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World Health Organization
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Rehabilitation Guideline after Myocardial Infarction

Ulaanbaatar 2013

PREFACE

This guideline is primarily concerned with rehabilitation following myocardial infarction (MI) or coronary revascularization, but also addresses the rehabilitation needs of patients with angina or heart failure.

This guideline was created by MOH and health project of MCC, WHO and professional committee of rehabilitation of MOH, Mongolian society of physical & rehabilitation medicine, Mongolian Physical Therapy Association, University of Health Sciences Mongolia (HSUM), the Shastin and State hospital. The guideline reviewed by the Ministry of Social Welfare, the National Rehabilitation Centre, AIFO, Aimag- and Soum-level representative hospitals.

This guideline includes clinical rehabilitation, prevention and management of the complications and community based rehabilitation services.

The overall purpose of this guideline is to provide recommendations and evidence of the current international evidence and best practise, which can guide the development of local protocols depending on the local situation, in order to ensure a standard service of cardiac rehabilitation management.

This clinical guideline was primarily produced on the basis of the Best Practice Guidelines for Cardiac Rehabilitation and Secondary Prevention by the National Heart Foundation (Australia, 1999), West Midlands Cardiac Rehabilitation Standards (UK, 2010), The National Institute for Health and Clinical Excellence Clinical Guideline MI: Secondary Prevention (UK, 2007), ACSM's Guidelines for Exercise Testing and Prescription (US, 2008), The British Association for Cardiac Rehabilitation Guidelines (UK, 2003), The British Association for Cardiovascular Prevention and Rehabilitation standards and core components for cardiovascular disease prevention (UK, 2012).

This guideline states the recommendations for Cardiac Rehabilitation post myocardial infarction based on the international current body of evidence and the recommended best practice based on clinical experience and expert opinion.

It is recommended that local protocols are developed to standardize the management possible at the local level (in terms of local human resources, patient management, referral network, where/how assistive and adaptive devices can be purchased/made). – As developments within staff capacity, organization of rehabilitation and equipment occur, the protocols should be reviewed and updated at regular intervals (ex. annually).

The Annex within this guideline includes the basic concepts of exercise prescription, detailed information on cardiac rehabilitation, examples of multidisciplinary assessment forms, discharge form and rehabilitation terminology. Furthermore the Annex includes a checklist guideline that can support the implementation of the national guideline and local protocols by guiding the healthcare professional through the patient management from admission to discharge to the community.

KEY RECOMMENDATIONS

A number of key priority recommendations have been identified for implementation and these are listed below.

Discharge Planning

- After an acute myocardial infarction (MI), confirmation of the diagnosis of acute MI and results of investigations, future management plans and advice on secondary prevention should be part of every discharge summary.

Physical Activity

- Patients should be advised to undertake regular physical activity sufficient to increase exercise capacity. Patients should be advised to be physically active for 20–30 minutes a day to the point of slight breathlessness. Patients who are not achieving this should be advised to increase their activity in a gradual, step-by-step way, aiming to increase their exercise capacity. They should start at a level that is comfortable, and increase the duration and intensity of activity as they gain fitness.

- Advice on physical activity should involve a discussion about current and past activity levels and preferences. The benefit of exercise may be enhanced by tailored advice from a suitably qualified professional.

- In selected patients after an MI, randomisation to an exercise prescription programme reduced the risk of death from MI after 3 years, but not all-cause or cardiovascular mortality.

- In selected patients after an MI, exercise performed at a level sufficient to increase physical work reduced all-cause mortality and cardiovascular mortality in long term follow up.

Cardiac Rehabilitation

- Cardiac rehabilitation should be equally accessible and relevant to all patients after an MI, particularly people from groups that are less likely to access this service. These include people from minority ethnic groups, older people, people from lower socioeconomic groups, women, people from rural communities and people with mental and physical health co-morbidities.
- Healthcare professionals should take into account patients' wider health and social needs, which may involve identifying and addressing economic, welfare rights, housing or social support issues. This may be a particular issue for patients in more deprived circumstances, and rehabilitation services should assess the likely scale of these needs when planning how their services meet the needs of the local population.
- All healthcare professionals involved in providing care for patients after an MI, should actively promote cardiac rehabilitation.
- All patients (regardless of their age) should be given advice about and offered a cardiac rehabilitation programme with an exercise component.
- If a patient has cardiac or other clinical conditions that may worsen during exercise, these should be treated if possible before the patient is offered the exercise component of cardiac rehabilitation. For some patients, the exercise component may be adapted by an appropriately qualified healthcare professional.
- Patients with left ventricular dysfunction who are stable can safely be offered the exercise component of cardiac rehabilitation.
- Cardiac rehabilitation in patients after MI reduces all-cause and cardiovascular mortality rates provided it includes an exercise component.
- Cardiac rehabilitation in patients after MI compared to no cardiac rehabilitation is cost effective.
- Reminders such as:
  - telephone calls
  - telephone calls in combination with direct contact from a healthcare professional
  - motivational letters

  should be used to improve uptake of cardiac rehabilitation.
- On completion of the Cardiac Rehabilitation programme there should be a formal assessment of lifestyle risk factors (physical activity, diet and smoking as relevant), psychosocial health status, medical risk factors (blood pressure, lipids and glucose) and use of cardioprotective therapies together with long-term management goals. This should be communicated by discharge letter to the patient as well as those directly involved in the continuation of healthcare provision.

Safety in the exercise component of comprehensive cardiac rehabilitation

- There is no evidence that stable patients are harmed by the exercise component of cardiac rehabilitation.
- Exercise training does not appear to endanger stable patients with left ventricular dysfunction.

- There is limited evidence on the safety of the exercise component of cardiac rehabilitation in older people. Therefore the cardiac rehabilitation programmes should include an exercise component designed to meet the needs of older patients or patients with significant co-morbidity.

Secondary Prevention

- Patients after MI who choose to exercise regularly have improved survival rates and a reduced incidence of non-fatal re-infarction.

- All patients who smoke should be advised to quit and be offered assistance from a smoking cessation service.

- Patients should be advised to eat more bread, fruit, vegetables and fish and less meat; and replace butter and cheese with products based on vegetable and plant oils.

Health education and information needs

- Comprehensive cardiac rehabilitation programmes should include health education and stress management components.
- A home based programme validated for patients who have had an MI that incorporates education, exercise and stress management components with follow-ups by a trained facilitator may be used to provide comprehensive cardiac rehabilitation.
- Most patients who have had an MI can return to work. Any advice should take into account the physical and psychological status of the patient, the nature of the work and the work environment.
- After an MI without complications, patients can usually travel by air within 2 –3 weeks. Patients who have had a complicated MI need expert individual advice.
- Most patients can return to normal activities of daily living. Any advice about the timing of this should take into account the patient's physical and psychological status, as well as the type of activity planned.
- Advice on competitive sport may need expert assessment of function and risk, and is dependent on what sport is being discussed and the level of competitiveness.

Psychological and social support

- Stress management should be offered in the context of comprehensive cardiac rehabilitation.
- Complex psychological interventions such as cognitive behavioural therapy should not be offered routinely.
- There should be provision to involve partners or carers in the cardiac rehabilitation programme if the patient wishes.

Sexual activity recommendations

Patients should be reassured that after recovery from an MI, sexual activity presents no greater risk of triggering a subsequent MI than if they had never had an MI.
Patients who have made an uncomplicated recovery after their MI can resume sexual activity when they feel comfortable to do so, usually after about 7-10 days. But therapist should be considering to age, functional capacity (MET), and risk of exercise. The sexual activity can be 3-6 MET. The sexual activity can to safely when the evaluation of exercise testing (cycle ergometer, treadmill) is under to 5-6 MET.

- The subject of sexual activity should be raised with patients within the context of cardiac rehabilitation and aftercare. (NICE Clinical Guideline 48 MI: Secondary Prevention, 2007)

A. INTRODUCTION

A.1. Definition of myocardial infarction and cardiac rehabilitation post myocardial infarction

Acute myocardial infarction is defined as myocardial cell death due to prolonged myocardial ischemia.

Cardiac rehabilitation is defined as the sum of activities required to favorably influence the underlying cause of disease, as well as the best possible physical, mental, and social conditions, safe to quality of life, prevent to secondary and mortality.

A.2. the code of disease: /ICD 10/

A.3. Target users of the guideline

- Rehabilitation doctors
- Physiotherapists (physical therapist)
- Nurses
- Dieticians
- Occupational Therapists
- Clinical psychologists,
- Internist
- Cardiologists
- Family doctors/ General physicians at Aimag and Soum Hospitals

A.4. The aims of the guideline

The aim of the guideline is provided to prevention myocardial re infarction, decrease to mortality, increase to quality of life, and based to complex individualized, progressed physical activity.

A.5. Developed date: 2012
A.6. Updating date: 2016
A.7. Guideline Development Group

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Discussion of guideline preparation

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A.8. TERMINOLOGY

Activities of daily living (ADL): Activities of daily living (ADLs) are basic self-care tasks, to doing self care activities from wake up to sleep such as personal hygiene, grooming, dressing, feeding, and bowel and bladder management.

ATP (adenosine triphosphate): ATP captures chemical energy obtained from the breakdown of food molecules and releases it to fuel other cellular processes.

Aerobic capacity: Individual amount of oxygen intake for one kilogram of the body in a minute during the aerobic exercise training.

Body mass index (BMI): Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2).

Borg Scale: The Borg Rating of Perceived Exertion (RPE) is a way of measuring physical activity intensity level. Perceived exertion is how hard you feel like your body is working. It is based on the physical sensations a person experiences during physical activity, including increased heart rate, increased respiration or breathing rate, increased sweating, and muscle fatigue. Although this is a subjective measure, a person's exertion rating may provide a fairly good estimate of the actual heart rate during physical activity (Borg, 1998).

Cardiac rehabilitation: multi-factorial, multi-professional, designed to cater for the needs of patients with coronary heart disease (and their families), with the objective of restoring them to as normal a life as possible.

Cardiac rehabilitation team: multi-disciplinary team includes doctor, physical therapist, nurse, dietician, occupational therapist, psychologist, and other health professionals, which multidisciplinary health professionals communicate to patient and their family.

Maximal Heart Rate: the maximal number of times the heart contracts per minute. Maximal heart rate is reduced with increasing age and average maximal values may be predicted by the equation 220 (beats per minute) minus age (years) HR_{max}= 220-age;

Metabolic index (MET): It can be estimated using standard regression equations, as a multiple of resting energy expenditure (metabolic equivalent- MET) with one MET defined as the oxygen requirement in the resting, 1MET is equivalent to 3, 5 ml $O_2/kg^{-1}/min^{-1}$ of body weight.

Quality of Life: a concept encompassing the board range of physical and psychological characteristics and limitations which describe an individual's ability to function and derive satisfication from doing so. Quality of life

is now usually assessed from the perspective of the individual rather than as a rating by health of other professionals.

Respiratory exchange ratio (RER): the ratio of carbon dioxide produced to oxygen consumed.

Risk factor: factor known to increase the likelihood of future cardiac morbidity or mortality.

Risk stratification: a process whereby patients are grouoed into levels of future risk (low, moderate, high), usually by a combination of assessment of risk factors and clinical status.

Target heart rate (THR): A heart rate that is attained during aerobic exercise and represents the minimum level of exertion at which cardiovascular fitness can increase for an individual in a given age group. The THR can be calculated as a range of 50%–85% intensity; Karvonen method THR = $((HR_{max} - HR_{rest}) \times \%\ \text{intensity}) + HR_{rest}$;

$VO2_{max}$ Maximal volume of oxygen consumed per minute (maximal oxygen uptake, maximal oxygen consumption): is expressed either as an absolute rate in liters of oxygen per minute (l/min) or as a relative rate in milliliters of oxygen per kilogram of bodyweight per minute (ml/kg/min).

A.9. EPIDEMIOLOGY

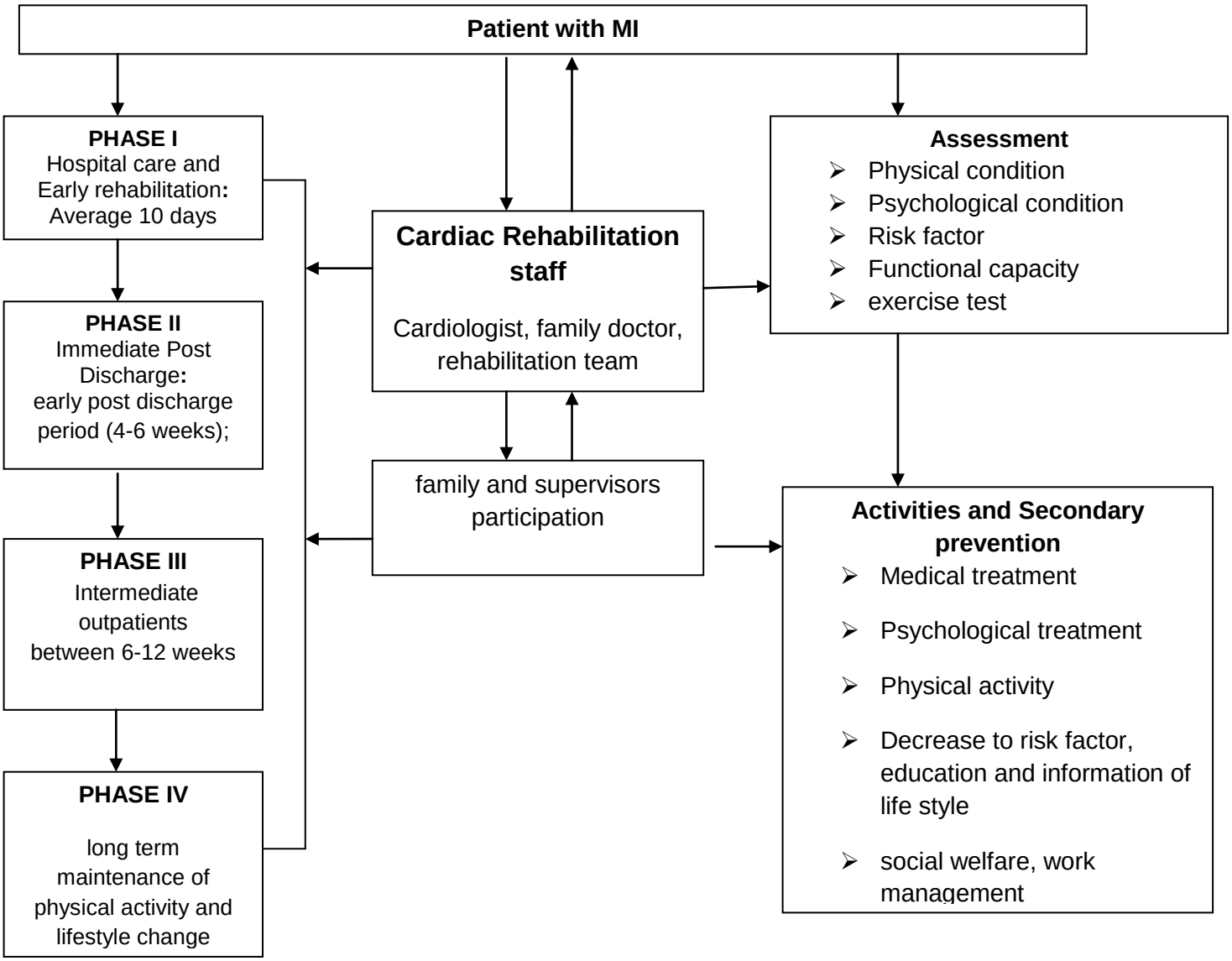
Worldwide 17 million people had suffered from cardiovascular diseases and led inactive lifestyles; 15-20% of whom could not return to their work.

However after 4 weeks 'Rehabilitation Program' 85% of the patients, who had positive results from exercise training and psychiatric, tests, were able to return to their work.

Scientists and therapist determined that the immobilization and restriction of the movements have negative effects for the patient's curing process during the MI. The patients with CVD were participated 37 various rehabilitation programs, which include decreasing activities of psychological and other negative risk factors. Result show that the death caused by CVD was decreased by 37%, another MI-by 29% in a decade.

The whole country most recent figure of acute myocardial (MI) per year was 1878 (male 949, female 929) registered patients of which 485 patients treated in Ulaanbaatar. Most common cases of MI occurred to people aged from 45 to 49. Currently, have not Cardiac rehabilitation programs in the Mongolia. Therefore have not national research relating to cardiac rehabilitation. Patient with MI should be cardiac rehabilitation, improve to quality of life, activities of daily living, mobilization and return to work.

B. MANAGEMENT ALGORITHM



C. EVALUATION AND MANAGEMENT

C.1. Organisation of Rehabilitation Services

1) Rehabilitation post myocardial infarction is divided into four phases:
   - Phase 1: Hospital Care and early rehabilitation post myocardial infarction
   - Phase 2: Immediate Post Discharge
   - Phase 3: Intermediate Outpatients
   - Phase 4: Long-term Maintenance

2) The Cardiac Rehabilitation Programme from Phase 1 – 4, should be completed by a multidisciplinary team.

3) The Cardiac Rehabilitation Services will be in line with the Medical and Rehabilitation Guidelines.

4) As part of the hospital care a standardized checklist (see Appendix 6) is recommended to be implemented in order to ensure all in-hospital care has been provided within the planned time frame. This checklist should be started on admission and completed throughout the hospital stay. The Rehabilitation Team lead by the rehabilitation doctor would be in charge of ensuring the checklist is being completed by the team.

5) Cardiac rehabilitation team should provide to information, education, advice for patient and their families and to produce social welfare and participation of family.

2. Management and Prevention Strategies

C.2.1.Hospital Care Post Myocardial infarction – *Phase 1*

Phase 1 occurs during the inpatient hos**p**ital stage or after a “step change” in the patient’s cardiac condition (defined as any myocardial infarction, onset of angina, any emergency hospital admission for coronary heart disease (CHD), cardiac surgery or angioplasty, or first diagnosis of heart failure).
During this phase medical evaluation, reassurance and education, correction of cardiac misconceptions, risk factor assessment, early mobilisation, self care and discharge planning are the key elements. Phase 1 is primarily delivered on an individual basis and, additionally, in some hospitals, to groups of patients. It is recognised that inpatient education may be ineffective because of the psychological state and concerns of patients soon after their acute event.
It is customary to involve family and partners from this early stage. Key staff with knowledge of heart disease and rehabilitation can improve both the patient, family or carer understands of heart disease and reduce anxiety and depression compared with those receiving routine care.
The issues to consider for in-patient needs include:

- Reassurance
- Information
- Risk Factor Assessment
- Risk Stratification
- Education
- Mobilisation
- Discharge planning

- Involvement and support of family/partner

The main purpose of exercise therapy during the in-patient phase is to counteract the deleterious effects of prolonged bed rest and in many cases the debilitating effects of long-term inactivity prior to admission. Activities include general range of motion exercises, activities of daily living, including sitting, standing and walking. Activities performed during Phase 1 typically do not exceed 3 METs. See example of Phase 1 exercise programme in Annex 7.

Table: Presentation of the ACSM recommendations for the prescription of exercises in phase I of cardiac rehabilitation
Intensity
RPE below 13 on Borg Breathing Scale (scale 6-20)
Post AMI: HR below 120 bpm or resting HR + 20 bpm (Arbitrary lower limit)
Post-surgery: resting HR + 30 bpm (Arbitrary upper limit)
Up to tolerance if non-symptomatic
Duration
Intermittent sessions lasting from 3 to 5 min
Resting periods: As the patient wishes - lasting from 1 to 2 min
Resting period should be shorter than the time of the exercise sessions
Total duration of 20 min
Frequency
Early mobilization: 3 to 4 times per day (1st to 3rd days)
Subsequent mobilization: twice per day (As from the 4th day)
Progression
Initially increase the duration by up to 10 to 15 min of exercise time and then increase the intensity

Transfer from Hospital to Home

Prior to discharge

- Ideally the patient has started to progress mobility within the limit of approximately 3 METS. They may be able to walk up to 240 meters in 3 minutes, if this feels comfortable to the individual.
- The patient should be independent in completing a home exercise programme, which includes: a warm up and cool down exercises as well as a programme of exercises to be progressed.
- The patient should also independently take their pulse and understand the use of Borg Breathing Scale.

Checklist guideline

- It is recommended that the checklist guideline which should be started on admission, should also includes the education components and discharge planning (see Annex 6).

Discharge Letter

- To facilitate timely information to the patient it is recommended that Na Rehabilitation Discharge letter is provided in addition to the medical discharge letter. This will allow the patient to leave hospital with consistent written instructions regarding their care at home. This letter will include standard information as well as individualized advice: (see Annex 6).
- Diagnosis/Procedure
- Immediate care instructions specific to condition (i.e. pain relief, wound care, exercise limitations, driving restrictions where known)
- Exercise plan and recommendations for progression
- Reminders about follow up with primary health care providers

See example of detailed Local Cardiac Rehabilitation Protocol in Annex 4..

In the situation where a cardiac rehabilitation programme or community programme (with home visits) is not possible, patients can be issued a home exercise programme, which includes educational advice, an exercise programme as well as being taught how to self-progress the training programme. See example of home exercise programme in Annex 9.

C.2.2. Immediate Post Discharge – *Phase 2*

Phase 2 is the early post discharge period (4-6 weeks); this phase applies to the initial phase of healing of the myocardium. It is the stage that focuses on health education, the resumption of physical activity and lifestyle change, as well as starting an exercise program within the limitations of the individual. This is a time when many patients feel isolated and insecure.
Support can be provided by:

- Home visits by health staff
- Telephone contact by staff
- Attendance to hospital appointments
- Attendance to group sessions (focus on counselling)

During Phase 2 activities should be designed to increase functional capacity and endurance gradually and progressively. Patients are initially encouraged to walk in and around their homes and then to walk outdoors, avoiding extremes of temperature.

As functional capacity improves, rating of perceived exhaustion (Borg Breathlessness Scale) or pulse monitoring should be used to monitor the response to increases in speed or distance.

- By the time the patient starts the Cardiac Rehabilitation Program, they should be able to walk for about 30-40 minutes each day.

Prior to starting the Cardiac Rehabilitation Group (Phase 3), patients will need to be reviewed by the Cardiac Rehabilitation Team (Rehabilitation Doctor), in order to evaluate whether they are ready to start a Cardiac Rehabilitation Programme and tailor an individualized exercise program for the patient.

See example of detailed Local Cardiac Rehabilitation Protocol in Annex 4..

C.2.3. Intermediate Outpatients – *Phase 3*

Phase 3 is recommended to start between 4-8 weeks after hospital discharge and should last from 6-12 weeks according to local policy and the patient's individual progress.

This phase takes the form of structured exercise sessions to meet the assessed needs of individual patients. These sessions should complement the patient's continued efforts at home to increase daily physical activity levels and walking.

The Cardiac Rehabilitation is either completed in the hospital setting or in the community by health care professionals trained in Cardiac Rehabilitation.

Graded exercise testing completed at the end of Phase 2 should be performed prior to enrolment in order to ensure that the training programme is individualized. Safe and effective progression is achieved by increasing the frequency and duration of selected activities, first and only then the intensity.

During the early stages of exercise training, extended periods of warm-up and cool-down are recommended and the conditioning phase should represent 60-75% of predicted age-adjusted heart rate, or (if known) maximal heart rate. – This intensity correlates to 11-13 on the 15-point Borg Rate of Perceived Exertion (RPE) Scale. With time the training heart rate may be increased to 70-85% of predicted or actual maximum heart rate.

Patients should not be discomforted nor take a long time to recover from a session; these are signs of inadequate physiological adaptation arising from too much exercise or exercise at too high an intensity. It is recommended to test heart rate, blood pressure and Borg's RPE Scale during each training session. The rate of perceived exertion (breathlessness) and heart rate should correlate, however sometimes patients underestimate of overestimate their rate of perceived exertion. Therefore it is of benefit to complete both during the training session (see example of training diary in annex 10)

Swimming may be introduced in Phase 3, but it is not recommended until 6-8 weeks of rehabilitation has been completed, when heart tissue has had sufficient time to heal.

Competitive games and exercise-to-music classes are not recommended, since their intensity is dictated at least in part, by factors not under the control of the individual.

The Cardiac Rehabilitation Programme includes progression of a cardiac exercise programme as well as educational and psychological support, advice on risk factors and relaxation techniques.

Table: Example of what education sessions should include
Common misconceptions about cardiac illness that lead to increased disability
Pathophysiology and symptoms
Risk factors: Smoking and the effect
Risk factors: Diet and the effect
Physical activity/inactivity – self-management of an exercise programme
Psychological issues (mood and emotions)
Vocational advice on return to work

Sexual dysfunction
Pharmaceutical, surgical interventions and devices
Cardiopulmonary resuscitation

One of the issues of most importance in setting-up an exercise programme is that of patient safety. This is influenced by several factors:

- Medical screening and assessment
- Risk Stratification and the identification of high risk patients
- Inclusion/exclusion criteria for exercise sessions
- Individual exercise prescription
- Experience of staff
- Resuscitation resources
- Health and safety issues regarding premises and equipment
- Supervision and monitoring during exercise sessions

C.2.4. Long-term Maintenance – *Phase 4*

Phase 4 involves the long term maintenance of physical activity and lifestyle change. Phase 4 progresses or maintains the conditioning programme initiated in Phase 3 and is necessary if patients are to gain long-term benefit. Available evidence suggests that both physical activity and lifestyle change must be sustained for cardiac benefits to continue.

Phase 4 patients should be clinically stable and capable of regulating their own exercise prescription (using sub-maximal heart rate and Borg RPE to monitor progress). They should have a minimal functional capacity of 5 METs, without difficulty.

Membership of a local cardiac support group, which involves exercise in a community centre such as a gym, leisure centre or walking group, may help maintain physical activity and behavioural change.

Referral to other services may be needed:

- Psychological services
- Behavioural services to support smoking cessation and other lifestyle modifications
- Vocational support to return to work or support change of occupation.

Please see in Annex 4 a detailed section on Cardiac Rehabilitation Phase 1-4, which takes into account what is possible in situations, where all these resources are not likely to be present.

C.3. Provision of Information: Education and patient information

During Phase 1 the patient will be given advice on secondary prevention, however it has been fund that patients are not always able to take on the information during this stage.

It is recommended that the patient is taught how to measure their own heart rate and understand the use of Borg Rate of Perceived Exertion Scale during exercise.
Prior to discharge education will also involve the practical instruction in a home exercise programme.

C.4. Secondary Prevention

Guidelines on prevention and secondary prevention are detailed in general in the Guideline Arterial Hypertension in Adults (2011) and specifically with regard to MI in the Guideline for the Management of Patients with Acute MI (2013), please refer to these for further details.

C.5. Exercise Prescription

- As written under Phase 1: All patients will undertake an exercise assessment for both screening and exercise prescription purposes before starting the exercise training programme. This will, ideally, be a 12 lead exercise tolerance test. If this is not possible, for the purposes of exercise prescription, then the use of an evidence based sub maximal protocol is recommended eg,
    a. Walk test
    b. Step test
    c. Cycle ergometer test
    d. Arm ergometer test

The above assessments will also be used for Phase III discharge evaluation and for Phase IV programming. Patients should have a final assessment to include all aspects in Phase III in preparation for transfer to Phase IV.

Cardiac rehabilitation programmes should standardise the choice and use of assessment/ measurement tools locally and on a national basis.

Best practice standards and guidelines for physical activity and exercise prescription should be used

Prior to participating in the exercise/activity component of cardiac rehabilitation all patients should undergo assessment, including baseline assessment of fitness/functional capacity and risk stratification. This will determine the appropriate exercise prescription, activities of daily living (ADL) guidance and support.

C.6. Safety: Adequate emergency response

The safety of a programme will depend greatly on adequate planning to reduce or avoid potentially dangerous situations, e.g. screening and risk stratification of patients. In addition to this it is essential to have developed a comprehensive plan of action in the event of an emergency situation. The following points should be considered:

- All staff should be certified as competent at Basic Life Support level of cardio-pulmonary resuscitation.
- At least one member of staff involved in the supervision of exercise sessions should be certified competent in Advanced Cardiac Life Support
- There should be a policy of regular review and updating the training of all staff involved in resuscitations at all levels
- For exercise sessions, a staffing policy should exist which states the ratio of staff to patients. The recommended ratio of staff to patients for the cardiac rehabilitation programme is 1:5.
- The training session should be closely supervised and should adhere to maintaining guideline levels of blood pressure, heart rate and glucose in order for safe exercise.

C.7. Roles of the Multidisciplinary Team

There is a strong body of evidence recommending that cardiac rehabilitation and secondary prevention programs should be conducted by a multidisciplinary team. It is recommended that special areas of expertise amongst team members should be recognised.

In situations where a complete multidisciplinary team is not possible, recommendations suggest a minimum standard program may be conducted by one single health practitioner with back-up from other local or regional health practitioner in order to complete in-patient, ambulatory (outpatient) cardiac rehabilitation and secondary prevention programs.

The team should include the cardiologist, cardiac surgeon, rehabilitation doctor, nurse, physiotherapist, dietitian, occupational therapist, rehabilitation nurse, social worker, psychologist, and general practitioner. Others who may participate as members of the team include an exercise physiologist, physical educator, diabetes educator, welfare worker, pharmacist, psychiatrist, vocational counsellor.

The recommended model for ambulatory (outpatient) cardiac rehabilitation and secondary prevention programs following discharge is based upon groups, with input from a variety of health professionals. This section outlines the main functions of each team member.

While many tasks can be shared by more than one member of the team, some tasks require specific skills and training and should be performed by the appropriate, designated health professional. Team members have different backgrounds and training and therefore different areas of expertise. It is important to determine in advance those tasks which should be undertaken by a designated team member and those which may be shared by several team members.
Activities such as processing referrals, co-ordinating programs and following up patients after program discharge may be allocated to any team member who has good organisational and interpersonal skills and sufficient time available to carry out these duties.

Role of multidisciplinary team members

- Attending multidisciplinary meetings and case conferences
- Specific liaison with other professionals, teaching staff, patients and relatives
- Setting and meeting appropriate goals
- Supporting patients and families
- Liaison with other healthcare professionals through networks and specific training in the management of cardiac rehabilitation post myocardial infarct.

Rehabilitation Doctor

A rehabilitation physician who has experience managing patients with cardiac illness may participate in the team conducting the cardiac rehabilitation and secondary prevention program.

Nurse

The role of the Nurse	
• Comprehensive nursing assessment • Patient observations • Pressure sore risk assessment and management of skin integrity • Assist with early mobility and activities of daily living • Ensure pain control • Prevent secondary complications	• 24-hour nursing care • Participate in discharge planning • Support and education to patients and family/carers.

Nurses are involved in in-patient rehabilitation and often in ambulatory cardiac rehabilitation and secondary prevention programs. One role is to detect medical and other problems which become apparent during the program and to refer patients to other health care providers, when required. Nurses are also extensively involved in patient education. They commonly facilitate group discussions on heart disease, risk factors for cardiovascular disease and other medical topics. In many smaller hospitals and community health centres, especially in rural areas, nurses are responsible for a greater range of activities, including conducting exercise sessions and recruiting patients to programs**.**

Physiotherapist

The physiotherapist should assess the physical needs of patients, devise exercise programs tailored to meet the requirements of the individual patient and supervise the exercise sessions.
The physiotherapist is mainly concerned with the physical aspects of the patient's recovery. Specific roles of the physiotherapist include assessing the physical needs and cardiovascular fitness of patients at entry to the program, prescribing exercise to minimise the deconditioning effects of physical inactivity and promoting reconditioning. The exercise program needs to be flexible and adapted to the needs of the individual patient. It should aim to facilitate recovery to a level necessary for patients to resume their work and other activities of daily living. The physiotherapist is considered best equipped to design and conduct exercise sessions. While focusing particularly upon the patients' physical needs, the physiotherapist should also address emotional concerns of patients and explore any perceived barriers to exercise. For those patients who have been almost totally inactive, the physiotherapist needs to design an acceptable exercise program, encouraging such patients to initiate and continue the recommended exercises. Other key roles of the physiotherapist include monitoring patients during exercise sessions. Pains and other physical problems reported by patients need to be assessed by the physiotherapist. The physiotherapist should provide practical advice to patients about what they can and cannot do safely, including any sporting activities. Patients seeking to exercise at high levels require particular attention and usually require medical clearance. Such patients may benefit from referral to a trained exercise therapist.
The physiotherapist may play a useful role in addressing the work requirements of patients, especially if the job is physically demanding. In this respect, the role of the physiotherapist may overlap to some extent with that of the occupational therapist. - To minimise role conflict, each team should determine which health professional has more appropriate skills for the tasks involved in promoting the physical rehabilitation of patients and allocate roles accordingly.

Dietician

The dietician is an essential member of the team, undertaking group and individual counselling about nutrition and appropriate dietary habits.
Although patients receive some dietary information in hospital, dietary advice is best provided by the dietician during the outpatient program when more time is available to follow-up advice given in hospital. Discussion over a period of weeks is highly desirable to address individual queries, especially from those with limited ability to comprehend dietary information. Moreover, several dietary sessions are recommended, because patients are generally unable to absorb all the necessary information at once.
To differing extent depending on the Cardiac Rehabilitation program and country, a dietician is involved. In some programs, dieticians facilitate several sessions, whereas in other programs, only one session is devoted specifically to dietary issues. Research findings suggest that cardiac patients generally want more dietary advice than they currently receive.
Regardless of their cholesterol levels, patients require counselling about healthy dietary habits and explanations about food labels in order to make informed choices about their diet. Practical advice about the preparation of food is also vital. Dietary information needs to be realistic, simply presented and easy to follow. The dietician needs to provide individualised advice, where possible. Information provided in a group setting can be confusing if there is a significant disparity in the ages and cultural backgrounds of participants. For example, information for an overweight, pre-diabetic 40 year old patient with lipid abnormality might be quite inappropriate for a 70 year old female with average lipid levels whose major risk factor was hypertension.
An important function of the dietician is to clarify misconceptions about diet and nutrition.
To avoid conflicting and inaccurate dietary information being imparted by different members of the team, dieticians need to ensure that all team members follow the same general guidelines concerning diet and reinforce the dietician's advice. To encourage more consistent and relevant dietary advice to patients, it is desirable for team members to receive regular in-house training and updating regarding appropriate dietary advice for cardiac patients. Written guidelines and formal protocols for nutritional education sessions can be of benefit to standardise information. Specific dietary advice should be delegated to the dietician, with other team

members providing general information only. Counselling regarding weight loss may also need to be individualised and appropriate.

Occupational therapist

The occupational therapist's role in cardiac rehabilitation programs is oriented towards assisting the patient to function effectively and independently in employment, family, social and recreational activities. Where this is not possible or appropriate, the occupational therapist should assist the patient to live as productive a life as possible within any constraints imposed by their disability.
The occupational therapist should have specific training to undertake vocational assessments to determine the feasibility and capacity of the patient to resume work at a reasonable level of physical or other occupational demand. To prepare the patient for resuming work, the occupational therapist undertakes work conditioning and, if required, may also conduct simulated work tests, liaise with the employer and visit the worksite. This needs to be completed in liaison with the Cardiologist, in order to ensure clear plans for return to work. The occupational therapist also assesses the patient's functional status and potential for resuming usual activities of daily living. Leisure and social activities are assessed.
Realistic goals are set and activities are prescribed which are functionally based. The skills acquired by the patient can then be transferred to the home or work setting.
While occupational therapists have a particular role in facilitating occupational recovery of the patient, their training is broadly based and they can contribute to the program in several areas and support other staff. For example, stress management sessions are sometimes conducted by the occupational therapist. Occupational therapists are involved in patient education and counselling and are trained in group dynamics and facilitating groups. In some programs, the occupational therapist participates in the group exercise sessions. Occasionally the occupational therapist co-ordinates the overall program. It is important for other team members to refer patients to the occupational therapist, if there are perceived occupational problems.
Although the roles of the occupational therapist and physiotherapist may overlap, their primary functions differ, with the physiotherapist using exercise and physical modalities to improve physical status, while the occupational therapist's approach is a functional one, which applies the patient's skills to perform a wide range of activities of daily living or at work. Typically, however, the occupational therapist is more involved in the later stages of the patient's recovery rather than in hospital.

Social worker
The social worker plays an important role in the team by promoting the psychosocial recovery of the patient and supporting the patient's family.
The social worker can make an important contribution to the psychosocial adaptation of the patient and family through education and intervention. The social worker's primary role is to detect any psychological or social problems and to undertake counselling, if required. Issues commonly addressed during counselling include grief and stages of loss; the development of coping strategies to handle emotional responses such as anxiety and depression; the impact of the illness on the family; and sexual activity, a concern commonly raised with the social worker during individual counselling rather than with other team members, and return to work and the future. Ideally, the social worker should have access to patients in hospital to assess the need for counselling, rather than awaiting referral from other staff. Detection of psychosocial problems may be difficult because of their subtle presentation.
In many programs, the social worker is responsible for attending to the practical needs of patients, including discussion of the patient's financial status, and where necessary, facilitating the patient's access to social security benefits and liaising with employers. The social worker may also facilitate access to community services such as home care nursing.
The social worker also has an important linking function**,** communicating with patient's spouse and family, especially during the acute phase of the illness, and offering assistance. A family meeting may be organised by the social worker to assess and assist with the patient's and family's adaptation to the illness. Another useful role played by the social worker is to organise and conduct separate spouse groups during convalescence to address any psychological problems and concerns they may have. The social worker may also follow up the patient during convalescence and, if the patient dies, offer support to the spouse.

Greater involvement of the social worker in addressing the needs of special groups is recommended. Such groups include those patients from other cultures and those who are insecure about resuming work. The social worker can make a positive contribution to teamwork by providing feedback about how the patient is coping with the illness. Instructing patients in stress management and relaxation techniques may also be undertaken by the social worker, if there is no psychologist to complete this.
While the social worker's role is especially important during the acute phase, some emotional, family and other problems may only become apparent after discharge. Thus, it is essential for a social worker to be involved in the ambulatory program.

Psychologist

The psychologist should be involved in cardiac rehabilitation and secondary prevention programs to assist with psychosocial aspects of the patient's rehabilitation and to facilitate behavioural changes.

Psychologists have a role in conducting relaxation or stress management sessions**.** The psychologist may also be trained in individual and group counselling and can therefore facilitate sessions with patients and spouses. In undertaking counselling and stress management, the psychologist's role overlaps to some extent with that of the social worker and the occupational therapist. The roles of the psychologist may also include assessing the psychological status or cognitive functioning of cardiac patients and relaying the results to the doctor and other team members. Such information can be useful in developing the patient's rehabilitation plan. Many cardiac rehabilitation programmes do not include a psychologist. However, clinical psychologists can make a significant contribution by using behavioural strategies to help patients acquire skills to change and maintain healthier behaviours. This aspect of secondary prevention needs further development in cardiac rehabilitation programs. Psychologists should be more extensively involved in programs to address this need.

Cardiologist

The cardiologist should define the medical parameters of the program, review the medical content, encourage patients to attend the program, facilitate the roles of other team members and support the program.
Cardiac rehabilitation and secondary prevention programs include a significant component of education concerning medical topics. These topics include cardiovascular disease risk factors, the development of coronary heart disease, acute cardiac events, procedures and investigations. It is essential that patients and family members receive accurate medical information from team members. Thus, the cardiologist should define the medical parameters of the program from the outset, reviewing the medical content at intervals to ensure information is current and accurate.
While cardiologists do not generally play an active role in group cardiac rehabilitation programs, they can make a significant contribution by referring patients to programs, encouraging them to attend, enquiring about the patient's progress at the program and supporting the roles of other team members**.** Where possible, it is highly desirable for the cardiologist to facilitate an occasional group discussion during the cardiac rehabilitation program. The cardiologist's participation in, or visit to, the cardiac rehabilitation group enhances patients' acceptance of the program as being important to their recovery. Further, the cardiologist should supervise the discharge review and, if undertaken, the discharge exercise test.
If cardiologists consider certain individual patients unsuitable for rehabilitation, they should advise the program co-ordinator and include this in the patient's medical records.

Cardiac surgeon

The cardiac surgeon should support cardiac rehabilitation and secondary prevention programs by referring patients and encouraging them to attend.
While cardiac surgeons do not actively participate in cardiac rehabilitation and secondary prevention programs, they should endorse the program, referring patients and encouraging them to attend.

General practitioner

The general practitioner should refer patients to group rehabilitation programs and manage the long-term medical follow-up of patients.
Referral to an ambulatory rehabilitation program should be organised before the patient is discharged from hospital. However, the general practitioner should encourage the patient to attend. Failure of medical practitioners to advise or encourage patients to attend a cardiac rehabilitation and secondary prevention program is a major reason for poor participation rates. The general practitioner should reinforce the goals of rehabilitation, ensuring that the patient understands the expected benefits of the program and the functions of other team members. To fulfil these roles adequately, the general practitioner needs sufficient information about the aims and content of cardiac rehabilitation and secondary prevention programs. Information about available cardiac rehabilitation programs should be circulated to general practitioners.
While the cardiologist is in charge of the medical management of patients in hospital, the general practitioner can put follow-up plans into action and to coordinate the patient's medical management after discharge from hospital. To maximise the contribution of the general practitioner, the cardiologist should involve the general practitioner in the early stages of each patient's recovery and provide clear guidelines on how to manage patients following their acute events.
The general practitioner is primarily responsible for the long-term medical follow-up of patients and for assisting patients to maintain healthy lifestyle changes. Thus, the general practitioner has an important educational role, especially after the patient completes the cardiac rehabilitation program. The program co-ordinator should ensure that the general practitioner receives a discharge summary about what the patient has achieved at the cardiac rehabilitation program. Any difficulties the patient is experiencing on completion of the program should also be communicated. This information should be sent to the general practitioner directly, as well as recorded on a card for the patient to take to the general practitioner. A patient held record may encourage patients to take increased responsibility for their health. Early communication with the general practitioner should minimise the likelihood of patients receiving conflicting information. The general practitioner has continuing responsibility for ensuring that there is long-term satisfactory control of patients' symptoms, lipids, smoking habit, blood pressure, diabetes, weight and well-being. This may necessitate intermittent or regular testing, as indicated by national or other current guidelines. Team members should emphasise the importance of the general practitioner's role and encourage patients to see their general practitioner at regular intervals. While the general practitioner is often close to the patient and family, other health care providers may have more time to devote to handling the patient's nutritional, psychosocial and other concerns. The general practitioner should refer the patient to other health care providers, such as dieticians and social workers, as required.
A general practitioner can also facilitate occasional education group discussions at cardiac rehabilitation and secondary prevention programs. However, as a general rule, it may not be feasible for the general practitioner to be an active participant in the cardiac rehabilitation program, because of time constraints.

Diabetes educator

A diabetes educator is a valuable member of the team and may provide individual or group counselling.
Many cardiac patients suffer from diabetes mellitus or are at high risk of developing diabetes because they are overweight or obese. Diabetes educators occasionally facilitate education groups in ambulatory programs but are more commonly involved in the counselling of individual patients who are referred to them by other team members**.**

Pharmacist

The pharmacist can play an important role by providing information and advice to the patient regarding medications and encouraging compliance with regimens.
Patients attending cardiac rehabilitation programs typically have many questions concerning the purpose of their medications and common side effects. These issues can be effectively addressed either by a pharmacist,

doctor or nurse, providing that simple terms are used and complex pharmacological jargon avoided. A Pharmacist can facilitate education session on medication as part of the Cardiac Rehabilitation Program.

Program co-ordinator

One member of the team should be the designated co-ordinator of the cardiac rehabilitation programme, in order to ensure proper organisation of the program. Any member of the team with appropriate skills may be the program coordinator.
A designated program co-ordinator is essential to ensure efficient running of the program. The co-ordinator requires good organisational, management and interpersonal skills, the time to devote to the tasks involved and a commitment to the program. Team members should approve the choice of co-ordinator.
An important function of the co-ordinator is to organise referrals, liaise with general practitioners and forward discharge summaries to them when patients complete the program. The co-ordinator should also be responsible for referring patients to appropriate community services during or following the cardiac rehabilitation program and maintain contact with patients, if possible, to follow-up their long term progress. The coordinator requires good record-keeping skills for these tasks.
Another responsibility of the co-ordinator is organising team meetings and ensuring all team members are familiar with the program. The co-ordinator should identify specific roles within the team, minimising any conflict between team members and avoiding duplication of effort. However, some overlapping of roles may be beneficial if it reinforces advice from other team members. In-house training of team members should be organised by the co-ordinator, as required.
The co-ordinator requires enthusiasm, confidence and a commitment to cardiac rehabilitation. Another important attribute is the ability to motivate others in the team. Further, the co-ordinator needs to have a sound knowledge of coronary heart disease and other cardiac conditions, as well as the relevant terminology. A good knowledge of each stage of recovery from an acute cardiac event and of the rehabilitation process is also required.

Team meetings

Team meetings should be held during the hospitalisation phase as well as during the cardiac rehabilitation program (which starts in phase 3). Meetings of the rehabilitation team should be held at regular defined times. During hospitalisation, this should happen weekly and during the cardiac rehabilitation program, meetings should be held at least monthly.
During hospitalisation the team meeting includes the patent's initial progress in terms of mobility and activities of daily living, education and awareness, discharge planning and cardiac rehabilitation plan following discharge.
During the Cardiac Rehabilitation Program the team meeting is recommended to provide regular opportunities to discuss patients who have recently enrolled and those who are experiencing problems. The specific input of each team member in relation to individual patients can also be clarified during meetings to avoid overlapping of roles. These team meetings should be held at least monthly, and preferably weekly. They should be attended by all team members. As well as addressing the needs of individual patients, these meetings should also review the program, refining it as required.

Core competencies and staff training

Practitioners who lead the cardiac rehabilitation must be able to demonstrate that they have appropriate training, professional development, qualifications, skills and competency for the elements of the program for which they are involved or responsible.

It is also advantageous for program co-ordinators and other team members to acquire basic skills in data collection and documentation. Such skills should facilitate systematic record keeping of patients' progress, contacts with attending doctors and other health care providers, and periodic auditing of the program.

ANNEX 1

BASIC CONCEPTS

Physical activity refers to any activity in which skeletal muscle contraction and relaxation results in bodily movement and requires energy. The intensity of physical activity can be described in terms of the energy required per unit of time for the performance of the activity. This energy requires per unit of time for the performance of the activity. This energy requirement can be quantified in absolute terms by measuring the oxygen uptake during exercise the activity, using respiratory gas analysis. It can be estimated using standard regression equations, as a multiple of resting energy expenditure (metabolic equivalent- MET) with one MET defined as the oxygen requirement in the resting, 1MET is equivalent to 3,5 ml O_2/kg/min of body weight. MET's are useful and convenient way to describe the intensity of variety of physical activities. Maximal aerobic capacity usually declines with age; the exercise professional should understand that when older and younger individuals work at the same MET level, the relative exercise intensity (VO_2) will usually be different. In other words, the older individual will be working at a greater relative percentage of $VO_{2max.}$ Work activities it can be calculated in multiples of METs; this measurement is useful to determine exercise prescriptions, assess disability, and standardize the reporting of submaximal and peak exercise workloads when different protocols are used. The intensity of a physical can also be defined in relative terms by expressing it is a proportion of the individual's maximal capacity (e.g... the percentage of type maximal oxygen uptake or the percentage of maximum heart rate). /Annex1./

Exercise or exercise training is planned physical activity that is performed with the goal of improving or preserving physical fitness. Physical fitness is a set of attributes that enables an individual to perform physical activity. Physical fitness is best assessed by directly measuring peak or maximum oxygen uptake during a graded exercise test. Although this not always practical , it is more commonly estimated from the peak MET level attained, or reporting the peak work rate (e.g., speed and grade of a treadmill, watts on a stationary cycle) during graded exercise tests. Although most types of exercise involve both endurance and resistance training, one training usually predominates. The physiological responses to exercise depend on the type of exercise performed.

Endurance exercise (also referred to as aerobic, dynamic, or isotonic exercise) consists of activity involving high-repetition movements against low resistance. Regular endurance exercise is also referred to as endurance training because it usually leads to an improved functional capacity, thereby enabling the individual to exercise for a longer duration or at a higher work rate.

Physical activity	Any bodily movement
Exercise	Physical activity to stress and train
Aerobic exercise	Exercise that primarily stresses the oxygen transport system and includes activities such as walking, jogging, swimming, cycling
Resistance exercise	Exercise that primarily stresses the musculoskeletal system and includes weight lifting
Exercise training	Exercise performed repetitively in order to increase the performance capacity of the cardiovascular (aerobic exercise training) or muscular skeletal (resistance exercise training) system

Table 1; Thompson PD: exercise prescription and proscriptionfor patient with coronary artery disease. Circulation 112:2354, 2005

Exercise physiology; Anticipation of dynamic exercise results in an acceleration of ventricular rate caused by vagal withdrawal, increase in alveolar ventilation, and increased venous return, primarly as s result of sympathetic venoconstraction. The magnitude of hemodynamic response during exercise depends on the severity of the exercise and the amount of muscle mass involved, in the early phases of exercise in the upright position, cardiac output is increased by an augmentation in stroke volume mediated through the use of the Frank-Starling mechanism and heart rate; the increase in cardiac output in the latter phases of exercise is primarily caused by a sympathetic-mediated increase in ventricular rate. At fixed sub maximal workloads below anaerobic threshold, steady-state condition are usually reached after the second minute of exercise, follow which heart rate, cardiac output, blood pressure, and pulmonary ventilation are maintained at reasonably constant level. During strenuous exertion, sympathetic discharge is maximal and parasympathetic stimulation is withdrawn, resulting vasoconstriction of most circulatory body systems, expect for that in exercising muscle and in the cerebral and coronary circulation.
The cardiac heart rate is decreased in older persons, partly because of decreased beta- adrenergic responsively. Maximum heart rate (HR) can be estimate from the following formula:
HR_{max} =220-age with standard deviation of 10-20 beats/min.
In the post exercise phase, hemodynamic returns to baseline within minutes of termination of exercise. Vagal reactivation is an important cardiac declaration mechanism after exercise and is accelerated in well-trained athletes but blunted in patients with chronic heart failure.

Maximal oxygen uptake (VO_2); Only small amounts of energy are immediately in skeletal muscle. Consequently, both aerobic and resistance exercise increase the body's oxygen requirements to supply energy to the exercising muscle. The amount of energy used during exercise is measured indirect as the amount of O_2 consumed. This is referred to as the ventilator oxygen consumption or VO2.Significant variation in VO2max across populations and fitness levels results primarily from differences in maximal cardiac output; therefore, VO2max is closely related to the functional capacity of the heart. Open-circuit spirometry is used to measure VO2max. In this procedure the subject breathes through a low-resistance valve with his/ her nose occluded (or through a nonlatex foam mask) while pulmonary ventilation and expired fractions of oxygen (O2) and carbon dioxide (CO2) are measured. Modern automated system provides ease of use and a detailed printout of test results that save time and effort. However attention to detail relative to calibration is still essential to obtain accurate results. Administration of the test and interpretation of results should be reserved for professional personnel with a through understanding of exercises science. Because of the costs associated with the equipment, space, and personnel needed to carry out these tests, direct measurement of VO2 max generally is reserved for research or clinical settings. When direct measurement of VO_2 max is not feasible or desirable, a variety of sub maximal and maximal exercise tests can be estimate VO_{2max}.

Myocardial oxygen uptake (**M VO_2);** Myocardial oxygen uptake increases (M VO_2) in linear fashion with increasing exercise intensity. In a normal heart, the supply of blood and oxygen matches the M VO2. The major determinant of myocardial of blood and oxygen matches the M VO2. The major determinant of myocardial blood flow is the diameter of the coronary arteries, which normally dilate to increase capacity as myocardial oxygen demand increases M VO2 demand can be estimated as the product of HR and systolic blood pressure (SBP) or the so- called double product. M VO2 = DP = HR × SBP. Although the absolute exercise work rate determines VO_2 and Q, the increases in HR and SBP are determined by the exercise VO_2 requirement as a percentage of VO_{2max}.Consequently, for any absolute exercise level, an individual with larger VO2max uses less of his or her maximal capacity and demonstrates a lower HR and SBP exercise response. The key point is that MO_2 is not determined solely by the external exercise work rate, but by the exercise work rate relative to maximal exercise capacity.

Heart rate response; The sinus rate increases progressively with exercise, mediated in part through sympathetic and parasymphetic innervations of sinoartrial node and circulating catecholamine's. In some

patients who may be anxious about the exercise test, there may be an initial overreaction of heart rate and systolic blood pressure at the beginning of exercise, with stabilization after approximately 30-60 seconds. An inappropriate increases in the heart rate at low exercise workloads may occur in patients who are in atrial fibrillation, physically reconditioned, hypovolemic, or anemic, or who have marginal left ventricular function.

Maximal work capacity; This variable is one of the most important prognostic measurements obtained from an exercise test. Maximal work capacity in normal individuals is influenced by familiarization with the exercise test equipment, level of training, and environmental conditions a at the time of testing. In patients with known or suspected CAD, a limited exercise capacity is associated with an increased risk of cardiac events and, in general, the more severe the limitation, the worse the CAD extent and prognosis. In estimating functional capacity, the amount of work performed expressed in METs, not the number of minutes exercise, should be the parameter measured. Estimates of peak functional capacity for age and gender have been will established most of the exercise protocols in common use, subject to the limitation estimates of peak functional capacity for age and gender have been will established most of the exercise protocols in common use, subject to the limitation described in the section on cardiopulmonary testing.

Anaerobic threshold is defined as the exercise intensity at which anaerobic energy pathways start to operate and where blood lactate reaches a concentration of 2 mmol/litre (at rest it is around 1). This tends to be at a heart rate of approximately 20-40 bpm less than the anaerobic threshold and correlates with about 65% of the maximum heart rate. The anaerobic energy system does not utilize oxygen to create Adenosine triphosphate (ATP) and uses glycogen/glucose. Lactic acid is the by-product of creating ATP for working muscles.

Benefits of exercise

Improvement in cardiovascular and respiratory function:

- Increased maximal oxygen uptake resulting from both central and peripheral adaptations
- Decreased minute ventilation at a given absolute sub maximal intensity
- Decreased myocardial oxygen cost for a given absolute sub maximal intensity
- Decreased heart rate and blood pressure at given sub maximal intensity
- Increased capillary density in skeletal muscle
- Increased exercise threshold for the onset of disease signs or symptoms (angina pectoris, ischemic ST segment depression, claudicating)

Reduction in coronary artery disease risk factors:

- Reduced resting systolic/ diastolic pressures
- Increased serum high-density lipoprotein cholesterol and decreased serum triglycerides
- Reduced total body fat, reduced intra-abdominal fat
- Reduced insulin needs, improved glucose tolerance
- Reduced blood platelet adhesiveness and aggregation

Decreased morbidity and mortality:

- primary prevention
- higher activity and/ or fitness levels are associated with lower death rates from coronary artery disease
- higher activity and/ or fitness levels are associated with lower incidence rates for combined cardiovascular diseases, coronary artery disease, stroke, type 2 diabetes, osteoporotic fractures, cancer of the colon and breast, and gallbladder disease
- secondary preventation (intervention after a cardiac event)
- cardiovascular and all-cause mortality are reduced in post myocardial infarction patients who participate in cardiac rehabilitation exercise training, especially as component of multifactorial risk factor reduction
- randomized controlled trials of cardiac rehabilitation exercise training involving post myocardial infarction patients do not support a reduction in the rate of nonfatal reinfarction

Other benefits:

- decreased anxiety and depression

- enhanced physical function and in dependent living in older persons
- enhanced feelings of well-being
- enhanced performance of work, recreational, and sport activities
- reduced risk of falls and injuries from falls in older persons
- prevention or mitigation of functional limitations in older adults
- effective therapy for many chronic disease in older adults

RISK STRATIFICATION

Risk of with exercise; In general, exercise does not provoke cardiovascular events in healthy individuals with normal cardiovascular systems. The risk of sudden cardiac arrest or myocardial infarction is very low in healthy individuals performing moderate intensity activities. However, there is an acute and transient increase in the risk of sudden cardiac death and or myocardial infarction in individual performing vigorous exercise with either diagnosed or occult cardiovascular disease.

Potential participants should be screened for the presence, signs, symptoms, and or risk factor of various cardiovascular, pulmonary, and metabolic diseases as well as other condition (pregnancy, orthopedic injury) that require special attention to optimize safety during exercise testing and aid in the development of a safe and effective exercise prescription. The purposes of the preparticipation health screening include the following:

- identification of individuals with medical contraindications for exclusion from exercise programs until those conditions have been abated or are under control
- recognition of persons with clinically significant disease or conditions who should participate in medically supervised exercise program
- detection of individuals at increased risk for disease because of age, symptoms, and or risk factors who should undergo a medical evaluation and exercise testing before initiating an exercise program or increasing the frequency, intensity, or duration of their current program
- Recognition of special needs of individuals that may affect exercise testing and programming

A health-care or fitness professional should have a logical and practical sequence for gathering and evaluating an individual's health information, assessing risk, and providing appropriate recommendations about additional screening procedures and physical activity recommendations (e.g. Frequency, Intensity, Time, and Type or FITT framework)

Risk stratification; Appropriate recommendations for medical examination, activity/ exercise, exercise testing and physician supervision are made based on a risk stratification process that assigns participants into one of three risk categories: (a). low, (b).moderate, (c). High risk

Low risk:	Asymptomatic men and women who have ≤1 CVD risk factor
Moderate risk	Asymptomatic men and women who have ≥2 risk factor
High risk	Individuals who have known cardiovascular,[a] pulmonary,[b] or metabolic[c] disease or one or more

Table 2; ACSM, Americian College of Sport Medicine; CVD, cardiovascular disease.
[a] cardiac, pheripheral vascular or cerebrovascular disease.
[b] chronic obstructive pulmonary disease, asthma, interstitial lung disease, cystic fibrosis
[c] diabetes mellitus, thyroid disorders, renal, or liver disease

The process by which individuals are assigned to one of these risk categories is called risk stratification based on:

- The presence or absence of known cardiovascular, pulmonary, and or metabolic disease
- The presence or absence of signs of symptoms suggestive of cardiovascular, pulmonary, and or metabolic disease
- The presence or absence of CVD risk factors

Risk stratification is based in part on the presence or absence of the CVD risk factors listed **table 3.** The health/ medical history should be reviewed to determine if the individual meets any of the criteria for positive risk factors. Clinical relevant established CVD risk factor criteria that should be considered collectively when making decisions about (a).the level of medical clearance, (b). the need for exercise testing before initiating participation, and (c).the level of supervision for both exercise program participation.

POSITIVE RISK FACTOR	DEFINING CRITERIA
Age	Men≥45yr; Women ≤55yr
Family history	MI, coronary revascularization,or sudden death before 55yr of age in father or other , Male first-degree relative, or before 65 yr of age in mother or other female first degree
Cigarette smoking	current cigarrate smoker or those who quit within the prevois 6months or exposure to environmental tobacco smoke
Sedentary lifestyle	moderate intensity (40-60% VO_2R) physical activity on at least three days of the week for at least three months
Obesity	body mass index≥30 $kg \cdot m^2$or waist girth>102 cm (40 inches) for men; and >88cm (35lnches) for women
Hypertension	systolic blood pressure ≥140mm Hg and/ or diastolic ≥90mm Hg, confirmed by measurements on at least two separate occasions, or on antihypertensive medication
Dyslipidema	Low-density lipoprotein (LDL-C), cholestrol≥130$mg \cdot dL^{-1}$ (3.37$mmol \cdot L^{-1}$) or high-density lipoprotein (HDL-C) cholesterol<40$mg \cdot dL^{-1}$ (1.04 $mmol \cdot L^{-1}$) or lipid- lowering medication. If total serum cholesterol is all that is available use ≥200mg·dL-1(5.18mmol·L-1)
Prediabetes	impaired fasting glucose (IFG)=fasting plasma glucose≥100$mg \cdot dL^{-1}$ (5.50$mmol \cdot L^{-1}$) but <126$mg \cdot dl^{-1}$ (6.93 $mmol \cdot L^{-1}$) or impaired glucose tolerance (IGT)=2-hour values in oral glucose

Table 3; atherosclerotic cardiovascular disease (CVD) risk factor thresholds for use with ACSM risk stratification

Cardiac patients may be further stratified regarding safety during exercise using published guideline.

Lowest risks	absence of complex ventricular dysrhythmias during exercise testing and recovery
	absence of angina or other significant symptoms (unusual shortness of breath, light- headedness, or dizziness, during exercise testing and recovery)

	presence of normal hemodynamic during exercise testing and recovery (appropriate increases and decreases in heart rate and systolic blood pressure with increasing workloads and recovery)
	functional capacity ≥7METs
	Non exercise Testing Findings.
	Resting ejection fraction ≥50%
	Uncomplicated myocardial infarction or revascularization procedure
	Absence of complicated ventricular dysrhythmias at rest
	Absence of congestive heart failure
	Absence of signs or symptoms of post event/ post procedure ischemia
	Absence of clinical depression
Moderate risk	presence of angina or other significant symptoms (unusual shortness of breath, light- headedness, or dizziness occurring only at high levels of exertion≥7METs)
	mild to moderate level of silent ischemia during exercise testing or recovery (ST-segment depression <2mm from baseline)
	functional capacity<5 METs
	Non exercise testing findings
	rest ejection fraction = 40-49%
Highest risk	presence of complex ventricular dysrhythmias during exercise testing or recovery
	presence of angina or other significant symptoms (unusual shortness of breath, light- headedness, or dizziness occurring only at high levels of exertion<METs or during recovery)
	high level of silent ischemia (ST-segment depression≥2mm from baseline) during exercise testing or recovery
	presence of abnormal hemodynamic with exercise testing (chronotropic incompetence or flat or decreasing systolic BP with increasing workloads)or recovery (severe post exercise hypotension)
	Non exercise testing findings
	rest ejection fraction <40%
	history of cardiac arrest or sudden death
	complex dysrhythmias at rest
	complicated MI, or revascularization procedure
	presence of congestive heart failure
	presence of signs or symptoms of postevent/post procedure ischemia
	Presence of clinical depression

Table 4; American Association of Cardiovascular and Pulmonary Rehabilitation Risk Stratification Criteria for Cardiac Patients

ANNEX 2

ASSESSMENT AND EXERCISE TESTING

The extent of medical evaluation necessary before exercise, and especially atherosclerotic cardiovascular disease (CVD), and other cardiovascular disorders, the exercise test and accompanying physical examination are critical to the development of a safe and effective exercise program.

The evaluation provides greater assurance of exercise safety by identifying residual myocardial ischemia, significant dysrhythmias, and the effect of certain medical therapies. In the clinical setting generally includes a Medical history, physical examination, and laboratory tests.

The Medical history
Medical diagnosis; including myocardial infarction and other acute coronary syndromes
Previous physical examination findings;
History of symptoms;
Recent illness, hospitalization, new medical diagnosis, or surgical procedures;
Orthopedic problems including arthritis, joint swelling;
Medication use, drug allergies
Other habits, including caffeine, alcohol, tobacco, or recreational (illicit) drug use
Exercise history.Information on readiness for change and habitual level activity; type of exercise, frequency, duration, and intensity.
Work history with emphasis on current or expected physical demands, noting upper and lower extremity requirements.
Family history of cardiac, pulmonary, or metabolic disease, stroke, or sudden death

The physical examination
Body weight; in many instances, determination of Body mass index (BMI), waist girth
Apical pulse rate, and rhythm
Resting blood pressure, seated, supine, and standing
Auscultation of the lungs with specific attention to uniformity of breath sounds in all areas (absence of rales, wheezes, and other breathing sounds)
Palpation of the cardiac apical impulse, point of maximal impulse (PMI)
Auscultation of the heart with specific attention to murmurs, gallops, clicks, and rubs
Palpation and auscultation of carotid, abdominal, and femoral arteries
Evaluation of abdomen for bowel sounds, masses, viscermegaly, and tenderness.

Palpation and inspection of lower extremities for edema and presence of arterial pulses
Absence or presence of tendon xanthoma and xanthelasma
Follow-up examination related to orthopedic or other medical conditions that would limit exercise testing
Test of neurologic function, including reflexes and cognition
Inspection of the skin, especially of the lower extremities in known diabetes patients

Recommended Laboratory Test by Level of Risk and Clinical assessment
Apparently healthy (low risk) or individuals at increased risk, but without known disease (moderate risk) Fasting serum total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides Fasting plasma glucose, especially in individuals ≥ 45 years old and younger individuals who are overweight (BMI≥25 $kg \cdot m^{-2}$) Thyroid function, as a screening evaluation especially if dyslipidemia is present
Patients with known or suspected cardiovascular disease (high risk) Preceding tests plus pertinent previous cardiovascular laboratory tests (e.g., resting 12 lead ECG, Holter monitoring, coronary angiography, echocardiography studies, previous exercise tests) Carotid ultrasound and other peripheral vascular studies Consider measures of Lipoprotein, high-sensitivity C reactive protein, LDL particle size and number, and HDL subspecies (especially in young persons with a strong family history of premature CVD and in those persons without traditional coronary risk factors) Chest radiograph, if heart failure is present or suspected Comprehensive blood chemistry panel and complete blood count as indicated by history and physical examination
Patients with pulmonary disease Chest radiograph Pulmonary function tests Other specialized pulmonary studies /e.g., oximetry or blood gas analysis/

Exercise stress testing; Exercise is common physiological stress used to elicit cardiovascular abnormalities not present at rest and determine the adequacy of cardiac function. Exercise electrocardiography is one of the most frequent noninvasive modalities used to assess patients with suspected or proven cardiovascular disease. The test is mainly used to estimate prognosis and determine functional capacity, the likelihood and extent of coronary artery disease (CAD), and the effects of therapy. Hemodynamic and electrocardiographic measurements, combined with ancillary techniques such as metabolic gas analysis, radionuclide imaging, and echocardiography, enhance the information content of exercise testing in selected patient.

Exercise testing after Myocardial infarction; Exercise testing after MI can be performed before or soon after hospital discharge for prognostic assessment, activity prescription, and evaluation of further medical therapy or interventions, including coronary revascularization. Low level exercise testing provides sufficient data to make recommendations about the patient's ability to safety perform activities of daily living and serves as a guide for early ambulatory exercise therapy. Symptom limited tests are usually performed at more than 14 days after MI. Contemporary therapies have led to dramatic reductions in mortality after MI, the use of exercise testing in the evaluation of prognosis has changed. Patients who have not undergone coronary revascularization and are unable to undergo exercise testing appear to have the worst prognosis. Other indicators of adverse prognosis in the post MI patient include ischemic ST-segment depression at a low level of exercise (particularly if accompanied by reduced left ventricular systolic function); functional capacity of) <5 METs; and hypotensive blood pressure response to exercise.

Commonly used modes of exercise testing include field test /6 minutes walking test/, step test, cycle ergometry test and graded tests. Medical supervision maybe required for moderate or high risk individuals for each of these modes.

	Advantages	Disadvantages
Fields tests: consist of walking or running a certain distance in a given time (i.e.,12 minute and 1.5-mile 2.4-km run test; and the 1and 6 minute walk test)	Easy to administer to large numbers of individuals at one time and little equipment is needed.	That they all potentially could be maximal tests, and by their nature, are unmonitored for BP and HR. These all-out run tests may be inappropriate for sedentary individuals or individuals at increased risk for cardiovascular and musculoskeletol complications. However, VO_2max can be estimated from test result.
Treadmill test; can be used for submaximal and maximal testing and often are used for diagnostic testing.	They provide a common form of exercise (e.g., walking) and can the least fit to the fittest individuals across the continuum of walking to running speeds.	Usually are expensive, not easily transportable, and make some measurements (e.g., BP) more difficult. Must be calibrated to ensure the accuracy of the test. Holding on to the support rail should

		not be permitted to ensure accuracy of the metabolic work.
Cycle ergometers tests; are excellent test modalities maximal and submaximal testing.	They are inexpensive, easily transfortable, and allow BP and ECG (if apporpriate) to be measured easily.	That is cycling is a less familiar mode of exercise, often resulting in limiting localized muscle fatigue. Cycle ergometers provide a non-weight-bearing test modality in which work rates are easily adjusted in small work-rate increments, and subjects tend to be least anxious using this device. Must be calibrated and the subject must maintain the proper pedal rate because most tests require that HR be measured at specific work rates Electronic cycle ergometers can deliver the same work rate across a range of pedal rates but calibration might require special equipment not available in most laboratories.
Step test; is an inexpensive modality for predicting CR fitness by measuring the HR response to stepping at a fixed rate and / or a fixed step height or by measuring post exercise recovery HR.	Require little or no equipment Easily transportable Stepping skill requires little practice Usually is of short duration Stepping is advantageous for mass testing	Some single –stage step tests an energy cost of 7-9MET, which may exceed the maximal capacity of participant. Inadequate compliance to the step cadence and excessive fatique in the lead limb may diminish the value of step test. Most tests are unmonitored because of the difficulty of measuring HR and BP during a step test.

ANNEX 3. Protocols of exercise testing (please, attached to of 6 minute walk test, step test, cycle ergometer test, treadmill test protocol)

ANNEX 4.

Example of Detailed protocol for Cardiac Rehabilitation Programme Phase 1-4.

FOR PEOPLE LIVING IN ULAAN BAATAR CITY (with initial admission after acute Myocardial Infarction, to No.3 Hospital)

1. Phase 1

The goals for inpatient stay;

→ Offset deleterious physiologic and psychological effects of bed rest

→ Provide additional medical surveillance of patients

→ Identify patients with significant cardiovascular, physical, or cognitive impairments that may influence prognosis.

→ Enable patients with to safely return to activities of daily living within limits imposed by their CVD

→ Prepare the patient and support system at home or in transitional setting to optimize recovery following acute-care hospital discharge

→ Facilitate patient entry, including physician referral into an outpatient cardiac rehabilitation program.

1.1. When: Immediately following Myocardial Infarction (MI)
1.2. Location: In-patients during hospital admission following acute MI
1.3. Length of Hospital Stay: max. 10 days
1.4. Referral to Rehabilitation Department:

All patients admitted with Myocardial Infarction (MI) should be referred to Rehabilitation Department within 24 hours of admission. Even if the patient is still medically unstable, early referral means that the Rehabilitation Team will be aware of the patient and can start rehabilitation as soon as he/she has stabilized.

1.5. What should rehabilitation include:

→ Reassurance
→ Information
→ Risk Factor Assessment
→ Education
→ Mobilization
→ Discharge Planning
→ Involvement and support of partner/family

1.5.1. Reassurance

Patient should be including health insurance in which patient and their family incurred economical and social risk because of rehabilitation continued to long term.

1.5.2. Information

Return to activities of daily living
Return to work
Financial issues
Return to driving

1.5.3. Risk Factor Assessment (See the Annex 1)

1.5.4. Education

This section should also include educating the patient on taking their own pulse and the understanding of the RPE (Borg Breathlessness Scale).

1.5.5. Mobilization

As soon as the patient is medically stable a rehabilitation assessment should be completed (see in annex 6).

Mobilisation needs to happen as soon as the patient is medically stable.

Early mobilisation below 13 on the Borg Breathing Scale (BBS) and guided by a HR of “resting HR + 20-30”, unless patient becomes symptomatic earlier. Symptoms such as chest pain, shortness of breath (of more than 13 on BBS), muscular fatigue or general exhaustion).

Currently there is a need for more evidence on rehabilitation (in terms of duration of activity, intensity and time for recovery/rest) during Phase Early mobilisation during the inpatient stage needs to be guided by the principles of clinical physiology of exercise and prescribed depending on the individual patient (age, gender, morbidity, co-morbidities).

The aim is to avoid inactivity, maintain and improve pulmonary function and endurance and maintain global muscle strength.

Best practice suggestions of exercise during Phase 1 include:

Table: Presentation of the ACSM recommendations for the prescription of exercises in phase I of cardiac rehabilitation
Intensity
RPE below 13 on Borg Breathing Scale (scale 6-20)
Post AMI: HR below 120 bpm or resting HR + 20 bpm (Arbitrary lower limit)
Post-surgery: resting HR + 30 bpm (Arbitrary upper limit)
Up to tolerance if non-symptomatic
Duration

Intermittent sessions lasting from 3 to 5 min
Resting periods: As the patient wishes - lasting from 1 to 2 min
Resting period should be shorter than the time of the exercise sessions
Total duration of 20 min
Frequency
Early mobilization: 3 to 4 times per day (1st to 3rd days)
Subsequent mobilization: twice per day (As from the 4th day)
Progression
Initially increase the duration by up to 10 to 15 min of exercise time and then increase the intensity

Table: Contra-indications to exercise
Unstable angina
Severe uncontrolled hypertension (resting hypertension over 200/100)
Orthostatic BP drop of more than 20mmHg with symptoms
Uncontrolled arrhythmias
Severe aortic stenosis
Uncontrolled diabetes
Complicated acute myocardial infarction
Untreated heart failure
Shortness of breath on low exertion
Resting heart rate over 100 beats per minute
Hypertrophic cardiomyopathy
Third degree heart block
Acute febrile illness
Viral infections
Monitor during exercise and stop if occur:
Exercise-induced hypotension
Exertional angina, uncontrolled by medication

1.5.6. Discharge Planning

- Discharge planning is a multidisciplinary effort, where communication between the team members is necessary.
- After discharge, generally patients are reviewed by a cardiologist in their district hospital within UB.
- If the patient lives in Ulaan Baatar, they should be offered the opportunity to be reviewed by the Rehabilitation Department in No.3 Hospital, where a Cardiac Rehabilitation Programme is implemented.
- If this is not possible, the patient can be encouraged to visit the Rehabilitation Department at their local District Hospital. – The rehabilitation doctor of No.3 Hospital should call the district-level hospital to inform them of the patient.
- Within the medical discharge letter the Cardiologist may write the rehabilitation plan: For example:

  The Rehabilitation Doctor should give advice on the activities of daily living; mobilizing and progression of exercises which the patient can complete in Phase 2 (see description under Phase 2). These exercises can be written down for the patient.

- The Rehabilitation Doctor can give the patient a telephone number to the Rehabilitation Department, so the patient can telephone, if any questions.

1.5.7. Involvement and support of partner/family

Partner/ family contribute with rehabilitation team.

1.6. Rehabilitation Staffing:

- → **Assessment (Initial and follow up):** Rehabilitation Doctor (as more Physiotherapists (PT) qualify nationally Rehabilitation Doctors should train PTs)
- → **Information:** By Multidisciplinary Team (MDT) lead by Cardiologist and Rehabilitation Doctor
- → **Mobilisation/Education:** Rehabilitation doctor to train rehab nurse (as more Physiotherapists (PT) qualify nationally Rehabilitation Doctors should also train PTs)
- → **Discharge Planning:** By Multidisciplinary Team (MDT) lead by Cardiologist and Rehabilitation Doctor
- → **Involvement and support of partner/family:** By Multidisciplinary Team (MDT) lead by Rehabilitation Doctor
- → **If a psychologist is available,** they should be involved in any psychological issues (anxiety, depression etc.). If these staffs are not available, the Rehabilitation Doctor will include this in their assessment and management.
- → **If social worker or occupational therapist is available,** they should be involved in issues related to vocation (return to work, change of work). If this staff is not available, the Rehabilitation Doctor will include this in their assessment and management.

2. Phase 2

2.1. When: Immediate post-discharge, normally lasts for 4-6 weeks
2.2. Location: Home and Hospital Outpatients
2.3. What should rehabilitation include:

- → **Phase 2 progression of ADL, mobility and exercise**
- → **Telephone Follow-up**
- → **Review Appointment**

2.3.1. Phase 2 progression of ADL, mobility and exercise. This phase generally happens at home, immediately following discharge.
The aim within this phase is for the patient to gradually return to their normal activities of daily living both personal (washing, dressing etc.) and domestic (cooking, cleaning, shopping) and to progress their mobility (distance and speed) walking outside. It is recommended, that the patient mobilise/physically active for 20-30 minutes per day, to a RPE of 11 (BBS).

Table: Contra-indications to exercise
Unstable angina
Severe uncontrolled hypertension (resting hypertension over 200/100)
Orthostatic BP drop of more than 20mmHg with symptoms
Uncontrolled arrhythmias
Severe aortic stenosis
Uncontrolled diabetes
Complicated acute myocardial infarction
Untreated heart failure
Shortness of breath on low exertion
Resting heart rate over 100 beats per minute
Hypertrophic cardiomyopathy
Third degree heart block
Acute febrile illness
Viral infections
Monitor during exercise and stop if occur:
Exercise-induced hypotension
Exertional angina, uncontrolled by medication

2.3.2. Telephone Follow-up by one rehabilitation doctor – using a telephone screen form to assess the current situation, in terms of return to the normal personal and domestic activities of daily living.This telephone follow-up should be completed within 7-10 days of discharge.

2.3.3. Cardiologist review normally happens at the patient's local district hospital, however may also happen at the tertiary hospital, where the patient was admitted or at the district hospital if patient is from an Aimag outside of Ulaan Baatar or were admitted there initially.
This review normally happens within 4 weeks of discharge.

2.3.4. Rehab doctor to review the patient in the Rehabilitation Outpatient Department after 4 weeks. This visit will include:

- Review assessment (see example of assessment form in Annex 8)
- Risk assessment
- Exercise testing (see below) to identify current exercise frequency, duration, intensity
- If no ECG available, including age predicted maximal heart rate and training (target) heart rate.
- Discussion with patient, whether patient able to start (wish to start) Cardiac Rehabilitation Group – if so, then the exercises which the patient will do in the Rehabilitation Class will be completed finding the initial frequency, duration and intensity of each exercise within the training heart rate.
- If the patient does not want to join the Cardiac Rehabilitation Group, then it is advised to identify, if the patient will be safe to complete an exercise programme independently. If yes, then the exercises, which normally would be done in the Cardiac Exercise Group will be completed finding the initial frequency, duration and intensity of each exercise within the training heart rate and a written home exercise programme given.
- Review if patient able to take own pulse and if the patient understands the use of the Borg Scale to determine his/her breathlessness. Patient should be educated on how to use the heart rate and RPE to guide their exercise (as educated during Phase 1 as well).

→ **For the exercise testing:**
If a 12-lead exercise tolerance test is not possible to complete, then one of the following exercise tests should be chosen and completed:

a. Walk test (6-minute Walk Test)

b. Step test

c. Cycle ergometer test

d. Arm ergometer test

e. Graded exercise test

A qualitative measure such as the 12-item Duke Activity Survey Index can also be administered.

- See Annex 3 for description of tests

Rehabilitation Staffing:

→ **Telephone Follow-up: Rehab doctor** (as more Physiotherapists (PT) qualify nationally Rehabilitation Doctors should train PTs)
→ **Re-assessment (face-to-face): Rehab doctor** (as more Physiotherapists (PT) qualify nationally Rehabilitation Doctors should train PTs)

3. Phase 3

3.1. When: Intermediate time post-discharge (from 6-8 weeks following discharge)
3.2. Location: Rehabilitation Outpatients within No.3 Hospital
3.3. What should rehabilitation include:

→ Individualised Treatment programme based on a programme of 10 exercises, where the frequency, duration and intensity is individual to each patient (see below exercises) either in Cardiac Rehabilitation Group or as a home exercise programme, if assessed as safe.

3.3.1. Frequency and duration of exercise: Evidence suggests that exercise should be completed 3 times per week for 30 minutes (the 30 minutes, can be divided into smaller sections of 10 minutes)**.** Due often to limitation in resources a Cardiac Rehabilitation Group is normally run twice weekly within the Outpatient Rehabilitation setting. The aim is for the patient (if considered safe) to continue with a home exercise programme. (for local protocol: Wednesday and Friday 3-4.30 pm

3.3.2. Duration: Each session will last 90 minutes and the patient will attend between 6-8 weeks.

3.3.3. Format of Cardiac Rehabilitation Group
The Cardiac Group is divided into 6 sections:

- Introduction to class and BP, HR, RPE monitoring at rest: 5 minutes
- Warm up: 10-15 minutes
- Exercise circuit: 30-35 minutes
- Cool down: 10 minutes
- Relaxation: 15 minutes
- Education/advice and question session: 15 minutes

3.3.4. Detailed steps within the Cardiac Rehab Group:

1. After 5 minutes of sitting down start with taking blood pressure, resting HR and rate of perceived exertion (RPE- Borg) at rest
2. Warm up for 10-15 minutes (see specific example of warm up exercises.
3. One patient starts at each exercise station. <u>It should be the same exercise station to which the patient starts at each session</u>.
4. Each exercise station will take 30 seconds - 3 minutes followed by 30 seconds rest.
5. After each exercise station the RPE (Borg) will be taken. After every second station the HR will be taken. It must be monitored that the HR stays within the training heart rate.
6. Following the exercise circuit the cool down period of 10 minutes with slow walking and stretches.
7. Repeat measurement of HR and RPE (Borg) 10 minutes after exercise. Program has been completed.
8. Relaxation for 10-15 minutes in a sitting or lying position. This could be completed with relaxing traditional Mongolian music, or through imagery, where the staff member asks the patients to visualize of peaceful place.
9. Education, advice and patient questions for 15 minutes. The education can be structured into 6-8 different aspects, so a new topic is chosen in each of the Cardiac Rehabilitation sessions. If the program is a rolling program (meaning that a new patient can start at

anytime) they will manage to have all the training during the 6-8 weeks of cardiac rehabilitation training.

3.3.5. Exercises for cardiac rehabilitation within the Rehabilitation Department

Table: Example of exercises to include:

Below is a suggestion of 10 exercises to be included in a cardiac exercise programme, which require minimal equipment or low-cost equipment and least risk of patients completing exercises wrongly, when exercising alone. Caution should be taken, giving exercises to patients, which require high level of precision to complete correctly.

No.	Exercise	Description/ Progression
1	10 meter walking	Increase duration, before increasing the speed of walking
2	Biceps curls	Increase repetitions and duration of exercise, before adding a weight (0.5kg – 1kg)
3	Cycling	Increase duration, before increasing resistance to bike
4	Sit-to-stand	Start by using hands on side of chir/arm-rests. Then increase repetitions and duration before trying sit-to-stand with no hands. Lastly reducing height of chair.
5	Triceps press-ups against wall	Increase repetitions and duration, before increasing distance of body from wall and depth of press-up
6	Marching on the spot/ alternate hand to opposite knee	Increase duration, before increasing hip/knee flexion and arm swing
7	Lateral arm raises	Increase repetitions and duration of exercise, before adding a weight (0.5kg – 1kg)
8	Calf exercises	Increase repetitions and duration, before starting to jog on the spot
9	Step ups	Increase repetitions and duration, before increasing height of step
10	Floor mats: Sit-ups placing hands on	This should be the last exercise completed, in order to avoid changing from

	knees, bridging exercise	standing-lying-standing during the exercise program.

3.3.6. Safety during Cardiac Rehabilitation

Safety during the Cardiac Rehabilitation Group should include:

1. Staff must be trained in cardiopulmonary resuscitation (CPR)
2. Staff Must know the telephone number for the hospital CRASH TEAM
3. There must be a working telephone in the training room, where the Cardiac Rehabilitation Group is being completed
4. Staff must know where the nearest resuscitation equipment is located (this equipment should be easy to retrieve)
5. Regular updates of the CPR, should be completed.
6. During each training session the staff member must place close attention to the medical state of the patient and pay attention to their HR, BP and RPE as well as other clinical signs of adverse effects to the exercise. – The staff member must act on this immediately.
7. The contraindication is a similar to phase 1 and 2.

3.3.7. Education

Each cardiac Rehabilitation session should include some education, information/ advice and time for questions. Below table, shows an example of some of he topics to be covered.

Table: Example of what education sessions should include
Common misconceptions about cardiac illness that lead to increased disability
Pathophysiology and symptoms
Risk factors: Smoking and the effect
Risk factors: Diet and the effect
Physical activity/inactivity
Psychological issues (mood and emotions)
Occupational factors
Sexual dysfunction
Pharmaceutical, surgical interventions and devices
Cardiopulmonary resuscitation

Basic anatomy and physiology of the heart

—Effects of heart disease, the healing process, recovery and prognosis

—Risk factors for heart disease and their modification for secondary/ ongoing prevention

—Skills for behaviour change and maintenance

—Resumption of physical, sexual and daily living activities including driving and return to work

—Psychological issues – mood, depression, emotions, sleep disturbance

—Social factors – family and personal relationships, social support/isolation

—Management of symptoms – chest pain/ warning signs of heart attack, breathlessness, palpitations

—Medications – indications, side effects, importance of concordance

—Investigations and procedures

—Cardiac health beliefs and misconceptions

—Importance of follow up by specialist, General Practitioner/ Primary Health Care provider

3.4. Rehabilitation Staffing:

There should at least a staff ratio of 5:1 (5 patients: 1 Rehabilitation Doctor) within the Cardiac Rehabilitation Group. – Depending on the severity of the patients there should be more staff available.

→ Staff should include at least a rehabilitation doctor
→ A rehabilitation nurse could be trained by a rehabilitation doctor in order to support the Cardiac Rehabilitation Group.
→ As more Physiotherapists (PT) qualify nationally Rehabilitation Doctors should train PTs as well

4. Phase 4

4.1. When: Following Phase 3 – long-term maintenance
4.2. Location: At home and could be in community facilities if local exercise groups were set-up
4.3. What should rehabilitation include:

→ Progression of the patient's exercise programme from phase 3 (see above)
→ Telephone follow-up
→ Rehabilitation review after 4 months. Then after review, either progress exercises at home OR continue with exercise program OR come back to Cardiac Rehabilitation Group for support in completing exercise programme.

4.4. Discharge to self-maintenance

Decide if patient is ready to be discharged to a self-maintenance of the Cardiac Rehabilitation Programme or whether the patient will need review again.

FOR PEOPLE LIVING IN AIMAGS OUTSIDE OF ULAAN BAATAR CITY

1. Phase 1

For all patients admitted with Myocardical Infarction (MI) to a aimag's hospital, the above guideline for Phase 1 post MI rehabilitation is adviced to be followed.

2. Phase 2

If a patient has been discharged from No.3 Hospital to their Aimag, then the rehabilitation Doctor from No.3 Hospital will call patient to monitor their progress with their activities of daily living, mobility and exercises. The rehabilitation doctor should also encourage the patient to attend their local district Rehabilitation Department for further review of their exercises.

The Rehabilitation Doctor from No.3 Hospital could liaise with the Rehabilitation Department at the local district-level hospital in order to give report regarding the patient.

If a patient was admitted with acute myocardial infarction to the local district hospital, the rehabilitation doctor should follow the above guideline for Phase 2.

3. Phase 3

A set-up of a Cardiac Rehabilitation Group or a home exercise programme, should follow the above guideline for Phase 3.

For advice and further information, the local Rehabilitation Doctor is advised to contact the Rehabilitation Department of No.3 Hospital in Ulaan Baatar

4. Phase 4

The progression to the long-term maintenance programme, please follow the above guideline for Phase 4.

ANNEX 5. MET values

	LIGHT (<3METs)	MODERATE (3-6 METs)	VIGOROUS(>6METs)
Walking	Walking slowly around home, store or office=2.0[a]	Walking 3.0mph=3.0;	Walking at very, very brisk(4.5mph) =6.3[a];
			Walking/hiking at moderate pace and grade with no or light pack (<10pounds)=7.0[a];
			Hiking at steep grades and pack 10-42pounds)=7.5-9.0 [a]
		Walking at very brisk pace(4mph)=5.0[a]	Jogging at 5mph=8.0 *a*
			Jogging at 6mph=10.0 *a*
			Running at 7mph =11.5 *a*
Household and occupation	Sitting-using computer, work at desk, using light hand tools=1.5 *a*	Cleaning, heavy- washing windows, car, clean garage=3.0[a]	Shoving sand, goal, etc=7.0
		Sweeping floors or carpet, vacuuming, mopping=3.0-3.5[a]	Carrying heavy loads, such as bricks=7.5
	Standing performing light work, such as making bed, washing dishes, ironing, preparing food or store clerk =2.0-2,5*a*	Carpentry-general=3.6α	Heavy farming, such as bailing hay=8.0
		Carrying and stacking wood=5.5*a*	Shoveling, digging ditches=8.5
		Moving lawn- walk power mower=5.5 *a*	
Leisure time and sports	Arts and crafts, playing cards=1.5 *a*	Badminton-recrational=4.5 *a*	Basketball game=8.0
	billiards=2.5 *a*	Basketball-shooting a round=4.5 *a*	Bicycling on flat- moderate
	boating-power=2.5 *a*	Bicycling on flat- light effort (10-12mph) =6.0 *a*	Effort (12-14mph) =8.0
	croquet=2.5 *a*	Dancing-ballroom slow=3.0; ballroom fast =4.5	Fast (14-16mph) =10.0
	Darts=2.5 *a*	Fishing from riverbank and walking=4.0	Skiing cross country-slow (2.5mph=7.0;fast)
	Fishing-sitting=2.5 *a*	Golf- walking pulling clubs =4.3	Soccer- casuel=7.0
	Playing most musical instruments=2.0-2.5 *a*	Sailing boat, wind surfing=3.0	competitive=10.0
		Swimming leisurely=6.0*b*	Swimming- moderate/ hard = 8-11[b]
		Table tennis =4.0	Tennis singles=8.0
		Tennis doubles=5.0	Volleyball- competitive at gym or bech = 8.0
		Volleyball-noncompetitive=3.0-4.0	

Table.2.1 *MET values of common physical activities classified as light, moderate, or vigorous intensity [a]--on flat, hard surface; [b]-MET values can vary substantially from person to person during swimming as a result of different strokes and skill levels; MET, metabolic equivalent; mph, miles per hour.*

ANNEX 6: Myocardial Infarction assessment form- Phase 1

Myocardial Infarction Assessment Form – PHASE 1

Rehab Doctor - Physiotherapy – Occupational Therapy

Card № _____Ward_____Room_____

Age:_____ Gender:_____ Date of MI_____ Admission date_____

Diagnosis	**PMH/ Family History**
Reason for referral	
HPC	
Resus Status:	
Medications	**Social History (living, work, leisure)**
How is the medication Managed?:	

Assessment Findings		**Risk Factors**	
Blood Pressure		Smoking	
		Hypertension	
Weight		High Cholesterol	
		Diabetes	
Height		Obesity/ Metabolic Syndrome	
		Family History	

BMI		Alcohol Intake	
		Stress	
Waist Circumference		Physical Inactivity (current exercise level pre-admission)	
ECG			

№	**ADL**				
	Barthel index	Independent	Partial independent		Dependent
1	Feeding 0 = unable 5 = needs help cutting, spreading butter, etc., or requires modified diet 10 = independent	10	5		0
2	Bathing (or shower) 0 = dependent 5 = independent (or in shower)	5			0
3	Grooming 0 = needs to help with personal care 5 = independent face/hair/teeth/shaving (implements provided)	5			0
4	Dressing 0 = dependent 5 = needs help but can do about half unaided 10 = independent (including buttons, zips, laces, etc.)	10	5		0
5	Bowels 0 = incontinent (or needs to be given enemas) 5 = occasional accident 10 = continent	10	5		0
6	Bladder 0 = incontinent, or catheterized and unable to manage alone 5 = occasional accident 10 = continent	10	5		0
7	Toilet Use 0 = dependent 5 = needs some help, but can do something alone 10 = independent (on and off, dressing, wiping)	10	5		0
8	Transfers (bed to chair and back) 0 = unable, no sitting balance 5 = major help (one or two people, physical), can sit 10 = minor help (verbal or physical) 15 = independent	15	10	5	0
9	Walking on the even ground 0 = immobile or < 50 yards 5 = wheelchair independent, including corners, > 50 yards 10 = walks with help of one person (verbal or physical) > 50 yards 15 = independent (but may use any aid; for example, stick) > 50 yards	15	10	5	0
10	Stairs 0 = unable 5 = needs help (verbal, physical, carrying aid) 10 = independent	10	5		0
	Score 0 / 100				
	Explanation : Above 60 : independent Below 40 : partial dependent Below 20 : full dependent				

Respiratory System			
NAD	Oxygen requirement _____% by nasal cannula/ O2 mask	SpO2	Cough Effective/ Weak/ Insufficient

DASI - duke activity status index

№	Action	Date	Once come hospital	Discharge hospital
1	Take care of yourself by eating, dressing, bathing, toileting?	2.75		
2	Walk indoors such as around the house?	1.75		
3	Walk a block on level ground?	2.7		
4	Climb a flight of stairs or walk up hill?	5		
5	Run a short distance?	5.5		
6	Do heavy housework such as scrubbing floors or moving furniture?	8		
7	Do light housework such as dusting or washing dishes?	2.7		
8	Do moderate housework: vacuuming, sweeping, or carrying groceries?	3.5		
9	Do yard work such as raking, weeding, or pushing a mower?	4.5		
10	Have sexual relations?	5.25		
11	Moderate Exercise such as golf, bowl, dance, doubles tennis, throw ball?	6		
12	Strenuous Exercise such as swim, ski, singles tennis, football, basketball?	7.5		
Explanation : score +MET=/0,43*all score +9.6/3.5				

ANALYSIS and PLAN

DATE	**IMPAIRMENTS**
	☐ Breathlessness ☐ Impaired functional activity ☐ ROM limitation ☐ Pain
DATE	**ACTIVITY LIMITATIONS/PARTICIPATION RESTRICTIONS**
DATE	**ENVIRONMENTAL & PERSONAL FACTORS**
DATE	**ACTION PLAN (further Ax, treatment plan, referrals)**

ANNEX 7. Phase 1 exercise programme

Activity		**Date**	**Date**	**Date**	**Date**
Level 1 (1-1.5 METS)					
1	Introduction and explanation of rehabilitation				
2	Discuss the patients goals and the Cardiac Rehabilitation goals				
3	Time for patient to ask questions				
4	Diaphragmatic breathing instruction with lateral costal expansion (check if other respiratory problems)				
5	Range of motion exercises in supine (5-10 repetitions*): - Hip abduction/adduction - Single knee to chest exercise -Shoulder flexion (active assisted if necessary)				
6	Transfer out of bed and sit on bed side/ chair for up to 15 minutes				
7	Ankle circling 10 repetitions per hour				
Level 2 (1.5 METS)					
1	Progress exercises in sitting: - Isotonic knee active extension (5-10 repetitions*) - Shoulder flexion (7-10				

	repetitions*) - Trunk bending (5 repetitions*)				
2	Progress exercises in standing: - Knee bending (10 repetitions*) - Shoulder flexion (10 repetitions*) - Trunk bending (10 repetitions*)				
3	Stationary walking for 1 minute*				
Level 3 (1.5-2.0 METS)					
1	Progression of standing exercise: - Knee bending (15 repetitions*) - Shoulder flexion (10-12 repetitions*) - Trunk bending (10 repetitions*)				
2	Start mobilising: Walking, aim for 30-60 meters in 1½ - 2½ minutes*)				
3	Teach patient how to take their pulse and understand the Borg Scale				
Level 4 (2.0 METS)					
1	Standing exercises: - Knee bending (15 repetitions*) - Double arm raises with abduction (14 repetitions*)				

	- Lateral trunk bend (7 repetitions*)				
2	Progress mobility: Walk 90 meters in 2-2½ minutes*				
Level 5 (2.0-2.5 METS)					
1	Standing exercise: - Hip circling (15 repetitions each hip*) - Trunk circle (10-15 repetitions*) - Single arm swing with trunk twist (10 repetitions*)				
2	Progress mobility: Walk 90-120 meters in 1½-2 minutes*				
Level 6 (2.5-3.0 METS)					
1	Instructions to patient on warm up and cool down exercises and starting them				
2	Progress mobility: Walk 120-180 meters in 2-3 minutes*				
3	Climb 1 flight of stairs				
Level 7 (3.0-3.5 METS)					
1	Instruction in a home exercise plan for exercises and walking for Phase 2 (when patient is discharged from hospital)				

2	Progress mobility: Walk 240 meters in 3 minutes* with independent warm up and cool down exercise. The patient should also independently take their pulse and understand the use of Borg Breathing Scale.				

Personal activities of daily living (ADL), should be started simultaneously with the above exercises, with progressions within patients limits. This means an RPE equal or below 13 on the Borg Breathing Scale (BBS) and guided by a HR of "resting HR + 20", unless patient becomes symptomatic earlier. Symptoms such as chest pain, shortness of breath (of more than 13 on BBS), muscular fatigue or general exhaustion).

*** =** The repetitions in the exercises above are guidance only, as the exercise needs to be guided by the patient's HR, BP and RPE.

Prior to Discharge	
Has Patient been given advice and education regarding return to activities of daily living? **Assessment of return to work:**	Y/N Y/N
Home program given	Y/N
Patient understand and can complete the given exercises independently	Y/N
Can Patient monitor own heart rate	Y/N
Does patient understand the use of Borg Scale	Y/N
Date given for review appointment (if patient lives in UB and wishes to come for review)	Y/N
Has patient been given a contact telephone number for the Rehabilitation Department?	Y/N
Additional Information	

ANNEX 8. Myocardial Infarction Assessment form- Phase 2-3

Myocardial Infarction Assessment Form – PHASE 2-3

Rehab Doctor - Physiotherapy – Occupational Therapy

Card № _____ Age:_____ Gender:_____ Date of MI_____

Admission-discharge date _____ from which hospital_____

<table>
<tr><td>Diagnosis</td><td rowspan="5">PMH/ Family History

Any musculoskeletal problems (that might effect exercise)</td></tr>
<tr><td></td></tr>
<tr><td>Reason for referral</td></tr>
<tr><td></td></tr>
<tr><td>HPC</td></tr>
<tr><td colspan="2">Medications</td></tr>
<tr><td colspan="2">Beta Blocker (maybe write the Mongolian drug names as example)
Ace inhibitor (maybe write the Mongolian drug names as example)
Digoxin</td></tr>
<tr><td colspan="2">Social History</td></tr>
<tr><td>Living situation</td><td></td></tr>
<tr><td>Work (return to work after MI, detail the exact job regarding level of activity, carrying of loads, amount of time standing/ sitting)</td><td></td></tr>
</table>

Leisure	
Other	

Patients main identified problems	
Patients main goal/ wish (in terms of returning to activities)	

Assessment Findings		**Risk Factors**	
Blood Pressure		Smoking	
Heart Rate (resting)		Hypertension	
Weight		High Cholesterol	
Height		Diabetes	
BMI		Obesity/ Metabolic Syndrome	
Waist Circumference		Family History	
ECG during in-patient stay		Alcohol Intake	
		Stress	
Any respiratory problems		Physical Inactivity	

Range of Motion		Flexion	Extension	Adduction	Abduction	Ext. rotation	Int. rotation
Shoulder	Active						
	Passive						
Elbow	Active						
	Passive						
Wrist	Active						
	Passive						
Hip	Active						
	Passive						
Knee	Active						
	Passive				Eversion	Inversion	
Ankle	Active						
	Passive						
Key: FROM = full range of motion/Limited/Severe or measurement in degrees							

Cardiac Rehab Outcome Measures

DASI - duke activity status index

№	Action	METS	1st Assessment	Discharge from Cardiac Group
1	Take care of yourself by eating, dressing, bathing, toileting?	2.75		
2	Walk indoors such as around the house?	1.75		
3	Walk a block on level ground?	2.7		
4	Climb a flight of stairs or walk up hill?	5		
5	Run a short distance?	5.5		
6	Do heavy housework such as scrubbing floors or moving furniture?	8		
7	Do light housework such as dusting or washing dishes?	2.7		
8	Do moderate housework: vacuuming, sweeping, or carrying groceries?	3.5		
9	Do yard work such as raking, weeding, or pushing a mower?	4.5		
10	Have sexual relations?	5.25		
11	Moderate Exercise such as golf, bowl, dance, doubles tennis, throw ball?	6		
12	Strenuous Exercise such as swim, ski, singles tennis, football, basketball?	7.5		
Explanation : score +MET=/0,43*all score +9.6/3.5				

Prior to starting cardiac rehabilitation program	
Has the patient gone through the cardiac rehabilitation exercise programme? **Any comments**	Y/N
Does the patient want to attend the cardiac Rehab Group?	Y/N – if yes, which date:
If not, has a home exercise program been given **If patient will complete home exercise program only, when will patient have review appointment in outpatient rehab department?**	Y/N
Patient understand and can complete the given exercises independently	Y/N
Can patient monitor own heart rate	Y/N

Does patient understand the use of Borg Scale	Y/N
Has patient been given a contact telephone number for the Rehabilitation Department?	Y/N
Additional Information	

If the patient uses a GTN spray, then remind patient to take their GTN spray with them prior to the cardiac exercise group

Education Sessions Attended during Cardiac Rehab Group (tick)			
Heart Disease		Exercise	
Stress/ relaxation		Diet	
Medication		Smoking	
Cardiologist		Psychological issues (mood and emotions)	
Cardiopulmonary resuscitation		Common misconceptions about cardiac illness that lead to increased disability	

ANNEX 9. Example of home exercise programme

Client Name:……...

Date:……..

Goal:……..

Home Exercise Programme

We want to encourage you to exercise at home so that you get used to exercising on your own. This Home Exercise Programme can be followed on the days you don't attend the Cardiac Rehabilitation exercise classes.

To maintain a healthy heart it is recommended that you are participating in 30 minutes of moderate intensity exercise at least 5 times a week.

Please use this Home Exercise Programme to help you to remain active after your course of Hospital Based Cardiac Rehabilitation has ended.

Guidelines for home based exercise

- Wear comfortable clothing and supportive footwear
- Prepare a space that is free of obstacles and safe to exercise in
- Allow at least 2 hours between eating your last large meal and beginning to exercise. If you are diabetic you need to follow the advice given by your Family Doctor or Diabetic Nurse
- If you use a GTN spray or an asthma inhaler it is important to have it with you when you exercise
- Do not exercise if you feel unwell for example you have a cold or are recovering from the flu
- Work within your own limits. While you are exercising you should aim to feel "comfortably breathless" but still able to have a conversation
- Avoid exercise or activity that makes you hold your breath, such as lifting a heavy weight
- **If you experience chest pain, dizziness or severe shortness of breath, stop immediately** and be in contact with your Family Doctor or local Hospital.
- If you experience pain in your joints or muscles, stop the exercise. Consult your Family Doctor or the Rehabilitation Department for advice.
- Contact the Rehabilitation Team at Hospital:_____ on telephone number:_____ if you have any questions or concerns about your home exercise programme

Activity Diary

You might find that keeping an exercise diary helps you keep track of your progress. You can fill in your diary every time you do some exercise or activity.

Day	Date	Exercise/activity	How long for?	Effort or exertion	Any comments

The Borg Scale

While exercising, we want you to rate your perception of exertion i.e. how heavy and strenuous the exercise or activity feels to you. The perception of exertion depends mainly on the strain and fatigue in your muscles and on your feeling of breathlessness.

Look at the rating scale; we want you to use this scale from 6-20 where 6 means "no exertion at all" and 20 means "maximal exertion"

9 corresponds to "very light" exercise. It is like walking slowly at your own pace for some minutes. Your breathing should be well controlled.

13 on the scale is "somewhat hard" exercise, but it feels ok to continue. Your breathing rate will be increased and you may feel warmer, or even sweat slightly. You may find you are slightly short of breath. It should be comfortable to talk whilst you exercise.

15 "very hard" is very strenuous. You could go on but you really have to push yourself. It feels very heavy, and you are very tired. You are unable to talk at a normal speed or in full sentences.

19 on the scale is an extremely strenuous exercise level. For most people this is the most strenuous exercise they have ever experienced.

Try to appraise your feeling of exertion as honestly as possible, without thinking about how hard you think it should be. Don't underestimate it, but don't over estimate it either. It's your own feelings of effort and exertion that's important, not how it compares to other people. Look at the scale and the descriptions and then give a number.

The Borg Scale (Borg RPE scale, 1998)

6 No exertion at all

7 Extremely light

8

9 Very light

10

11 Light

12

13 Somewhat hard

14

15 Hard (heavy)

16

17 Very hard

18

19 Extremely hard

20 Maximal exertion

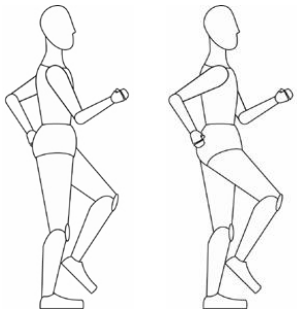
Warm up for home based circuit

Time: 15 minutes

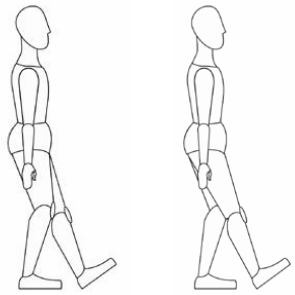
Intensity: very light, light (up to 9-11 using the Borg scale)

Gentle activity to prepare the body for exercise

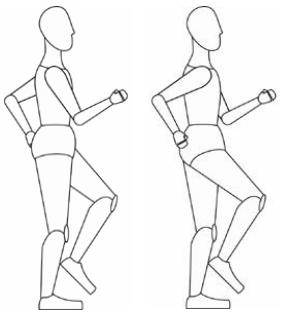
- Walk on spot x 1 minute



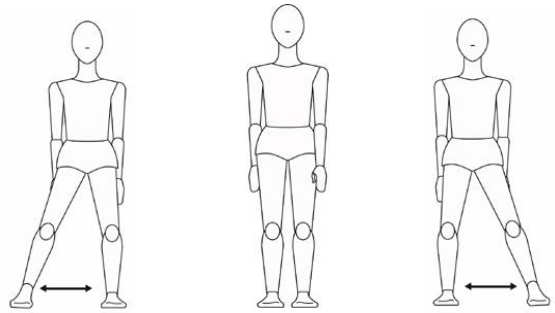
- Heel digs x 16



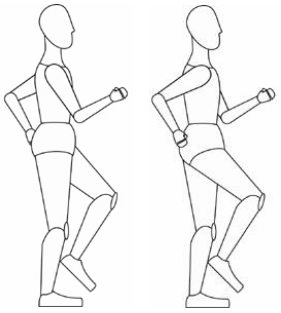
- Walk on spot x 1 minute



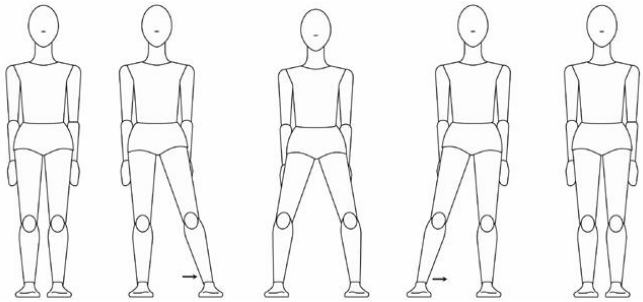
- Side taps x 16



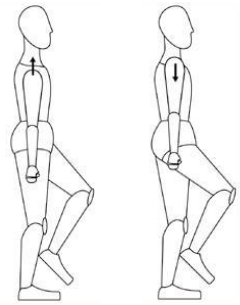
- Walk on spot x 1 minute



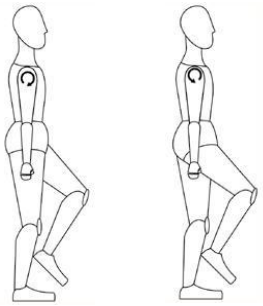
- Side steps x 16



- Walk on spot as you <u>lift and lower the shoulders</u> x 4



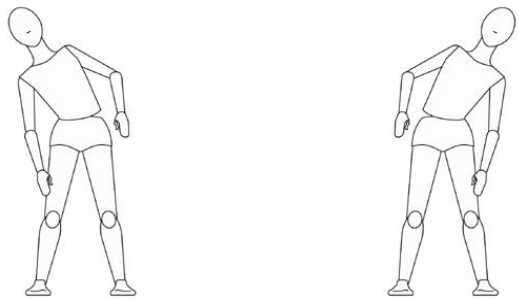
- Walk on spot as you <u>circle your shoulders</u> x 4



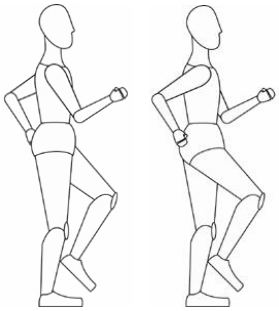
Stand with your feet shoulder width apart

- Side bends x 2 each side

Sliding hand down the side of leg towards the knee in a smooth controlled way x 2 each side

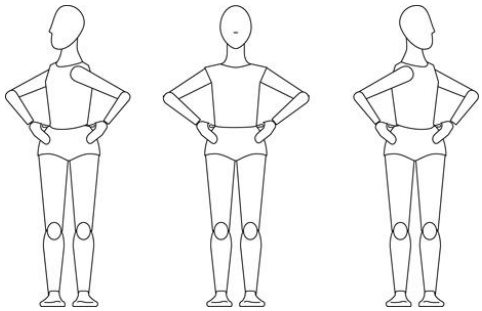


- Walk on spot x 1 minute

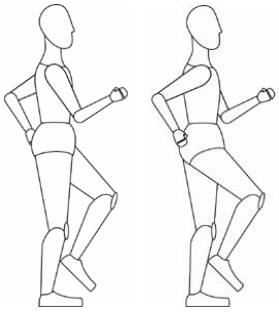


- Trunk twist x 2 each side

Keeping lower body still as you turn your upper body x 2 each side



- Walk on spot x 1 minute



Repeat the all the exercises above with a little more effort so you begin to feel warmer and notice an increase in your breathing. The exercise should still feel light and very comfortable. You are now ready to do your warm up stretches.

Warm up stretches

- Hold the stretches without bouncing for 8-10 seconds
- You should feel a gentle stretch in the muscle
- **Keep the feet moving when stretching the arms and upper body.**
- **Keep the feet moving between stretches where possible**
- Breathe normally during the stretches

1. Front of chest

- Keep your feet moving
- Place both your hands on your lower back or bottom
- Lengthen your spine and open out across the front of the chest
- Take both elbows back to open out and stretch across the front of your chest

Comments:

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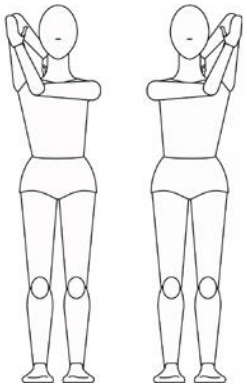
2. Back of upper arm

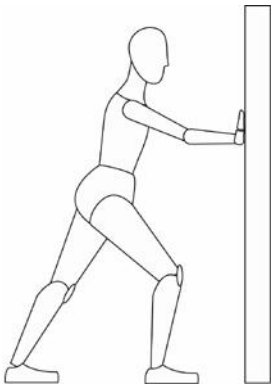
- Keep your feet moving
- Place the right hand on your right shoulder
- Using your left hand gently ease your right elbow towards the ceiling until you feel a stretch in the back of the arm
- Keep the body and the neck upright and avoid lifting your shoulders towards your ears
- Repeat on other arm



Comments:

3. Calf stretch (standing)

- Stand tall with feet hip-width apart
- Take one leg backwards and place the foot on the floor
- Bend the front knee, and straighten the back leg until you feel a stretch in the back calf muscle
- Keep both heels on the floor and your toes facing forwards
- You can use a wall for support
- Repeat on other side



Comments:

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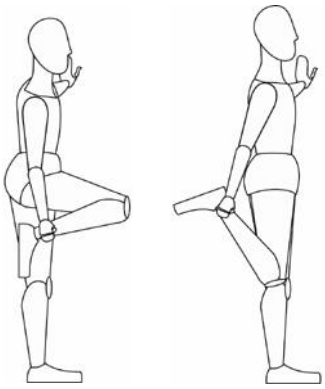
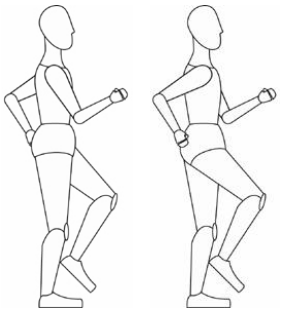
4. Front of thigh (standing)

- Stand tall with one hand on a wall
- Bring your right knee forwards
- Take hold of the back of your right ankle, sock or trouser leg and lower the knee so both knees are together
- Take care not to arch your back
- Feel the stretch down the front of your bent leg
- Repeat on the other side



Comments:

- Brisk walk on spot x 2 minute



Circuit

Time: Up to 20 minutes

Intensity: Moderate (Borg 11-13) “Exertion without discomfort”

Do the exercises from 1-6

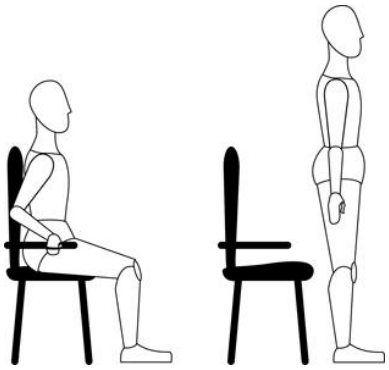
Do each exercise for ___ minutes

Complete the circuit ___ times

Exercise 1a: Sit to stand – high chair

Equipment: Stable chair against a wall

- Sit tall towards the front of the chair
- Place feet hip distance apart, with the heels slightly further back than usual
- Keep your tummy muscles gently pulled in and lean forwards from the hips to stand up
- Sit down with control

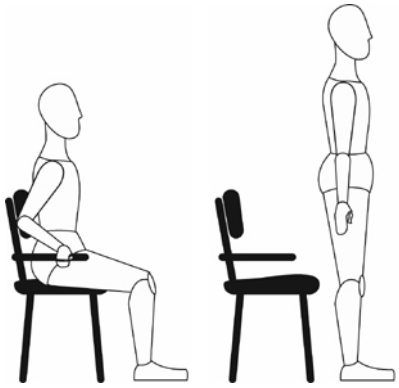


Comments:

Exercise 1b: Sit to stand – low chair

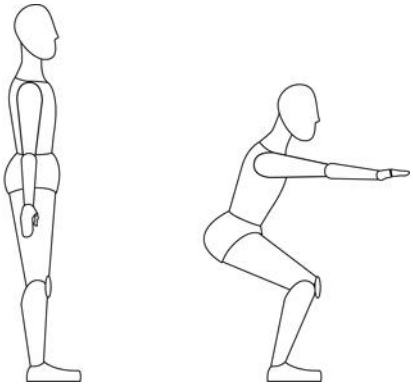
Equipment: Stable chair against a wall

- Sit tall towards the front of the chair
- Place feet hip distance a part, with the heels slightly further back than usual.
- Keep your tummy muscles gently pulled in and lean forwards from the hips to stand up
- Sit down with control.



Comments:

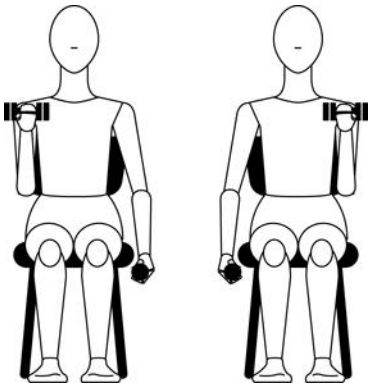
Exercise 1c: Squats



- Stand with your feet shoulder width apart
- Bend your knees and stick your bottom out behind as though you are about to sit down
- Squat as far as is comfortable, be careful not to loose your balance
- Let your arms raise out in front of you
- Keep you back straight and bend from the hips
- When in the squat position, your nose should be aligned over your toes.

Comments:

Exercise 2a: Arm curl (sitting down)



Equipment: Light weights for your hands, e.g. A can of vegetables or bottle of water.

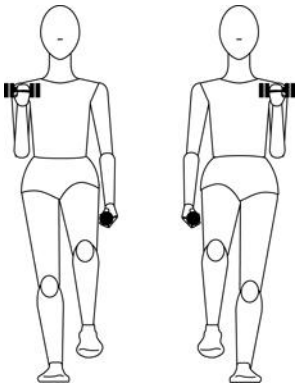
- Keep your elbows tucked into your sides
- Bend and straighten your arms with control
- Keep your feet moving

Comments:

Exercise 2a: Arm curl (standing)

Equipment: Light weights for your hands, e.g. A can of vegetables or bottle of water.

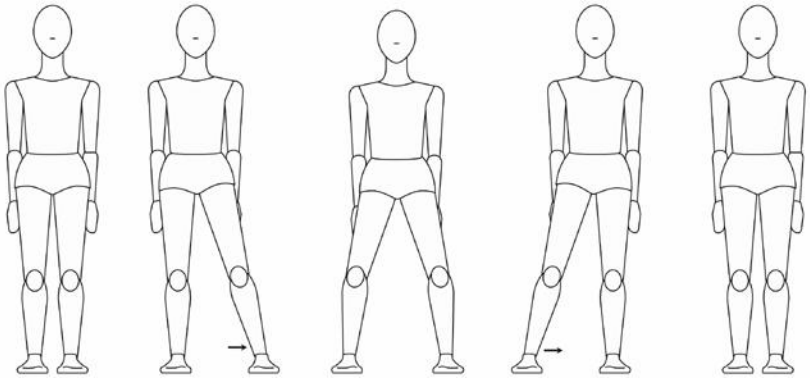
- Keep your elbows tucked into your sides
- Bend and straighten your arms with control
- Keep your feet moving



Comments:

Exercise 2b: Side steps

- If you are unsure about your balance, use a stable chair for support
- Stand tall and step from side to side

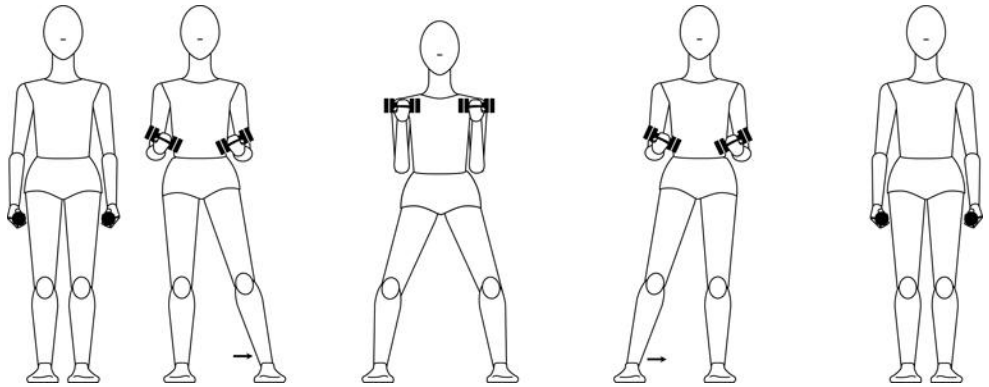


Comments:

Exercise 2c: Side steps with arm curls, light weights

Equipment: Light weights for your hands, e.g. A can of vegetables

- If you are unsure about your balance, use a stable chair for support
- Stand tall and step from side to side
- Bend and straighten your arms with control

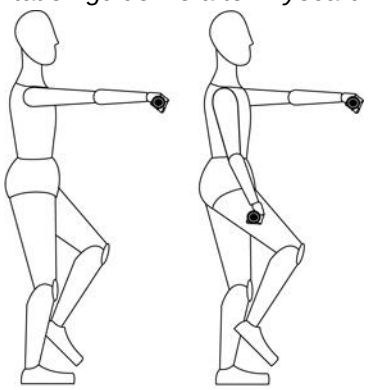


Comments:

Exercise 3a: Forward arm lift using light weight

Equipment: Light weights for your hands, e.g. A can of vegetables.

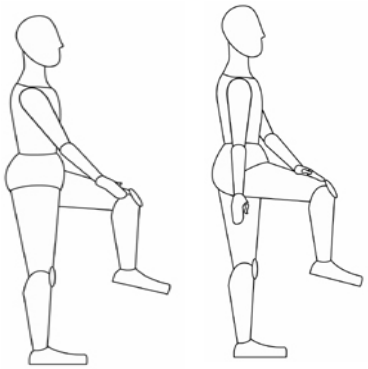
- Hold your arms by your side
- Lift alternate arms to shoulder level and lower with control
- Keep your feet moving



Comments:

Exercise 3b: Knee lifts

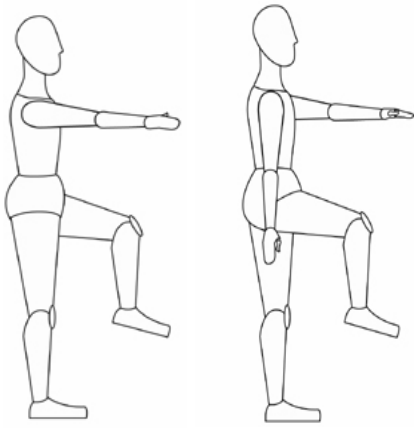
- If you are unsure about your balance, use the wall or a stable chair for support
- Stand tall with your feet hip distance apart
- Lift alternate knees up a comfortable height
- Touch the hand towards the opposite knee without twisting the body
- Keep the chest lifted



Comments:

Exercise 3c: Knee lifts with arm raise

- If you are unsure about your balance, use the wall or a stable chair for support
- Stand tall with your feet hip distance apart
- Lift alternate knees up a comfortable height
- Lift alternate arms to shoulder height
- Keep the chest lifted

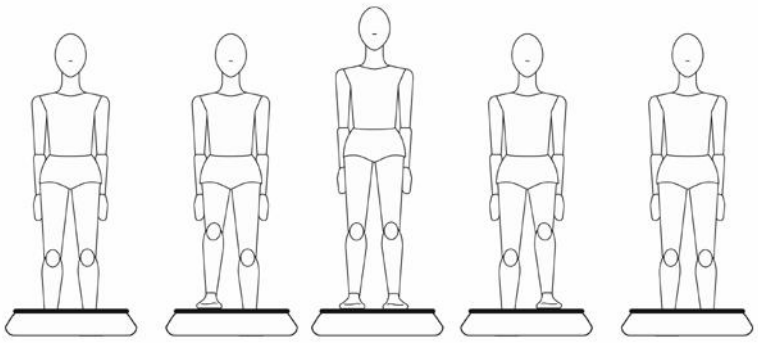


Comments:

Exercise 4a: Step-up – low step

Equipment: low step

- Stand close to your step
- Step at a comfortable pace putting your whole foot onto the step
- Try and stand tall throughout
- Remember to change legs

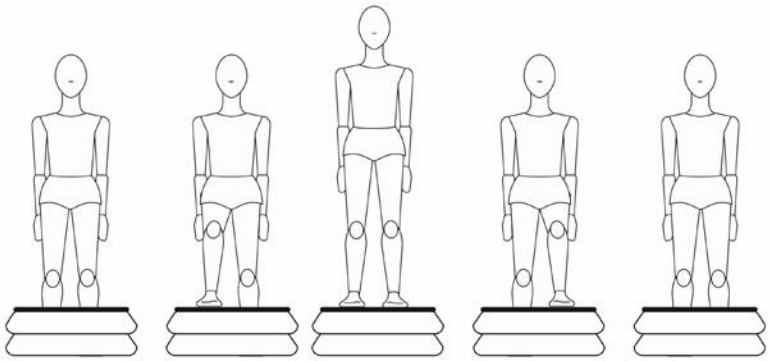


Comments:

Exercise 4b: Step-up – high step

Equipment: Higher step

- Stand close to your step
- Step at a comfortable pace putting your whole foot onto the step
- Try and stand tall throughout
- Remember to change legs

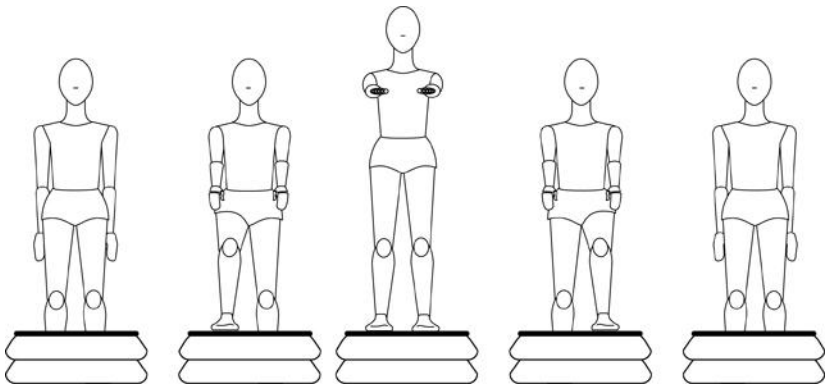


Comments:

Exercise 4c: Step-up – high step with arm raise

Equipment: Higher step

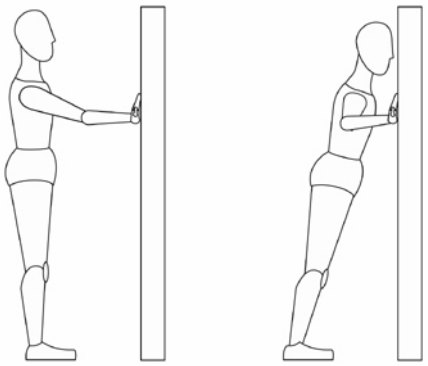
- Stand close to your step
- Step at a comfortable pace putting your whole foot onto the step
- Raise both arms together to shoulder level and lower with control
- Try and stand tall throughout
- Remember to change legs



Comments:

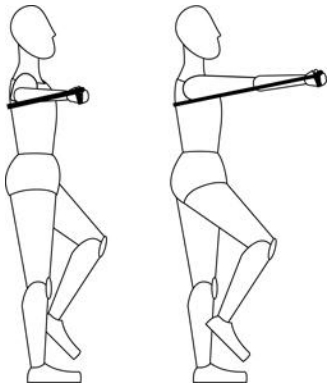
Exercise 5a: Wall press-ups

- Stand at arms length from a wall
- Place your hands against the wall at shoulder height, fingers upwards
- Keep your back straight and your tummy tight and bend your elbow to move your body towards the wall
- Breathe comfortably throughout



Comments:

Exercise 5b: Chest Press

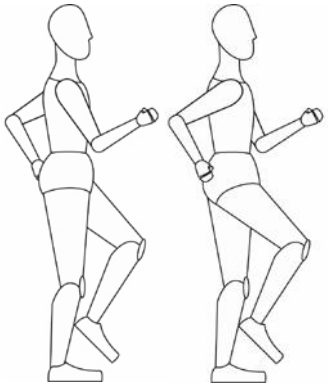


Equipment: Therapy band

- Place the band behind your back and hold the ends of the band in each hand.
- Slowly straighten the arms and then bend the arms and then bend the arms under control
- Breathe normally during this exercise
- Keep your feet marching

Comments:

Exercise 5c: March on spot

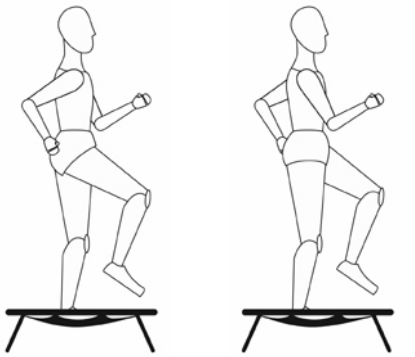


- Stand tall.
- March briskly on the spot, lifting the knees to a comfortable height.
- Breathe normally during this exercise
- Use a chair if you feel unsteady

Comments:

Exercise 5d: Jog on the spot / Jog on Trampette

Equipment: Trampette (if available) or mattress (if safe to stand on mattress)



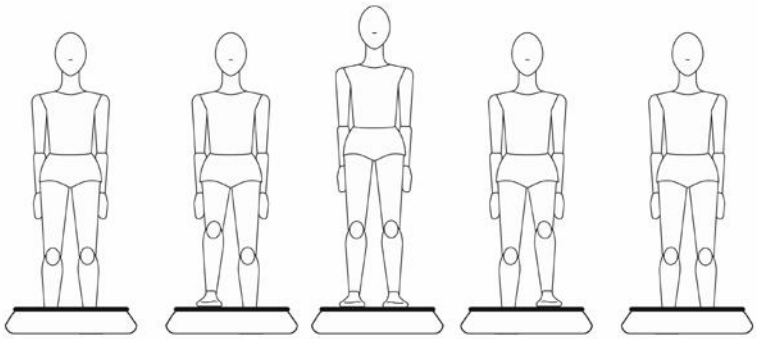
- Make sure you place the trampette near a wall or support.
- Stand in the middle of the trampette and gently jog on the spot.
- Stand still before getting off the trampette.
- If a trampette isn't available, jog on the spot

Comments:

Exercise 6a: Step-up – low step

Equipment: low step

- Stand close to your step.
- Step at a comfortable pace putting your whole foot onto the step
- Try and stand tall throughout
- Remember to change legs

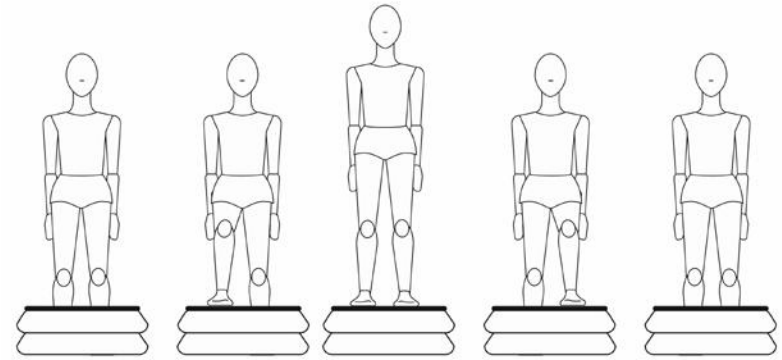


Comments:

Exercise 6b: Step-up – high step

Equipment: Step

- Stand close to your step
- Step at a comfortable pace putting your whole foot onto the step
- Try and stand tall throughout
- Remember to change legs

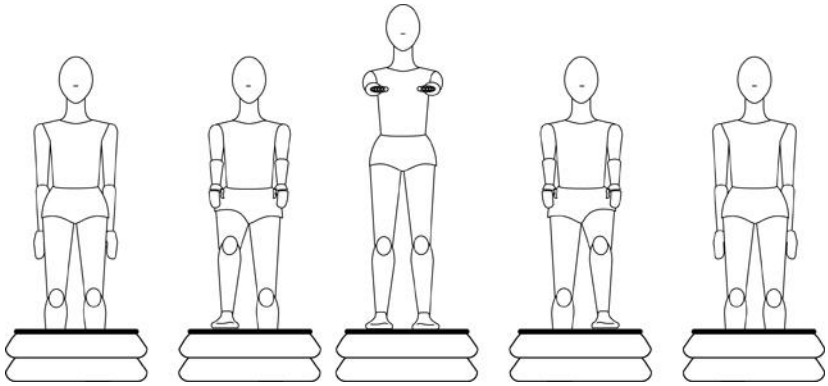


Comments:

Exercise 6c: Step-up – high step with arm raise

Equipment: Higher step

- Stand close to your step
- Step at a comfortable pace putting your whole foot onto the step
- Raise both arms together to shoulder level and lower with control
- Try and stand tall throughout
- Remember to change legs



Comments:

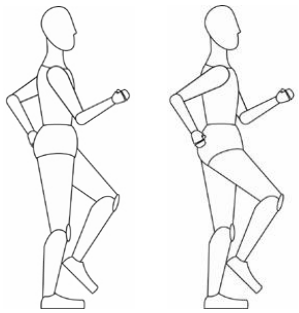
Cool - down and stretch

Time: Minimum 10 minutes

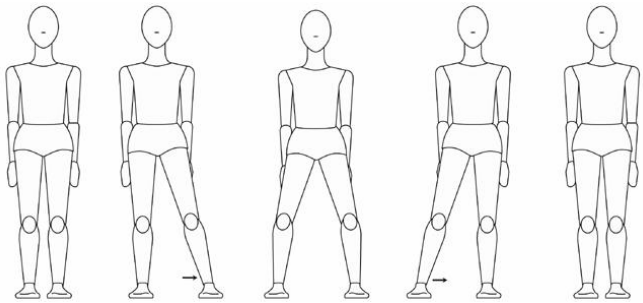
Intensity: Light to extremely light

Repeat the following activities from the warm up but begin to make the moves slower and smaller. It is important to gradually cool down to avoid feeling dizzy or light-headed. When the activity begins to feel very light and your breathing returns to a resting level you can begin your stretches.

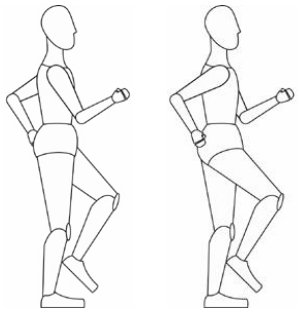
- Gentle marches on the spot x 1 minute



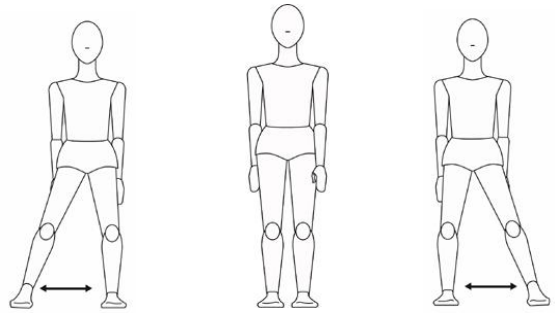
- Side steps x 8



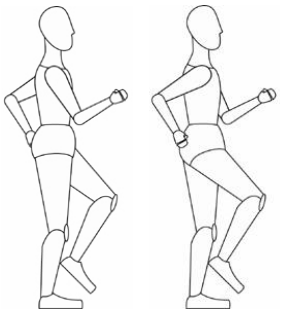
- Gentle marches on the spot x 1 minute



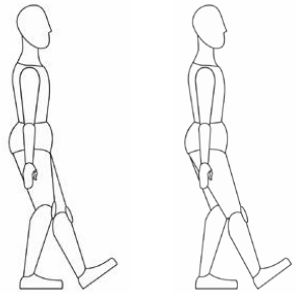
- Side taps x 8



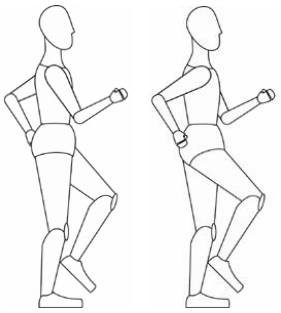
- Gentle marches on the spot x 1 minute



- Heel digs x 8



- Gentle walks on the spot x 1 minute



Repeat the sequence above with smaller and slower movements.

Cool down stretches

- **Keep your feet gently moving whilst performing the upper body stretches.**
- **Keep your feet gently moving between the standing stretches**
- Hold the stretches without bouncing for 20 to 30 seconds
- You should feel a gentle stretch in the muscle
- Breathe normally during the stretches

1. Front of chest

- Place both your hands on your lower back or bottom
- Lengthen your spine and open out across the front of the chest
- Take both elbows back to open out and stretch across the front of your chest

Comments:

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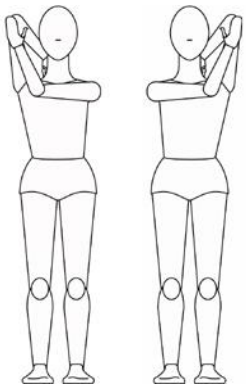
2. Back of upper arm

- Place the right hand on your right shoulder
- Using your left hand gently ease your right elbow towards the ceiling until you feel a stretch in the back of the arm
- Keep the body and the neck upright and avoid lifting your shoulders towards your ears
- Repeat on other arm



Comments:

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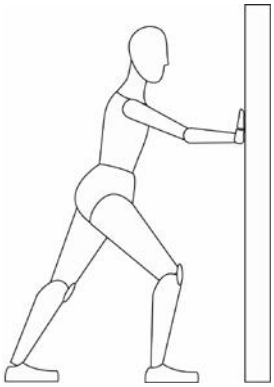
3. Calf stretch (standing)

- Stand tall with feet hip-width apart
- Take one leg backwards and place the foot on the floor
- Bend the front knee, and straighten the back leg until you feel a stretch in the back calf muscle
- Keep both heels on the floor and your toes facing forwards
- You can use a wall for support
- Repeat on other side



Comments:

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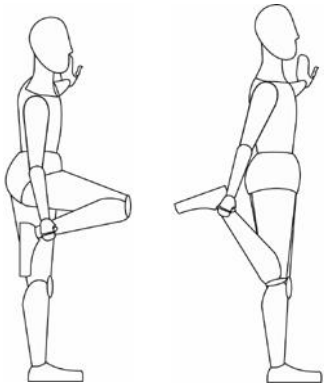
4. Front of thigh (standing)

- Stand tall with one hand on a wall for support
- Bring your right knee forwards
- Take hold of the back of your right ankle, sock or trouser leg and lower the knee so both knees are together
- Take care not to arch your back
- Feel the stretch down the front of your bent leg
- Repeat on the other side



Comments:

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5. Back of thigh (seated)

- Sit tall towards the front of a stable chair, legs hip width apart
- Straighten one leg in front of you, resting your heel on the floor
- Place both hands above the bent knee for support
- Lengthen the spine upwards and bend forwards until you feel a stretch in the back of the thigh
- Repeat on the other side

Comments:

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6. Side of body (seated)

- Place one hand on your thigh or the side of the chair and the lift the other arm upwards
- Lift upwards and very slightly sideways until you feel a stretch down the side of your body
- Try not to lean forwards or backwards
- Repeat on the other side
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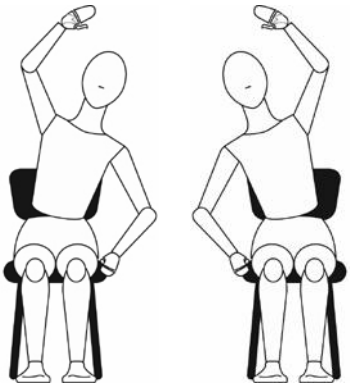

Comments:

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7. ..And Relax! You have finished the Home Exercise Programme.

The end of your exercise session is an ideal time for you to practise some of your relaxation techniques.

As you may know, learning to manage tension and stress is an important part of adjusting after a cardiac event. Benefits from using relaxation regularly can be obtained both through incorporating longer relaxation sessions (about 20 minutes) into a daily routine as well as quick techniques that can be applied in any tense or stressful situation. After exercise is a good time for a longer relaxation. You may have your own calming and

relaxing music or think about a situation or place that has a calming relaxing effect on you. A good way to start any relaxation is outlined below:

Find a comfortable position; this may be lying down or simply sitting in a chair. Gently close your eyes and allow yourself to be still – still in your mind and still in your body. Wait a couple of minutes. Focus lightly on your breathing. Don't try and control it in any way, just be aware of its rhythm as you breathe in and out. In your own time, take a deeper breath in, hold for just a moment and breath out. On each out breath, try to let go of any tension. Allow your breathing to return to its normal pattern.

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