
HUR
Cardiac Rehab
Concept

Introduction

The HUR cardiac rehabilitation concept is designed to be used as a therapeutic modality in exercise-based cardiac rehabilitation using the HUR's Natural Transmission method.

The Natural Transmission Method is a resistance strength training method based on pneumatic technology. The method allows for resistance to be adapted in response to the muscle's own force production, regardless of the speed of movement. An intelligent technology system for automated reporting, close to zero starting load, 100 g/1 kg increments in resistance, range limiters and additional support with connected outcome measures to document the effectiveness, enables the patient to start rehabilitation early and safely when coronary artery disease (CAD) is stable and the patient is on appropriate medication.

The HUR cardiac rehabilitation concept helps the rehabilitation professional to provide best practice of exercise-as-medicine, based on the latest international treatment guidelines, to help people with CAD to engage in regular weekly physical activity and to follow an exercise training regimen.

Contents

Cardiac rehabilitation concept: Background and overview

CAD is a disease caused by plaque building up along the inner walls of the coronary arteries. Arteries become narrow and blood flow to the heart is reduced, causing ischemia.

The decreased blood flow may be manifested as chest pain (angina pectoris), shortness of breath, or other CAD symptoms. A complete blockage can cause a myocardial infarction, which may lead to sudden cardiac death. CAD is the killer number one in the world, causing 7.4 (13.2%) million deaths in 2012.

CAD is strongly connected to lifestyle, especially the use of tobacco, unhealthy diet habits, physical inactivity, and psychosocial stress. CAD patients, after an acute event or with chronic heart disease, need special attention to be able to restore their quality of life and to maintain or to improve their functional capacity.

The components of cardiac rehabilitation include patient assessment, physical activity counseling, exercise training, nutritional counseling, weight control management, lipid management, blood pressure monitoring, smoking cessation, and psychosocial management.

Most importantly, it has been stated that many of the above-mentioned risk factor improvements occurring in cardiac rehabilitation can be mediated through increasing daily habitual physical activity and exercise training.

The current guidelines for exercise training and physical

activity in CAD shows that evidence for exercise training in CAD patients is at the highest level both in terms of recommendations and scientific justification stratification.

Exercise training sessions are organized with brief periods of warm-up and cool-down. Endurance training is usually performed on days that alternate with strength training, but both modes can be combined into a single session for patients who are sufficiently vigorous and healthy to tolerate the effort. Flexibility training is often integrated into the warm-up or cool-down periods.

The HUR cardiac rehabilitation concept helps the rehabilitation professional to provide best practice of exercise-as-medicine, based on the latest international treatment guidelines, enabling the earliest return to daily life and activity.

The role of strength training in cardiac rehabilitation

Skeletal muscle is the primary tissue for glucose and triglyceride metabolism and a determinant of resting metabolic rate. Therefore, increase in muscle mass reduces multiple CAD risk factors. Cross-sectional studies have shown that muscular strength is inversely associated with all-cause mortality and the prevalence of metabolic syndrome independently of aerobic fitness levels.

Furthermore, increased muscle mass can improve the individual's ability to become more physically active, raise the basal metabolic rate, and in older people, improve the ability to perform activities of daily living, decrease fall risk, and increase the quality of life.

Both research findings and clinical experience indicate that strength exercise is safe for stable CAD patients. For patients at moderate to elevated risk of adverse cardiac events, strength training can be safely undertaken with proper preparation, guidance, and surveillance.

Outcome measures

In order to gather information on the baseline status and effectiveness of the rehabilitation process, each patient is evaluated individually. Patients with CAD can initiate exercise training within a week after an acute coronary syndrome, after clinical screening, provided the patient is clinically stable.

It is recommended that CAD patients undergo symptom-limited exercise testing before initiating an exercise program in cardiac rehabilitation to establish a baseline fitness level, determine maximal heart rate, and ascertain the safety of exercise by assessing symptoms that would contraindicate exercise training or require a different therapeutic approach.

However, a clinical exercise test is not an absolute requirement and many programs do not require such testing in clinically stable patients. If facilities are lacking, it is recommended to use the 6 minute walking test to assess the patient's baseline fitness level.

When existing co-morbidities or other needs are registered, appropriate outcome measures should be performed. These may include maximal strength, stability, and questionnaires related to an individual's experience of pain and health-related quality of life.

The maximal isometric strength of big muscle groups can be evaluated by the HUR Performance Recorder for the assessment of side-to-side differences and to document changes in strength after the intervention.

The Performance Recorder can be directly connected to all HUR exercise machines, which are equipped with the isometric testing sensor attachment.

Recommended HUR equipment for Cardiac Rehabilitation

HUR CAD GYM

1 5540
LEG PRESS
REHAB

2 5140
CHEST PRESS
REHAB

3 5310
4 ABDOMEN/
BACK REHAB

5 5120
6 PUSH UP/
PULL DOWN REHAB

7 5340
8 TWIST REHAB

9 5175
OPTIMAL RHOMB
REHAB

10 5520
11 ADDUCTION/
ABDUCTION REHAB

12 5530
13 LEG EXTENSION/
CURL REHAB

for 5-10 min
warm-up and
cool-down
for example:

Performance
Recorder PR1

Strength training prescription for HUR devices for CAD

The primary objective is to transfer appropriate strength training programs into clinical practice and, first and foremost, to help persons with CAD to integrate the training programs into their daily life. To facilitate a lifelong commitment to regular exercise, outlines for six-month workout programs (both beginner and advanced) are presented below.

Strength training program for CAD patients (beginner and advanced) for six months.

Coronary Artery Disease, Strength Training program for 24 weeks: **Beginner**							
Week	Weekly volume	Series	Reps	% 1-RM	RPE	Rest intervals	Stage
1 - 2	1 - 2	1	15 - 20	20 - 30	10	90 - 120	Familiarization
3 - 4	1 - 2	1	15 - 20	20 - 30	10	90 - 120	Familiarization
5 - 6	2	1	15 - 20	20 - 30	10	90 - 120	Familiarization
7 - 8	2	1 - 2	15	30 - 40	10 - 12	90	Training
9 - 10	2	1 - 2	15	30 - 40	10 - 12	90	Training
11 - 12	2	1 - 2	15	40	12	60 - 90	Training
13 - 14	2	2	15	40	12	60 - 90	Training
15 - 16	2	2	15	40	12	60 - 90	Training
17 - 18	2 - 3	2 - 3	12 - 15	40 - 50	13	60 - 90	Training
19 - 20	2 - 3	2 - 3	12 - 15	40 - 50	13	60 - 90	Maintenance
21 - 22	2 - 3	2 - 3	10 - 15	50	13 - 14	60 - 90	Maintenance
23 - 24	2 - 3	2 - 3	10 - 15	50	13 - 14	60 - 90	Maintenance

Coronary Artery Disease, Strength Training program for 24 weeks: **Advanced**							
Week	Weekly volume	Series	Reps	% 1-RM	RPE	Rest intervals	Stage
1 - 2	2	2	15	40	12	90 - 120	Training
3 - 4	2	2	15	40	12	90 - 120	Training
5 - 6	2	2	15	40	12	90 - 120	Training
7 - 8	2	2 - 3	12 - 15	40 - 50	12 - 14	90	Training
9 - 10	2 - 3	2 - 3	12 - 15	40 - 50	12 - 14	90	Training
11 - 12	2 - 3	2 - 3	12 - 15	40 - 50	12 - 14	60 - 90	Training
13 - 14	2 - 3	2 - 3	12 - 15	50	12 - 14	60 - 90	Training
15 - 16	3	2 - 3	12 - 15	50	12 - 14	60 - 90	Training
17 - 18	3	3	10 - 15	50 - 60	14 - 16	60 - 90	Maintenance
19 - 20	3	3	10 - 15	50 - 60	14 - 16	60 - 90	Maintenance
21 - 22	3	3	10 - 15	50 - 60	14 - 16	60 - 90	Maintenance
23 - 24	3	3	10 - 15	50 - 60	14 - 16	60 - 90	Maintenance

References
(Cardiac Rehab Concept)

1. CORRA U, PIEPOLI MF, CARRE F et al. Secondary prevention through cardiac rehabilitation: physical activity counselling and exercise training: key components of the position paper from the Cardiac Rehabilitation Section of the European Association of Cardiovascular Prevention and Rehabilitation. Eur Heart J 2010: 1967-74.
2. FLETCHER GF, ADES PA, KLIGFIELD P et al. Exercise standards for testing and training: a scientific statement from the American Heart Association. Circulation 2013: 873-934.
3. HUIKURI HV, CASTELLANOS A, MYERBURG RJ. Sudden death due to cardiac arrhythmias. N Engl J Med 2001: 1473-82.
4. JURCA R, LAMONTE MJ, BARLOW CE et al. Association of muscular strength with incidence of metabolic syndrome in men. Med Sci Sports Exerc 2005: 1849-55.
5. PERK J, DE BACKER G, GOHLKE H et al. European Guidelines on cardiovascular disease prevention in clinical practice. The Fifth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice. Eur Heart J 2012: 1635-701.
6. PIEPOLI MF, CORRA U, BENZER W et al. Secondary prevention through cardiac rehabilitation: from knowledge to implementation. A position paper from the Cardiac Rehabilitation Section of the European Association of Cardiovascular Prevention and Rehabilitation. Eur J Cardiovasc Prev Rehabil 2010: 1-17.
7. WHO 2014. The top 10 causes of death.
8. WILLIAMS MA, HASKELL WL, ADES PA et al. Resistance exercise in individuals with and without cardiovascular disease: 2007 update: a scientific statement from the American Heart Association Council on Clinical Cardiology and Council on Nutrition, Physical Activity, and Metabolism. Circulation 2007: 572-84.