a) *Family and friends.* The stability of the social situation, and especially of the family group, in which the patient lives can affect the psychological reaction considerably. Even neurotic individuals can adjust to severe cardiac impairment if they are constantly integrated in a strong, supportive, reasonable but not over-protective, healthy family structure, which accepts and understands the illness. Long hospitalization and the development of heart disease *per se* may make the patient more egocentric and the family and friends more willing to react to his demands. This in turn may lead to a decrease in outside interests and to accentuation of dominance, irritability, intolerance and preoccupation.

The loss of income and the presence of financial obligations may endanger the survival of the family group and enhance psychological problems. The loss of the role of breadwinner in a family and the assumption of this role by the wife or relatives may have psychological connotations in one society, but not in another where the family system provides for mutual care without loss of status.

The economic problems also may depend upon the existence of disability insurance and other programmes of social assistance.

(b) *Work situation.* The reaction in the community to the patient's heart disease may affect the patient to a much greater extent than is usually realized. A strongly negative, pessimistic attitude towards cardiovascular disease and to those disabled by it is well known. It may be reflected by the reluctance of some employers to allow the cardiac to return to work, or to make the necessary work adjustments. The pessimistic attitude may explain the lack of acceptance of the cardiac by his fellow workers. This is unwarranted in view of the well-documented safe and productive performance of properly placed cardiac workers.

(c) *The time interval between disability and rehabilitation.* The time interval between the onset of cardiovascular disease and the return to work has a vital influence on the psychological adjustment. *If this period is long, the psychological reactions are likely to increase considerably* and it is more unlikely that the individual will be returned to working activity satisfactorily.

(d) *Prevailing laws and economic status of the community.* The prevailing economic structure, national and personal attitude towards work and retirement, the degree of general unemployment and the prevailing laws dealing with the disabled, and particularly the cardiacs, may favour or retard the likelihood of return to gainful work and thus have a potent psychological impact. Financial need is one of the major incentives for an early return to work.

However, if life in retirement is socially, economically and psychologically satisfactory and acceptable within certain cultures, a person having a life-expectancy less than that of the normal population — as is true of many middle-aged or older cardiac patients — may feel deprived of a human right, if he is forced to work for so long that he may eventually not get time to enjoy the possibilities of cultivating private interests and the leisure time offered by retirement. This aspect must not be forgotten in some so-called affluent societies, with a high potential of productivity, in which one of the foreseeable social problems may be increasing difficulties in providing opportunities for so-called gainful employment.

The psychological assessment should include assessing the mental capacity, the emotional stability, temperamental factors and motivational forces. The factors relating to emotional stability have a dominating influence on the prognosis of the rehabilitation process.

Repeated reassessment of the patient's psychological situation might be useful in enabling a larger choice of therapeutic measures to be applied. The rehabilitation process might be further developed when it is found that the patient's emotional balance has been restored and his ability to deal with his symptoms more rationally is increased. In such a situation even more complex occupational training schemes might be introduced. The final aim of psychotherapy includes the reduction of emotional tension, and the gaining of an insight into, and a realistic acceptance of, the impairment.

## **2.5 Vocational and socio-economic aspects**

The problems of employing patients with cardiovascular diseases are comparable to those of subjects with other chronic progressive diseases or disabilities.

The basic purpose of *pre-employment examinations* of subjects with cardiovascular diseases should be to assist in the selective placement in a specific job. Each job should be evaluated for its actual requirements in order to make it possible to match the abilities of the individual subjects, and to allow for their limitations.

*Pension, compensation and disability insurance plans* may modify the rate and the need for vocational rehabilitation. A pension should be granted only after skilled cardiological appraisal and realistic attempts at vocational rehabilitation have been made. To enhance work motivation, it is suggested that workmen's compensation laws and disability insurance plans in general should be modified to make provision for active early rehabilitation. Such changes have already been introduced in some countries.

Jobs cannot be categorized as being "cardiac" jobs. Instead they should be characterized by their requirements. There are numerous jobs whose requirements are well within the capacity of most subjects with cardiovascular diseases. For subjects in a more advanced stage of these maladies, special provisions may be required to reduce the work quota or to provide placement in sheltered workshops, the products of which should be commercially valuable whenever possible.

Very careful consideration, however, should be given to the recommendation of employment of certain cardiacs in jobs where loss of consciousness or sudden physical weakness would endanger others as well as themselves, e.g., in public transport.

The *work requirements* of individual jobs with the same title must be

defined individually since they vary in different countries, or in different works in the same countries.

The *risk* should be considered not only from the standpoint of the subject with cardiovascular disease and his fellow workers but also from that of his employer.

The risk to the employer of a known cardiac, if correctly placed, is comparable to the employment of subjects without heart disease. Evidence has been presented that the productivity, safety record, and absenteeism of cardiacs are comparable with those of subjects without cardiovascular diseases.

In some countries or places of work the lower life expectancy or shorter "active" life of some cardiac patients may be of little importance to the employer (or to fellow workers). In these situations it means a less effective investment. Governmental agencies often refuse to employ persons with cardiovascular disease, probably for the reason that they are ineligible for the usual retirement benefits. However, public agencies which might otherwise have to pay social security benefits to these patients should be particularly encouraged to accept cardiac patients even in cases where a somewhat shorter period of active work is anticipated.

*Periodic revaluation* of the requirements of the job and the capabilities of the individual subjects are advised, in order to ensure continued proper selective placement. Changes in the work design may be necessary in order to eliminate high peak-levels of activity.

From a *technical and administrative* point of view vocational rehabilitation should take into consideration such conditions as :

- (1) clinical examination and evaluation carried out, where necessary and if possible, by specialist cardiologist(s) and/or specialized cardiac assessment/evaluation clinics;
- (2) avoidance of all unnecessary risks to the patient, the employer and fellow workers;
- (3) selection of work commensurate with ascertained physical condition, remaining physical capabilities, intellectual and educational level, aptitudes and wishes of the patient;
- (4) the realistic possibilities of employment on the employment market;
- (5) avoidance of unnecessary strain, effort, fatigue, etc., by such means as :
  - (a) improvement or adjustment of the workplace, tools and equipment, etc.
  - (b) improved siting of the workplace in relation to other facilities used by the disabled person in the employing establishment;

(c) reduction as far as possible of long journeys to and from work, especially at rush hours;

(6) the aim should be to return the patient to working life in the following priority order:

(a) to restore him to his former work with the same employer in the same job;

(b) to restore him to his former employer in a different/modified capacity;

(c) to place him with another employer in the same kind of work or similar or related work;

(d) to place him — with or without vocational training — in a quite different occupation;

(e) to place him in special working conditions, such as sheltered employment, a work co-operative, etc.;

(f) to find him some useful activity, if necessary on a part-time basis;

(7) facilities should be available to all cardiovascular patients, whatever their age, provided they can be prepared for and have reasonable prospects of receiving and retaining suitable employment.

### 3. ASSESSMENT OF WORK CAPACITY OF PATIENTS WITH CARDIOVASCULAR DISEASES

#### 3.1 Evaluation of physical ability

##### 3.1.1 *Clinical approach*

During all stages of the illness of the patient with cardiovascular disease, and particularly during the adjustment period for return to his ordinary life, the attending physician is faced with the need to evaluate the individual patient's cardiovascular functional status. The assessment of his work capacity and work recommendations are based primarily upon clinical skills and mature judgement, combined with common sense, but should be supplemented by laboratory evaluation. Whenever feasible, observations and measurements should be made at work and during leisure activities.

*A careful medical history is the principal clinical criterion of cardiac reserve, but its usefulness is limited by its subjectivity. Simple objective criteria are available today to judge the degree of a patient's recovery and his ability to work. A patient's ability to perform ordinary home activities*

asymptomatically can be compared to the known energy cost of a wide range of activities in various occupations.

Measurement of the energy cost of many human activities have been made and are readily available.<sup>1</sup> Several examples may be cited. The energy cost of basal activity such as sitting or lying is approximately 1.25 calories per minute, a calorie-equivalent of oxygen being 4.8-5.0 calories per litre. A patient convalescing from acute myocardial infarction, who is able to wash and dress, uses approximately 3 calories per minute: to garden, to sit and to walk around the residence requires about twice as much. He may, therefore, be expending as much energy in this way as he would at work in clerical professions and in certain mechanized industrial jobs in highly industrialized countries. Recognition on the part of the physician of the relatively high cost of simple, ordinary, daily activities of living may encourage him to advise the patient to resume work without fear of overtaxing the patient's heart. It should be remembered, however, that many industrial and agricultural jobs are not mechanized, and demand hard physical labour, especially in less developed countries, and therefore caution is necessary.

### 3.1.2 *Limitations of the clinical approach*

The patient's history provides a subjective measurement of function and physical fitness, which is coloured by his psychological responses, work motivation, social circumstances, pain threshold or need to deny pain. Anxiety itself may increase cardiac output and reduce exercise tolerance. Nevertheless, evidence was presented that in approximately 70%-80% of cases there was a correlation between clinical evaluation of the functional state (based on history, physical examination, X-ray of the chest, resting electrocardiogram, and expressed according to the classification of the New York Heart Association<sup>2</sup>) and objective functional assessment. In addition this functional classification correlates also with physical fitness, with estimated work energy expenditure and with prognosis. The accuracy of the clinical evaluation is reduced by inadequate history, by failure to evaluate the patient's emotional status, or by excessive limitation of physical activity (caused by the patient or on the advice of his physician).

### 3.1.3 *Measurement of the functional ability using exercise tests*

Although the above correlations exist, functional assessment is valuable in obtaining an objective measure of physical fitness and of the cardiac reserve. Physical fitness is defined as the capacity to perform satisfactorily

<sup>1</sup> Passmore, R. & Durnin, J. V. G. A. (1955) Human energy expenditure. *Physiol. Rev.*, **35**, No. 4, 801-839.

<sup>2</sup> New York Heart Association Inc., Criteria Committee (1955) *Nomenclature and criteria for diagnosis of diseases of the heart and blood vessels*, 5th ed., New York.

certain muscular efforts. For many subjects the clinical functional evaluation suffices, and physical fitness (exercise) tests may not be necessary. This is particularly applicable to subjects who perform clerical and other low-energy demand jobs, and whose clinical evaluation indicates an adequate cardiac reserve.

Exercise tests do not in any case replace the necessity for clinical judgement, but provide supplementary information. They may be performed for a variety of reasons. *The primary purpose of an exercise test is to determine the response of the individual to efforts at given levels, and from this information to estimate probable performance in specific life and occupational situations.* By periodic application of the same test it is possible to evaluate changes in the functional status of the individual patient and the results of prescribed work and medical management. Exercise tests have also been used to provide a basis for prognosis as to the probable future course of the disease, and to aid in the diagnosis of its kind and degree. The psychological reassurance many patients obtain from the successful performance of exercise tests, although of value, is a secondary and not primary purpose. Tests may facilitate the steering of the patient along a course closer to that of his full potentialities than is possible by the mere clinical assessment of his functions. Furthermore, properly conducted tests may confirm, modify or reject the clinical conclusions and have usefulness in detecting the malingerer.

#### 3.1.4 *Limitations of exercise tests*

It should be recognized that the same factors that influence the clinical evaluation of function pertain in the laboratory evaluation. These factors, apart from the heart disease itself, include emotions, motivation, effects of environment, loss of physical training due to illness, reduction of physical mobility of various parts of the body, e.g., shoulder-hand syndrome, ingestion of foods, etc. Such limiting factors should be recognized and taken into account in making a final judgement. The electrocardiogram, blood lactate and heart rate response to the various exercise tests are not specific for heart disease of any given etiology. Similar changes to those consistent with ischaemic heart disease can occur in subjects with neuro-circulatory asthenia, or following the administration of digitalis, acetylcholine, or catecholamines; in persons with marked physical deterioration and lack of physical training; and in persons with emotional stress. Nevertheless, despite the non-specific nature of the response, there is good mortality and morbidity correlation with the response to exercise tests. Normal respondents to exercise tests have a lower morbidity and mortality rate than those who respond in an abnormal way.

Contraindications to the performance of exercise tests include diastolic blood pressure over 110 mm Hg, frequent angina on effort and angina

decubitus, congestive heart failure, evidence of impending or recent myocardial infarction, certain arrhythmias, and active carditis. Tests using maximal effort, which are commonly used by sports physiologists, are generally contraindicated for most patients with heart disease, especially those with myocardial infarction or significant valvular lesions. To ensure the safety of the test, a physician should always be in attendance and should discontinue the test at the first appearance of dizziness, chest pain, claudication, venous distention, premature beats, excessive tachycardia or bradycardia for a given workload, atrio-ventricular block, hypotension or respiratory distress.

### 3.1.5 Types of exercise tests

A good test of function must be safe, simple, require no special training and minimal equipment, and should have realistic energy requirements comparable to that of contemplated activities. The results of tests should be reproducible. Preferably there should be provision for testing several functional parameters and for synthesis of their changes with the total clinical picture.

Many exercise tests have been developed in the past, the design and interpretation varying with the original purpose of the test.<sup>1-3</sup> Although they have been used for many years in different countries and laboratories, there is at present not one simple exercise test which has been proved to be so satisfactory as to merit a recommendation for general adoption. It is generally agreed that it would be most desirable to have at least one test that could be used in precisely the same manner by many laboratories so as to provide a reference standard for comparison between laboratories.

Most of the clinical exercise tests have been designed primarily for the purpose of establishing a diagnosis of etiology, such as coronary insufficiency. Usually these tests have been of brief duration, insufficient to allow an evaluation of the attainment of a steady state, and have been found inadequate for a reliable assessment of physical fitness. Single-level peak-effort (non-steady state) tests are predictive of maximal or submaximal work capacity. Tests of vasomotor tone, which involve tilting, etc., of the patient, are very sensitive to psychic factors and probably reflect vasomotor regulatory function more than fitness for physical work.

The steady-state multi-level exercise tests which have traditionally

<sup>1</sup> Rosenbaum, F. J. & Belknap, E. L., ed. (1959) *Work and the heart* (93 authors). *Transactions of the First Wisconsin Conference on Work and the Heart*, New York, Hoeber.

<sup>2</sup> Taylor, H. L., Wang, Y., Rowell, L. & Blomqvist, G. (1963) The standardization and interpretation of submaximal and maximal tests of working capacity. *J. Pediat.*, **32**, 703.

<sup>3</sup> Denolin, H., Messin R. & De Coster, A. (1963) Les épreuves fonctionnelles en cardiologie. *Revue des Séminaires Belges de Réadaptation*, **5**, 1-19.



been used predominantly by physiologists are being used more extensively for clinical evaluation of cardiac subjects. They involve usually the use of steps, bicycle ergometer, treadmill or crank.

The *maximal oxygen work capacity* (aerobic capacity) can be estimated by extrapolating from the heart-rate responses, at several work-loads of submaximal magnitude, sufficient to attain a heart rate of 120-150 per minute. The extrapolation of the heart rate at a submaximal work-load to a near maximal rate, for example 170 beats per minute, is not considered to be advisable in cardiac subjects. The usual functional interrelationship between work-load and heart rate may be somewhat modified by medication, changes in heart rhythm, etc. (Thus for cardiac subjects it may be misleading to extrapolate to a maximal aerobic work-level corresponding to a near-maximal heart rate of, for example, 170 beats per minute).

Also, it has been found valuable to determine the work-load and its caloric equivalent at which a subject develops a heart rate of a given magnitude — say, 150 per minute — or electrocardiographic changes (ST-T displacement consistent with coronary insufficiency) and to compare this work-load for different patients with that of normal persons, and of the same patient at different times in the clinical course. The physical work capacity 150 (PWC/150), for example, is the steady-state work-load at which the subject reaches 150 beats per minute (see Fig.1).

Generally the submaximal work-load is sufficiently great when the heart rate is higher than 120 and less than 150 beats per minute for four to six minutes of steady-state exercise. If the work-load is too small, psychological factors may influence the heart rate and thus the result of the test. If the work-load is too heavy the subject may feel stressed and the test may be dependent upon the subject's will to co-operate. Particularly in cardiac subjects, over-loading of the circulation should be avoided.

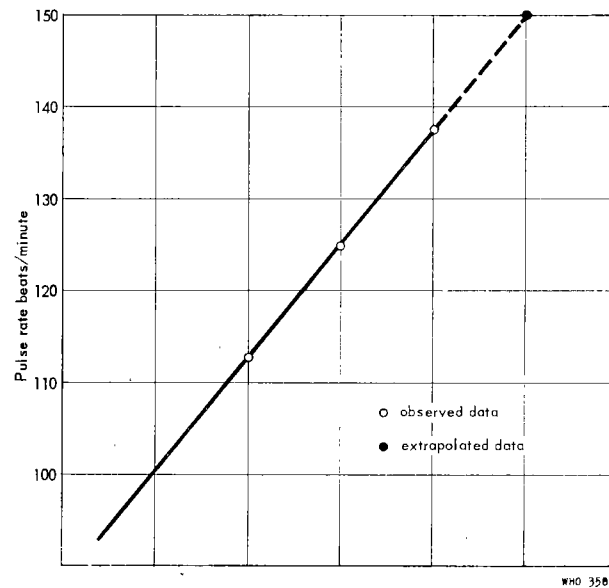
Although not as precise in cardiac subjects as in normal subjects, the estimated maximal oxygen consumption has proved valuable clinically. The allowable sustained work-level for normal subjects is considered to be 50% of the estimated maximal oxygen consumption. For subjects with heart disease a smaller amount is considered allowable, approximately 40%. This can be estimated in a simple fashion, e.g., for a subject whose calculated maximal oxygen-consumption amounts to 10 calories an average sustained work-load of 4 calories per minute would be allowed. The energy requirement of his work can be estimated from published data <sup>1</sup> on work-energy requirement, and it can be determined whether this is within the individual's capacity.

With steady-state multi-level exercise tests it is possible to evaluate the physical ability of a cardiac patient by submitting him to submaximal

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<sup>1</sup> Passmore, R. & Durnin, J. V. G. A. (1955) Human energy expenditure. *Physiol. Rev.*, **35**, No. 4, 801-839.

FIG. 1. PULSE RATE AND WORK-LOAD



Kilogram metres per minute .....	150	300	450	600	750	900
Watts .....	25	50	75	100	125	150
VO <sub>2</sub> ml/minute .....	400	800	1200	1600	2000	2400
+ calories .....	2	4	6	8	10	12

The chart expresses schematically the relationship between the physical work capacity (PWC) at the pulse rate of 150 per minute (by extrapolation) (PWC = 150) and the actual work-load and its oxygen and caloric requirements.

work-loads whose caloric equivalent can be compared with those of his daily activities at home and during work.

In clinical application measurement of the heart rate, blood pressure and electrocardiograms before and during exercise and during a recovery period has been found valuable — that is, the product of the heart rate and the systolic blood pressure can give an approximate measure of the myocardial oxygen need. Judgement of a patient's ability to perform should be supplemented by clinical observations of the usual signs of circulatory insufficiency and embarrassment. Where facilities are available a more exact picture of circulatory function may be obtained by measurement of other functional parameters, such as oxygen consumption, oxygen debt, cardiac output, blood lactate and pyruvate and other chemical determinations.

### 3.1.6 Application of exercise tests

Although laboratory measurements provide much useful information they should be used to supplement and not to supplant clinical judgement.

Their application becomes meaningful only if related to the requirements of the world in which the patient lives, works and plays. These exercise tests provide a measure of physical fitness but do not purport to account for the emotional and environmental factors which may prevent successful rehabilitation. Furthermore, there are limitations to all studies of function. The various tests do not measure over-all lifetime reserves, and do not predict the effect of the interplay of disease processes, emotional stresses and the environment. *A test performed but once cannot determine how long a specific work-load can be tolerated by a given individual for months or years. For this reason periodic re-testing is recommended.*

Despite the above shortcomings of exercise tests, successful matching of the patient's physical and emotional capabilities with the requirement of work is usually possible.

*No substitute exists for the close and skilled observation of the worker during and after his day's work.* Such observations, supplemented by information from co-workers, industrial plant physicians, relatives, etc., should be made soon after the return of the subject to work and periodically thereafter (see section 3.1.7).

While judgement of the experienced physician is usually adequate, controlled observations have shown him to be in error in about a fifth of patients so assessed. It is obvious that laboratory tests of cardiac function and reserve are helpful and complementary to his opinion. Whenever possible, the physician should become familiar with exercise tests and build up his own experience and the interpretation of the evidence they provide.

Only in a limited number of countries so far do special centres exist for functional testing. The natural development would be to build up centres of clinical work-physiology in connexion with hospitals or special assessment centres. Such a development might be enhanced if WHO and cardiological societies would try to arrive at a better standardization of principles and procedures within this field — a task which is long overdue, and in which WHO could make a useful contribution by taking an initiative.

### 3.1.7 *Evaluation of physical ability at the place of work*

Evaluation of proper placement can be sought in (1) objective physiological measurements, (2) signs and symptoms during and after work (particularly fatigue), (3) emotional adjustment, and (4) work record (productivity, safety and absenteeism). Such observations of the patient supplement those made in the clinic and laboratory and reflect more realistically the patient's reaction to his total environment.

A number of studies of normal and cardiac subjects at work have been undertaken and multiple parameters have been measured, including pulse rate, blood pressure, respiratory rate, minute volume, energy expenditure, electrocardiogram, blood lipids, lactic acid and pyruvates, and changes

in blood coagulation and viscosity. From this type of study many physiological responses to the various grades of work have been characterized. Modern techniques are currently being developed to allow the monitoring of the subject to take place unencumbered by apparatus. This includes such equipment as radio transmitters, electromagnetic tape recorders and other telemetering devices. Their use is at present reserved mainly for research purposes.

Physiological measurements at a practical clinical level can be simple and informative, such as the pulse rate during 15-30 seconds of each minute following specific activities at work. The lengthening of the recovery period, elevation of pulse rate for the same effort and environment during the work day and at the end of work, and a rising level of the resting pulse indicate cumulative fatigue. The blood pressure and respiratory rate provide other simple, useful parameters. Various criteria have been used to indicate a disproportionate response to work — i.e., a rising resting pulse above 100 per minute, prolonged pulse recovery, peak pulse rate above 130 per minute in low caloric work, peak pulse rate above 150 per minute in work involving the expenditure of four to six calories a minute, an increase in diastolic pressure to levels of 120-130 mm Hg, increasing fatigue persisting through non-working hours, and increasing cardiac symptoms at work and at home.

*The energy cost of non-work activities* may be considerable, and may exceed the requirements of work, particularly for sedentary workers. Participation in active recreational activities such as gardening, games and household work including carpentry, repairs, etc., may exceed the caloric requirements of work. For persons with limited cardiac reserve it may be necessary to restrict such desirable activities in order that the subject can continue in his gainful employment.

### 3.2 Evaluation of factors relating to work

The requirements of any work activity can be analysed in terms of its physical requirements, environmental stimuli, mental and intellectual level and the body's physiological responses thereto. Both the requirements of the job and the reactions to the activity can be measured quantitatively and qualitatively. The external work performed can be expressed in kilogram metres, watts, kilopond<sup>1</sup> metres, etc., compared with the energy expended by the subject in terms of oxygen consumed or calories.

#### 3.2.1 Design of work

The pattern of activity can be described in terms of pace (fast or slow) or rhythm of levels of energy expenditure (peak versus steady) and the

<sup>1</sup> Kilopond, also known as "kilogram-force", is the force acting on a mass of 1 kg at normal acceleration of gravity.

adequacy of rest periods interspersed to permit physiological recovery and prevent accumulated fatigue. Provision for proper rest periods is particularly important for certain cardiac subjects.

An activity may require a stationary posture of vertical or horizontal position. Whenever possible, comfortable seats should be used. Weight-carrying or -lifting may vary in amount, height, level or method (yoke, hand, levers, hoist). Dexterity co-ordination and certain postures and motions require static or dynamic use of large or small muscle masses. Rapid, fine motions of the arms or hands are lower in energy cost but are more fatiguing than movements of groups of large muscles. Mechanization and automation have reduced the energy costs of some jobs so that they may require no more than three times the average resting oxygen uptake, i.e., three calories per minute. However, without mechanization and automation the energy requirements of similar jobs may be several times higher. The requirements of bending, stooping and climbing may be of particular significance to the cardiacs with tendencies to syncope, such as those with sensitive carotid sinus and aortic valve heart disease.

### 3.2.2 *Environmental stimuli*

Control of the environment is particularly important and enhances the work capacity of both normal and cardiac subjects with resultant improvement in productivity as well as well-being. In some industries and agriculture heat is probably the most important environmental stimulus. Measurement of air speed, relative humidity, radiant heat and energy costs may be plotted on nomograms and quantitated as units of heat stress. Heat stress gives rise to two primary physiological consequences which are directly operative for the removal of body heat:

- (1) a marked increase in skin circulation with augmented cardiac work due to increased cardiac output and higher working and recovery pulse;
- (2) production of sweat.

The combination of heat and humidity with an associated calorie expenditure is often sufficient to precipitate or aggravate congestive heart failure. On the other hand, measures to diminish the heat stress, such as the use of protective clothing and rest pauses in controlled air movement, reduce considerably the physiological cost and makes most jobs in such areas feasible for people with a restricted work capacity. Other environmental factors which may influence the circulatory system include noise, mechanical vibration from tools, tractor seats, etc., toxic substances or contaminants, dust, smoke and fumes, which are particularly noxious to patients with chronic respiratory infections and cor pulmonale, and patients with pulmonary congestion.

### 3.2.3 *Other factors*

The transportation requirements to and from work — particularly the use of crowded subways, stairs and ramps, long distances between residence and places of work, or long distances between parking areas and the place of work — may impose a greater load upon the circulation than does the work itself. In selected instances arrangements can be made for special parking privileges, or change in job or domicile to reduce transportation problems.

Arrangements for proper meals at work are important, particularly for cardiacs who may require special arrangements for specific diets such as low sodium, etc. It may be preferable, where permissible, for some subjects to eat their meals on the premises to avoid the necessity of going long distances to and from work for the mid-day meal.

The duration of the working shift and the time of the shift are important. The rotation of shifts entails difficulties in personal, familial, and marital adjustments, as well as adjustment in the rhythmic functions of the body, particularly digestion. Rotating shifts impose a non-specific stress. Night shifts are usually unacceptable for most people for long periods of time for social and psychological reasons.

Non-work activities play an important role in determining the work capacity. Adequate arrangements should be made for sufficient rest, and the home should be conducive to sleep and tranquillity.

### 3.2.4 *Psychological environment*

The general atmosphere, the attitude of fellow workers who may not understand the work limitations of the cardiac who has a non-visible disability, interpersonal relationships, deadlines in decisions and judgments, and other factors may constitute a greater load than the energy requirements of the job. The response in general to the emotional milieu depends more upon the primary personality and the adjustment than upon the requirements of the work itself.

### 3.2.5 *Educational background*

The educational background, type of general education and basic intelligence influence the choice of vocation and are important determinants of the ease with which an alternative choice of vocation can be made effectively.

### 3.2.6 *Changing requirements of work*

In large parts of the world hard manual labour is still necessary in most occupations in agriculture and industry, with the exception of certain sedentary jobs. With the advent of industrialization, mechanization,

electrification and automation, the physical requirements of work are decreasing, and a greater emphasis is being placed upon skills and intellectual aptitude. In certain countries the level of energy expenditure may be limited by the availability of food.

According to information supplied by the International Labour Office, there has been a notable increase in the number of semi-skilled, skilled and technical workers and a corresponding decrease in the number of unskilled workers, labourers and farmers in the past 60 years in some highly developed countries in which automation and other modern industrial methods have been introduced. As these changes occurred, the caloric requirements of work decreased, and psychological and other aspects assumed greater importance. It is reasonable to anticipate that similar changes in the composition of the work force will take place gradually in the developing countries as they become industrialized.

While a significant reduction of the patient's maximal work capacity merits special consideration, this limitation need not be over-emphasized, particularly when he is placed selectively in a job whose requirements do not exceed his capabilities.

The manifestations of excessive physiological responses, whether in cardiacs or healthy subjects, due to any of the above-mentioned factors are an indication that efforts should be made to modify the job. On the other hand, where the energy requirements are so low as to lead to physical deconditioning, physical training — reconditioning — with recreational or other activities should be advised.

#### **4. RECONDITIONING, RE-EMPLOYMENT AND RESETTLEMENT OF PATIENTS WITH CARDIOVASCULAR DISEASES**

##### **4.1 Reconditioning of patients with cardiovascular diseases for work**

The medical profession used to have an unfavourable attitude towards the resumption of physical activity by patients with cardiovascular disease. However, clinical experiences of the past two decades have shown that physical activity indeed can be beneficial, at least in the short-term perspective, starting in the earliest phases of the illness with early ambulation and gradual resumption of most activities of daily living and return to work.

Reconditioning programmes have been in existence in many countries for several decades. Physical conditioning and reconditioning for normal subjects, subjects prone to heart disease, and subjects already stricken with heart disease have been demonstrated to be beneficial with enhancement of function and reduction of the magnitude of the disability. Data are

not available, however, to compare the longevity of cardiacs who have been reconditioned for a prolonged period with those who have not been so reconditioned.

The magnitude of the impairment of the patient's capacity to perform physical work depends upon age, sex, past training, the nature, course and psychological effect of the heart disease, and the physician's understanding and attitude towards heart disease.

#### 4.1.1 *Acute stage of disease*

By proper management from the beginning of treatment the physician can diminish the degree of deconditioning and prevent the psychological effects of the disease. He can minimize the ill-effects of bed-rest by instituting simple activities during acute illness, such as allowing the patient to sit in a bedside chair, passive and then active movement of limbs in bed, breathing exercises and early ambulation. The degree of negative nitrogen balance, atrophy of skeletal musculature, decrease in blood volume, negative calcium and other electrolyte imbalance, etc., can thus be reduced. As the patient is allowed to increase his activities, the physician and other members of the medical team should observe the heart rate, blood pressure and electrocardiogram and correlate them with the patient's subjective personal reaction to such activities.

#### 4.1.2 *Convalescence*

The full impact of the illness may become apparent in the form of psychic manifestations during the convalescent period. The patient may conceive of himself as being more invalidated than he really is. This may lead to overrestriction and thus greater deterioration, *ultimately requiring more physical reconditioning*. During convalescence increase of activity, by allowing more privileges and withdrawal of restraints, depends upon evidence of stability of the disease. In the case of rheumatic fever this would be indicated by quiescence of the rheumatic activity as judged from the usual clinical and laboratory signs <sup>1</sup>. The usual evolutionary electrocardiographic changes of acute myocardial infarction are not a contraindication to gradually increasing activity.

During the various phases of the illness, the physician can appraise clinically the fitness of his patient by observing the tolerance to efforts of known caloric requirements. The rate of increasing physical activities should be regulated and individualized. Taking into account differences between patients in regard to the type of heart disease and the personality, patients should be encouraged to increase their activities gradually, but

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<sup>1</sup> *Wld Hlth Org. techn. Rep. Ser.*, 1957, 126.



not beyond the point of discomfort. As reconditioning proceeds the patient's capacity for physical activity generally increases, and the physician can even encourage the patient to go up and down stairs, e.g., one flight of stairs once a day for several days and several times thereafter, at first slowly and later at a normal pace.

#### 4.1.3 *Return to work*

In favourable conditions, many patients with myocardial infarction may consider return to work within three months after the onset of the illness. Others may take longer. Recognition on the part of the physician of the relatively high energy cost of activities of daily living will enable him to advise the patient to resume work with confidence. The return to work and the associated enhancement of physical activity in a gradual fashion under the supervision of the attending physician constitutes a form of physical reconditioning.

When the requirements of the previous job exceed the capacity of the cardiovascular patient, return to work may require job modification, vocational re-training, or selective placement in another job of lesser requirements. Otherwise, further enhancement of the subject's physical capacity to perform muscular work is necessary.

The number of reconditioning facilities in Europe has increased rapidly in the past decades. However, physical reconditioning as an integral part of the management of patients with cardiovascular disease has not found as wide an acceptance elsewhere. Although data have not been published as to the preventive effects and prognostic significance of physical conditioning in patients with heart disease, the clinical impressions have been striking and encouraging as to the immediate enhancement of function in such patients. Ideally, reconditioning should be individualized, comprehensive, and multi-disciplinary, in order to deal with the associated medical, psychological, dietary and physical factors. The results of wider application of reconditioning are being awaited prior to making a recommendation for general application.

## 4.2 **Re-employment and resettlement of patients with cardiovascular disease**

The rehabilitation of patients with cardiovascular disease who are already capable of doing some kind of work is completed by their return to a suitable occupation. Many patients can return unassisted to their previous employment or some modified work with the same employer. Where this is practicable an effort should be made to ensure that re-employment is effected on receipt of an appropriate certificate from the attending physician.

In some cases it may be necessary to call upon vocational guidance, training and selective placement services. The services required to achieve this object are, in general, similar to those required for persons with disabilities arising from other diseases.

The requirements of the occupation have already been stated above. They are :

(1) The occupation should not increase the gravity of the over-all condition of the patient by either excessively high or excessively low physical requirements.

(2) It should make the best possible use of the individual's ability.

(3) It should provide maximum satisfaction for the individual, adequate remuneration and, if possible, opportunity for security and promotion.

Several problems, however, may arise when re-employment of the cardiac is being considered. The medical ones have already been discussed. It has also been considered to what extent the traditional fear of the consequence of heart disease held by the medical profession and society may hinder the re-employment of cardiacs. Many other factors may influence the patient's return to work, such as age, socio-economic situation, unemployment, administrative reasons, etc.

An older subject nearer to retirement age may, in general, find it more difficult or less attractive to return to work. However, there are many exceptions to this, particularly when the older worker has some skill which may override the disadvantages of age. Thus, for example, young patients with rheumatic heart disease who have not had the opportunity of acquiring the skill of a profession may have less chance of obtaining employment than older subjects with ischaemic heart disease, although their medical prognosis may be better.

Subjects with chronic cor pulmonale present a special problem because they need an employment environment free from air pollution, irritants, dust, etc.

Patients — particularly older patients — may find it less satisfactory to return to work if they have sufficient support from social security or pension schemes, and workmen's compensation schemes which, whilst not providing such a high income as would be obtained by working, do not make a return to work worth while in their individual family circumstances.

In areas of heavy unemployment the employer has access to an ample labour supply without need to consider patients with cardiovascular disease. This situation may be mitigated where the patient possesses skill which is scarce in the country or area.

The employer's fear is that sudden, and perhaps fatal, recurrence of the disease will involve him in compensation under "Second injury laws".<sup>1</sup>

Some pension, social security or workmen's compensation schemes require the employer to pay higher premiums in respect of cardiovascular patients. National schemes of this character do not usually require the payment of such higher contributions, but private companies often require the payment of higher premiums.

Seniority rules within an organization may create difficulties where patients with cardiovascular disease require a lower-grade job in another section to which they cannot carry their higher seniority, and must therefore start at the bottom again.

The opposition of trade unions to the introduction of disabled non-members who have not completed the periods of training normally prescribed for entry to the unions may also have a deterring effect in particular situations.

An attempt to alleviate all this should be made by suitable education. In countries where such a course is practicable, progress may be assisted by the introduction or enforcement of regulations for the employment of a specified percentage of disabled persons, including cardiovascular patients.

#### 4.2.1 *Sheltered employment*

Where cardiovascular patients are unable to do more than routine work or would not be likely to get employment under normal industrial conditions, the provision of sheltered employment would be better than allowing them to remain inactive. They could be admitted to similar institutions provided for other types of disabled persons, but the activities should be directed to securing their return to normal employment where such a course ultimately proves possible.

## 5. ORGANIZATION OF SERVICES

The Committee recognized that in more and more countries cardiovascular diseases form the major cause of mortality and morbidity and become a public health problem of primary importance. Under these circumstances health authorities should play a leading role in the promotion of services for their prevention, medical care and rehabilitation in collaboration with professional, voluntary and private social agencies.

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<sup>1</sup> "Second injury laws" are those which require an employer employing a person who already has a permanent physical impairment to bear the whole cost of compensation in respect of both disabilities if the person suffers a further injury in the course of his employment.

The structure and function of health and medical services vary from country to country according to social, economic and other factors. Similarly, systems of rehabilitation services in general and for cardiovascular diseases in particular vary considerably from nation to nation. The concept of rehabilitation of cardiovascular patients is relatively recent and therefore, while the history of medical care of cardiovascular patients is as old as the disease itself, adequate services for a dynamic and comprehensive programme of rehabilitation of these patients are available only in some countries. Improvement has been made in recent years through better understanding of the potential capabilities of these patients, as a result of greater clinical experience and better knowledge of the physiopathology of the circulatory system. Lack of trained personnel and facilities for rehabilitation has impeded progress in many less-developed countries.

The types of services necessary for rehabilitation of the cardiovascular patient are similar to those for rehabilitation of other types of disabled.<sup>1</sup> They are briefly enumerated as follows:

(1) Medical services: included in this category are those for medical care and rehabilitation in hospitals, outpatient clinics, domiciliary medical and nursing care and general practitioners' services, etc.

(2) Educational services: these provide for children and adolescents with congenital and rheumatic heart diseases who need general as well as vocational education.

(3) Vocational services: these provide services for vocational counselling and guidance, vocational training or re-training, employment, including sheltered employment, and selective placement, etc.

(4) Social services: included in this category are social security, social assistance and welfare, housing, transport, home help, etc.

In the more developed countries these services are available to a varying degree for disabled persons in general, and therefore could be utilized for the benefit of the cardiovascular patients without difficulty.

The Committee was unanimous in emphasizing that a multi-disciplinary team approach is essential in rehabilitating cardiovascular patients just as with those suffering from other categories of chronic disabilities. It is obvious that certain special instruction should be imparted to those in charge of the various services with regard to the specific needs, capabilities and limitations of the cardiovascular subject. The Committee further stressed the extreme importance of co-ordinating these various services, irrespective of the agencies or departments which may be responsible for them, in such a way that they are geared together as closely

<sup>1</sup> See: World Health Organization, Expert Committee on Medical Rehabilitation (1958) *First report*, Geneva, p. 24 (*Wld Hlth Org. techn. Rep. Ser.*, 158).

as possible, and the whole process of rehabilitation should be a smooth and continuous flow from the onset of illness until the rehabilitated cardiac has been returned to his work or home.

The existing patterns of services fall largely into three different categories :

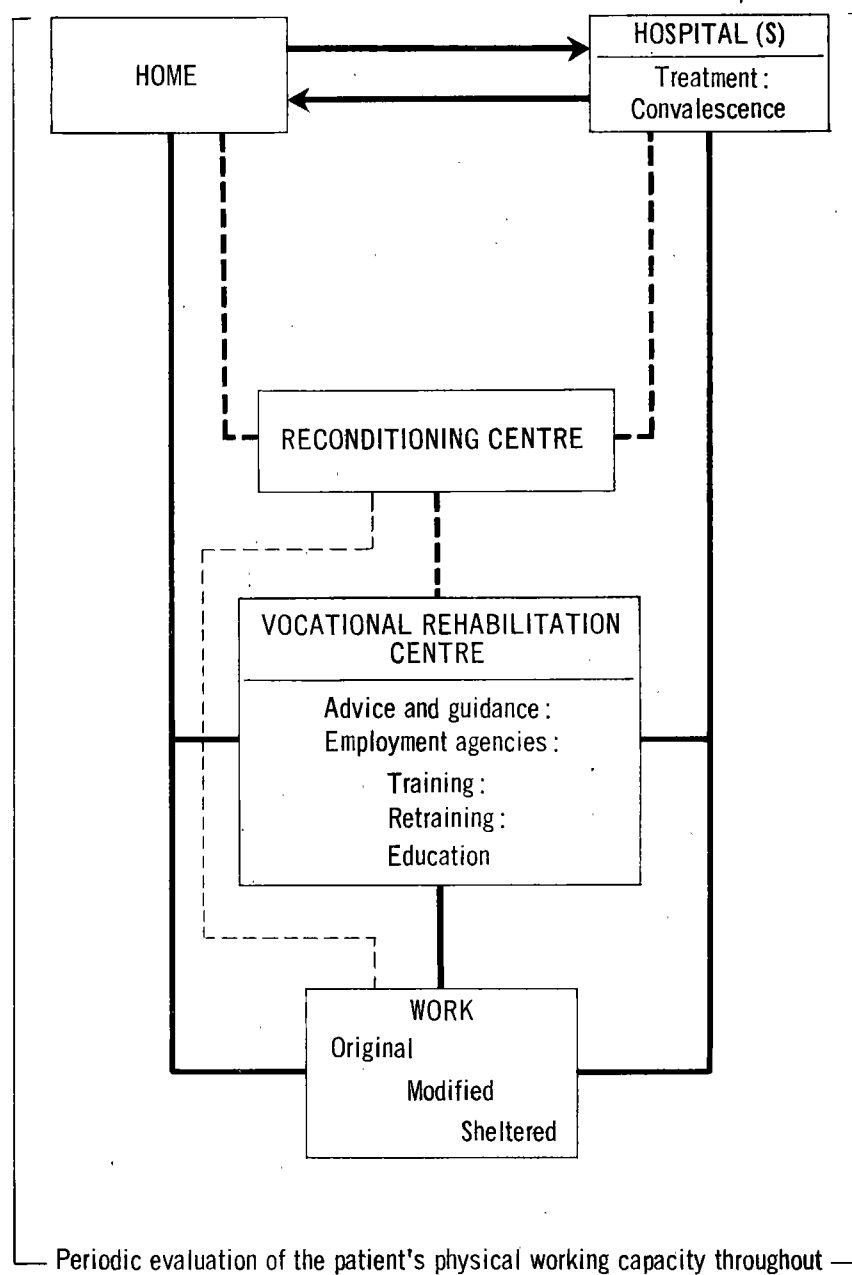
- (1) general hospitals with departments of internal medicine and cardiology in which the vocational aspect is covered by the services of vocational personal either attached to the department or by consultation;
- (2) special clinics or assessment centres where cardiovascular patients are examined for evaluation of their capabilities, reconditioned and advised regarding resettlement in employment or otherwise;
- (3) vocational rehabilitation units in which medical guidance is given either by a medical service attached to the institution or by consultation with a specialist from the outside.

The consensus of opinion is that the majority of cardiovascular patients can be handled by adequately staffed and equipped departments of medicine or cardiology without resorting to special clinics or assessment centres. On the other hand, in certain circumstances, work physiology units may permit precise co-ordination between patient's capacity and work requirement. In addition, however, vocational counselling, guidance and resettlement personnel will be needed to deal with the employment problem of the rehabilitated patients. *At present only difficult cases are referred to special clinics or assessment centres for more comprehensive studies, physical reconditioning, vocational training or re-training.* A period of observation of the reactions of the patient under actual working situations is necessary before he can be regarded as completely rehabilitated. It should be re-emphasized that, after the rehabilitated patient has been placed in work, periodic reviews are made regularly, remembering that the cardiovascular diseases are often progressive in nature, and readjustment of work may be made as necessary. In this connexion there should be close co-ordination between attending physicians, vocational counsellors and selective placement officers to ensure that periodic testing of the patient's working capacity is carried out and that steps are taken to secure a modification or change of job where necessary. In some cases employers may be able to make suitable adjustments to the task or the working-place which would enable the patient to continue with his job. It is, however, unlikely that they would be prepared to do so where alternative labour was readily available. In such a case re-training and resettlement would be necessary.

The use of the various services and special facilities are illustrated in Fig. 2.

The Committee noted with interest that in a group of countries effort is being made to create a special system of medical care and rehabilitation

FIG. 2. FLOW CHART PATIENT-REHABILITATION-WORK



services for the cardiovascular subjects. Thus special cardiovascular disease outpatient departments, polyclinics, special dispensaries for cardiovascular diseases, special hospitals and institutes, day and night sanatoria admitting cardiovascular patients for medical care and rehabilitation, special schools for vocational training, special producer co-operatives, special technical and industrial schools for juvenile cardiacs, and special workshops, are organized and planned to cover the whole country.

## 6. EDUCATION AND TRAINING

### 6.1 Medical and allied professions

The Committee noted with concern that, in general, inadequate attention has been given to the teaching of the principles and practice of medical rehabilitation in the education of medical and allied personnel (doctors, nurses, etc.) Although the concept of rehabilitation of patients suffering from chronic disabilities is not new, it must be admitted that its application to patients with cardiovascular disease is relatively recent. The time lag between available knowledge and its application in undergraduate medical education is often too long. The need for shortening this lag cannot be overstressed, especially in countries where cardiovascular disease is a major cause of death and disability. The Committee wished to draw the attention of medical education authorities to the need for giving more adequate training in this discipline to future doctors in the undergraduate course of instruction and to urge them to meet this need in so far as the present curriculum permits.

Cardiology is one branch of internal medicine and is, therefore, usually included in the department of medicine. Undergraduate education in internal medicine should include not only instruction on the natural history, diagnosis and treatment of various cardiovascular diseases, but also on their prevention and rehabilitation. This is in keeping with the modern trend of teaching on other diseases with equal emphasis on the preventive and rehabilitative as on the diagnostic and therapeutic aspects. Too often, however, little is taught on prevention and rehabilitation of cardiovascular patients unless a cardiologist with special competence in rehabilitation is on the staff of the department of medicine. The Committee emphasized that unless rehabilitation is taught as an integral part of medical treatment the latter will not serve its proper purpose.

It is suggested that instruction on physiopathology of the cardiovascular system in so far as rehabilitation is concerned, work physiology, and their clinical application to patients with cardiovascular diseases should be stressed within the framework of internal medicine. Basic principles and practice in the rehabilitation of the cardiovascular patient should likewise

be imparted—e.g., the need of team approach, the importance of co-operation with educational, vocational and social services, etc. Beside lectures, practical demonstrations by all members of the rehabilitation team (physicians, psychologists, work physiologists, vocational and social workers, etc.) through the medium of the clinical case conference could be a particularly effective method of instructing undergraduate students. Some visits to established institutions where rehabilitation of cardiovascular patients is carried out would be of additional benefit.

General practitioners of medicine need particularly to be brought up to date by postgraduate refresher training courses on recent advances in prevention and rehabilitation of cardiovascular diseases. The health and education authorities and professional and voluntary or private societies should co-sponsor such endeavours.

For the allied professions — nurses, including public health nurses, physiotherapists, occupational therapists, vocational counsellors, medical social workers, etc. — some instruction on the special features and needs of cardiovascular patients should be given, apart from the basic principles and practices in the entire field of rehabilitation. The team approach and inter-disciplinary co-ordination should particularly be stressed.

All the above outline suggesting specialized educational activities presupposes that cardiologists with an adequate knowledge and experience in the modern practice of cardiovascular rehabilitation are readily available. This is often not the case. Hence advanced courses of postgraduate education in this discipline should be encouraged and organized with the co-operation of the national or international bodies concerned.

This type of advanced training should include not only clinical cardiology, physiopathology, and work physiology related to the cardiovascular system, but also an adequate understanding of the work of other members of the team, occupational potentialities of the cardiac disabled, psychological, social and educational problems of the cardiovascular patient, and the means of establishing effective inter-disciplinary teamwork. It is recommended that WHO should consider initiating and assisting in the sponsorship of such training courses, in co-operation with other international or national organizations, especially for the benefit of those countries which are in great need of such specialists.

## 6.2 Education of the public

This includes the public information and education of (1) the patient and his relatives; (2) the employer and fellow workers; and (3) the general community.

The Committee endorsed the views expressed in the first report of the Expert Committee on Medical Rehabilitation<sup>1</sup> under this heading, as

<sup>1</sup> *Wld Hlth Org. techn. Rep. Ser.*, 1958, 158, 19-22.



they apply to disabled persons in general, and wished to emphasize the following points.

#### 6.2.1 *The patient and his relatives*

The physician, being usually the first in contact with the patient, is in the best position to give the necessary education to his patient. He has a duty to explain to the patient the nature of his illness in simple, clear layman's language consistent with the understanding of the patient. Allaying the patient's fears, and reassuring him of his future potentialities without arousing unjustified expectations, are the basic tenets of patient health education. It should be emphasized that education of the patient must be individualized. A fuller discussion on the attitude of attending physicians and other members of the medical team is to be found in section 2.4 (page 13).

In a similar vein, the patient's close relatives in the family group need to have an adequate understanding so that they do not influence him adversely. In accordance with traditional concepts, family relatives come to help the disabled, and often it is easier and quicker for them to help the patient with daily activities of life, such as toilet, feeding, and moving about, than to allow the patient to help himself. This encourages him to be too dependent and may even be contrary to what is desirable for the cardiovascular patient. Over-protective and over-sympathetic parents or relatives may condemn a child with rheumatic heart disease to unnecessary life-long dependence or restriction of activity. Here home-visiting health and social workers can play an important role, assisting the physician in giving careful and tactful guidance to them.

#### 6.2.2 *The employer and fellow workers*

There is a sympathetic feeling towards handicapped people with a visible impairment, such as an amputee, but in the case of those with invisible and unstable impairments, such as the cardiovascular disabled, the outlook might be different. They are expected to do similar work to that of healthy workers with equal efficiency. Lack of understanding of their special needs, abilities and limitations, together with possible difficulties of adjusting working conditions to suit them, makes the cardiovascular disabled less likely to be acceptable by the employer. Moreover, some employers seem to prefer to contribute towards disability pensions and institutions for the handicapped rather than to find a place for them in their own enterprise. In countries with a quota system of employment of the disabled, the solution of their employment is by no means simple and straightforward. Employers need, therefore, to be persuaded and educated to think in terms of the residual capacity rather than the incapacity of the cardiac disabled, to realize that the employment of a rehabilitated

cardiac properly placed entails no more risk than that of persons without heart disease, and to accept the principle that it is more humane to find work for the disabled, even at some cost and inconvenience, than to contribute to charity. In countries with a socio-economic system principally or entirely operated by the state, the employment of the cardiac handicapped could and should be more readily arranged, but even here education of the policy-makers in government and industry, particularly the supervisors, on the capacities of the cardiovascular patient is necessary (see page 19).

In countries where there is surplus manpower, as in many developing countries, the best way to overcome the difficulty of employment of the handicapped would be to demonstrate what the rehabilitated but handicapped person can do in practice and can contribute to society.

Fellow-workers might resist the acceptance of the cardiac either because of fear of sudden collapse, or because of the special needs of a cardiac which necessitate his working at a different pace and rhythm, thus having an adverse effect on team-work and in turn on the earning of production bonuses. Suitable education may help to counter these difficulties.

### 6.2.3 *The general community*

Misconceptions and lack of understanding about diseases of the heart exist among the general public just as in the patient himself as a member of it. To promote a better understanding of the capabilities of the cardiovascular patient through practical demonstrations of rehabilitated cardiovascular patients in useful and happy jobs is the most effective way of educating the public. In health education programmes for the public imparting elementary knowledge on the way the heart and circulation work and on the common diseases with which they may be afflicted might dispel some of the mysteries about the heart commonly in the minds of lay people.

The methods and media now available for popular health education are legion. They vary from lectures and group discussions through illustrated leaflet and pamphlet to radio and television broadcasts. The judicious use of these methods and media on cardiovascular subjects should have the advice and co-operation of personnel skilled in educational methods and techniques. Periodic campaigns are necessary, especially when new advances have emerged. The Committee was aware that health education of the public on cardiovascular subjects is currently sponsored or conducted by government as well as voluntary and private agencies. No matter who does this, it was emphasized that the following two points should be borne in mind. Firstly, the information to the public on cardiovascular rehabilitation should be medically authoritative and realistic, and commensurate with understanding by the lay public. Second-

ly, some centrally co-ordinated mechanism should be devised so that the information given on cardiovascular rehabilitation is accurate and balanced and not confusing to the public.

## 7. RESEARCH

The following problems in particular merit further investigation:

- (1) The development of simple exercise tests for general adoption, to be used as a reference standard for comparison between laboratories.
- (2) Measurements of energy requirements of habitual physical activities in men and women at work, in the home and during recreation.
- (3) Assessment of the advantages and disadvantages (including risk) of early physical reconditioning of subjects convalescing from acute episodes of heart disease, in particular to determine whether such procedures modify this natural history of the disease.
- (4) The influence of various types of occupation in men and women on the course of certain cardiovascular diseases. Such studies must also include energy expenditure during travel to and from the place of work, and leisure activity.
- (5) Assessment and quantitation of psychological factors affecting activity levels and rehabilitation potential, and of their effects, if any, on remote prognosis.
- (6) Evaluation of the success of rehabilitation in the patient's home environment, in comparison with that achieved in special institutions, for example, spas, day or night sanatoria, etc.
- (7) Comparative studies on the prognosis and longevity of patients in sheltered employment, part-time or domiciliary work, etc.
- (8) In regard to agricultural workers, studies in respect of prevalence and nature of cardiovascular disease, behaviour of farmers after the onset of such disease, and the type of rehabilitation or social assistance required. Information is also needed on energy costs and requirements of the farmer in different cultures, and on realistic recommendations as to methods of work simplification for cardiovascular patients.
- (9) Research to compare the prevalence, severity and clinical course of heart disease and longevity in athletes in comparison with other groups.
- (10) Studies on the course of the disease and its outcome in those who perform more or less activity than was prescribed.
- (11) An inquiry into the factors responsible for abandonment of a programme of rehabilitation, including cessation of gainful employment.

(12) Research into the most effective methods of community education in the field of cardiovascular rehabilitation in various countries.

(13) Comparison of the results of rehabilitation of patients with cardiovascular disease in different societies and social systems.

## 8. RECOMMENDATIONS

The Committee made the following recommendations for national and international action.

(1) WHO should, in collaboration with interested international and national organizations, intensify the dissemination of information on modern concepts and measures for rehabilitation of patients with cardiovascular diseases. For this purpose it would be useful to organize international and/or regional seminars, symposia and conferences with a multi-disciplinary participation.

(2) WHO should, in co-operation with international or national organizations, consider organizing advanced training courses for physicians specializing in the rehabilitation of patients with cardiovascular diseases.

(3) WHO should stimulate further research in problem areas as recommended on page 43.

(4) National authorities, in co-operation with the medical profession, are urged to promote and organize programmes for cardiovascular rehabilitation along lines described on page 35. The participation of general practitioners of medicine in these programmes is most important, and it is strongly recommended that refresher training courses on modern advances in cardiovascular prevention and rehabilitation should be organized for their benefit. Appropriate training of a similar kind should be made available for nurses, physical and occupational therapists and non-medical personnel engaged in cardiovascular rehabilitation work. International agencies could promote and assist in these training activities.

(5) There is a need for standardization of principles and procedures for the assessment of working capacity of patients with cardiovascular diseases. It is recommended that WHO should, in co-operation with international and/or national organizations, (a) promote and assist in the organization of centres for further studies on methods and procedures for evaluation of the working capacity of patients with cardiovascular disease, and (b) convene conferences for their standardization and general adoption.

(6) Governmental and non-governmental employing agencies should be urged to revise their employment policies so that rehabilitated patients with cardiovascular diseases should not be discriminated against. In

this connexion provisions in social security and other insurance systems which might have a disadvantageous effect on the effective rehabilitation of cardiovascular patients should be modified.

## 9. SUMMARY

The Expert Committee on Rehabilitation of Patients with Cardiovascular Diseases confined its discussion to rehabilitation of patients suffering from congenital, rheumatic and ischaemic heart disease, arterial hypertension or chronic cor pulmonale. Evidence was advanced that a high proportion of patients with cardiovascular disease can be rehabilitated satisfactorily to lead a useful life and to return in due course to gainful employment, provided that correct management and reconditioning of the patient begins early after the onset of the illness.

Psychological reactions may be the most important determinant in successful rehabilitation. Traditional fear and excessive anxiety about the disorder of such a vital organ as the heart have been largely responsible for exaggerated caution on the part of the patient as well as the physician, and have hindered in many instances the rehabilitation of patients suffering from cardiovascular diseases. Psychological adjustment of the patient to the cardiovascular disease depends largely on the attitude of the attending physician and other members of the health team, and the importance of adequate psychotherapy carried out from the beginning of the medical treatment was stressed.

Reconditioning of the cardiac patients should be started soon after the acute stage of the illness, and physical activities should be gradually increased under medical supervision. Prolonged bed-rest and inactivity may be harmful and should not be advocated except in very old patients and in those with severe disease. The fitness of the patient for work varies with the type and severity of the disease, age, sex, previous experience and training, as well as his mental attitude to the disease and to work. It can be evaluated by simple, clinical, functional classification of the patient's work capacity and by measurement of the actual working capacity. Clinical evaluation of the cardiovascular function was considered adequate for the assessment of the working capacity of the majority of patients. This is to be matched against requirements of different activities in daily living, work, and recreation or play. The use of exercise tests was recommended as a valuable addition to the clinical evaluation of cardiovascular function.

Many patients should be able to return to work taking care to observe the limitations imposed upon them by the nature and severity of their disease. The usual daily activities of living sometimes require more

energy than sedentary work and certain industrial jobs, and therefore patients capable of performing these activities are also capable of returning to such types of gainful employment. When the requirements of the previous job exceed the working capacity of the patient, return to work may require modification of the job, vocational re-training, and selective placement in another job or sheltered employment. The multiple services required for persons with cardiovascular impairments are in general similar to those for persons with other types of chronic impairments.

Problems connected with the re-employment of the cardiac were considered, and close co-operation between the attending physician, vocational counsellors and selective placement personnel during reconditioning as well as during re-employment was stressed.

The Committee emphasized the need for undergraduate and post-graduate education of medical and allied professions, as well as that for education of the general public, and concluded its report with several recommendations and suggestions for research.