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Impact of Cardiopulmonary Rehabilitation on Health and Quality of Life of Cardiac and Pulmonary Patients

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Abstract

Cardiopulmonary rehabilitation is a very important part of the rehabilitation of chronic cardiac or lung conditions , physical therapy has an integral role in the rehabilitation of such cases , patients undergo open heart kind surgeries are eligible for that kind of rehabilitation as soon as their case is stable ,this rehabilitation can assist the patient to cope up with his new life and improves his quality of life, physical therapy uses some types of supervised exercises to achieve that goal like endurance and resistance exercise using treadmills, bicycles and even free weights, several studies was done in that issue and almost most of them proved the efficacy of that kind of rehabilitation and its positive effect on the patient and how it can assist him to return work as soon as possible even after massive surgeries like open heart surgeries.

Keywords: Cardiac rehabilitation

Cardiac Rehabilitation

Objectives

- Identify common impairments & functional limitations in patients following CAB surgery
- Select outcome measures for patients following CAB surgery or MI
- Discuss aspects of plan of care for these patients
- Describe components of comprehensive cardiac rehabilitation Identify common impairments & functional limitations in patients following CAB surgery Statistics:
- CV disease
  - ✓ # 1 cause of death
  - ✓ 1 death every 33 seconds
- Coronary Artery Bypass CAB Surgery
  - ✓ >½ million surgeries per year
  - ✓ Clinical practice is changing [1-6].

Impairments & Functional Limitations following CAB

- Incisional (sternotomy and donor graft leg) pain and drainage
- Continuous pain from the shoulders and neck
- Thoracic pain
- Respiratory problems
- Feelings of weakness
- Sleeping difficulties including chest wall pain with side lying, waking frequently and early, more nightmares than usual
- Problems with wound healing
- Dissatisfaction with postoperative supportive care
- Problems with eating
- Ineffective coping
- Depression
- Functional Outcomes After CAB
- Comparison groups
  - ✓ CAB --- Surgical
  - ✓ AMI, PTCA, Angina --- Nonsurgical
- Functional outcome measurements
  - ✓ 6 Minute Walk Test --- Endurance (Performance-based)
  - ✓ Duke Activity Status Index --- ADL/Endurance (Self-report)
  - ✓ RAND 36 Health Survey --- Health-related QoL (Self-report) [7-10].

Surgical and Non-surgical Outcomes

	Surgical	Non-surgical
6 MWT	853 ± 324	965 ± 321
DASI	14.7 ± 7.5	18.5 ± 7.0
QOL total	40.0 ± 47.2	47.2 ± 12.4
QOL physical function	34.2 ± 19.6	45 ± 23.2
QOL role physical	1.4 ± 4.9	12.5 ± 25
(Lapier, 2003)		

Conclusions

Functional Status

- Functional limitations immediately after CAB are significant
- CAB surgery limitations >less invasive procedures
- Inability to perform ADLs is closely related to self reported QOL
- After 1 year, 36% report self care as unsatisfactory (Lapier, 2003, Dimateo, 2003)

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- Goals of Cardiac Rehabilitation:
- Limit the adverse physiologic effects of cardiac illness
- Limit the adverse psychological effects of cardiac illness
- Reduce the risk of sudden death or re-infarction
- Control cardiac symptoms
- Stabilize or reduce atherosclerosis
- Improve functional capacity
- Enhance psycho-social and vocational status
- Cardiac Rehab Components:
- Comprehensive long-term services
- Medical evaluation
- Prescribed exercise
- Cardiac risk factor modification
- Counseling
- Behavioral interventions
- Phases of Cardiac Rehabilitation:
- **Phase I : Inpatient**
- **Phase II: Outpatient EKG monitored**
- **Phase III: Outpatient with decreasing monitoring**
- **Phase IV: Community based, independent exercise**
- Inpatient Cardiac Rehabilitation Principles:
- **Goals**
  - ✓ normal cardiovascular response to changes in position and ADLs
  - ✓ reach 3-4 MET activity level by discharge
- Activity--Slow progression of activity intensity (increase by 1 MET/day) Initiating Inpatient Cardiac Rehab:
- Post-MI, Post-surgery, Post-stent (no MI), CHF, heart transplant
- Patient may begin if:

✓ MD approval/order

✓ No chest discomfort (8 hours)

✓ No new signs of decompensated heart failure

✓ No abnormal EKG changes (8 hours)

Monitoring

- HR
- BP
- SaO_2
- EKG
- Symptoms
- At each change in position

Cardiac rehabilitation programs outpatient

- Exercise Training performed by:
  - ✓ Exercise Physiologist
  - ✓ MD supervised
  - ✓ Physiotherapist
  - ✓ Nurse
- Risk Factor Modification provided by:
  - ✓ Nurse/educator
  - ✓ Dietician
  - ✓ Behavioral support

Safety

- Selection of appropriate patients
- Proper monitoring
- All professional exercise personnel must be able to do basic life support including defibrillators
- Emergency procedures must be specified
- Warm up and cool down are required

Exercise risk

- Risk of sudden death is low in cardiac patients, but still higher than healthy individuals
  - ✓ Cardiac arrest: 1: 111,966 person-hours
  - ✓ Risk of death 1: 783,972 person-hours
- Vigorous & uncontrolled exercise risk of death:
  - ✓ Cardiac: 1: 60,000 person-hours (1 event for 384 people @ 3 hrs/ week)
  - ✓ 1: 565,000 person-hours for healthy (1: 3122 people)

Principle role of cardiac rehab is to define exercise mode & intensity that is SAFE & EFFECTIVE VanCamp (1986), Fletcher (1990)

Exercise prescription

- Patients should be tested on dosage of medication they will be taking during exercise
- Beta-blockade blunts HR response, but % VO2 reserve and RPE may be used
- Below threshold of angina (use exercise test)

Cardiac Rehab Phase II

- Supervised outpatient program 6-8 wks
- Exercise test performed prior to rehab
- EKG monitoring every session
- Goals - increase exercise capacity to 5 METS
- Patient education on HR, exercise, symptoms

Pre-requisites

- Exercise Testing Prior to starting program

Components of Phase II

- 50% HRR, 3x/week, 60 minutes sessions including warm-up and cool-down

Exercise Training Core Components

- Evaluation
  - ✓ Symptom limited exercise test
- HR, rhythm, ST segment changes, hemodynamics, signs, symptoms, perceived exertion, exercise capacity
  - ✓ Risk stratify for level of supervision
- Interventions
  - ✓ Individual exercise program (aerobic & resistance)
  - ✓ F-I-T-T and progress
- Expected Outcomes
  - ✓ Increased aerobic capacity, strength, flexibility
  - ✓ Reduced symptoms, improved risk factor profile, improved QOL

Phase III Outcomes

- Functional capacity goals >8 METS or 2x energy requirements of work
- Training effects expected
- No cardiac symptoms
- EKG monitoring happens occasionally, or when increasing activity parameters
- Patients learn self-monitoring of HR and symptoms

Cardiac Rehab Phase IV

- Unsupervised program
- Community Based

Expected Outcomes

- Improved exercise tolerance
- Return to work
- Improved Quality of life
- Decreased risk factors (secondary prevention)
  - ✓ Weight loss
  - ✓ Low cholesterol with dietary changes
  - ✓ Smoking cessation

Aerobic capacity and endurance goals

Improved with appropriately prescribed and supervised exercise training program

- Peak VO_2 Increased+11-66% after 3 months training
- Increased submaximal exercise endurance (longer at given rate with lower HR & BP)
- Decreased exercise induced ischemia at same cardiac work (Rate-pressure product)
- Increased participation in exercise (does not continue after end of rehab program)

Additional effects of Exercise Training

- 27% decrease in all cause mortality
- 31% decrease cardiac mortality
- No effect on MI recurrence

Taylor RS, Brown A, Ebrahim S (2004) Exercise-based rehabilitation for patients with coronary heart disease: Systematic review and meta-analysis of randomized controlled trials. American Journal of Medicine116 (10): 682-692.

Effects of Exercise Training

- BP reductions
- HDL+5-15%, no effect of LDL & total cholesterol
- Inconsistent effect on controlling body weight (nutrition intervention better)
- No effect on smoking cessation
- Improves psychological wellbeing (effect occurs with and without other counseling services)

Resistance training in cardiac rehabilitation

- AACVPR states patients may begin:
  - ✓ Minimum of 5 weeks post MI, including 3 weeks of participation in cardiac rehab
  - ✓ Minimum 8 weeks post CABG, including 3 weeks of participation in cardiac rehab
  - ✓ Resistance training defined at >50% of 1RM
  - ✓ Theraband, light weights (1-3#) may be initiated sooner if indicated

Secondary Prevention

- Education is important in the management of hypertension
- Education, counseling and behavioral modification do not improve exercise capacity
- Alternative approaches (home telemetry monitoring) useful for clinically stable patients

Return to Work

- Work rates 49-93% after MI
- 20% do not return to work after revascularization
- Factors that influence return to work
- Work rates 49-93% after MI
- 20% do not return to work after revascularization
- Factors that influence return to work
  - ✓ Demographic & socioeconomic factors only 50%
  - ✓ Physical/emotional functioning 29%
  - ✓ Medical factors 20%
  - ✓ Patients perception of own activity status very predictive of return to work

Utilization of Cardiac Rehab

- 15% of qualified patients who have had MI or CABG participate
  - ✓ Lack of physician referral

- ✓ Poor patient motivation
- ✓ Logistics
- ✓ Financial

Summary

Supervised Exercise programs are beneficial in improving exercise tolerance in patients with cardiac or vascular disease. Other components of cardiac rehabilitation also produce beneficial effects on depression, risk profile and quality of life [11-16].

Pulmonary Rehabilitation

Definition of Pulmonary Rehabilitation:

"A deliberate supervised therapeutic process of restoring a patient's function through the process of rehabilitation"

Consequences of chronic respiratory disease

- Peripheral Muscle dysfunction
- Respiratory muscle dysfunction
- Low or high BMI
- Cardiac impairment
- Skeletal disease
- Psychosocial dysfunction

Principle goals of pulmonary rehabilitation

- Aims to reduce symptoms, decrease disability, increase participation in physical and social activities and improve overall quality of life.
- Reduce healthcare utilization and costs

How

- Multi-disciplinary approach
- Individually tailored exercise program
- Patient and family education
- Addressing psychosocial issues
- Measuring outcomes

Benefits of rehab

- Improved exercise capacity
- Improved muscle strength
- Reduced dyspnoea
- Improve health-related QOL
- Reduced readmission rates and length of stay in COPD [17-20].

Duration of benefit

- Exercise benefit 12-18 mths
- QoL benefit 24 mths

Pulmonary rehabilitation post AECOPD

- 60 patients randomised to PR x 8 weeks or usual care <1 week post discharge
- 33% in UC group vs. 7% in PR group readmitted <3/12 (p=0.02)
- 57% in UC group vs. 27% in PR group had an unplanned hosp visit (p=0.02)

Patient selection

- Obstructive Diseases–COPD, asthma, bronchiectasis
- Restrictive Diseases
  - ✓ Interstitial–IPF, sarcoid
  - ✓ Chest Wall/Neuromuscular
- Gains can be achieved regardless of age, gender, lung function or smoking status
- Severe nutritional depletion and low fat-free mass may be associated with a poor response to rehab

Exclusion criteria

- Significant neurological or orthopaedic disease
- Unstable cardiac disease
- Unstable psychiatric disease [21-24].

Setting for pulmonary rehabilitation

- Outpatient
- Inpatient
- Home
- Community Based
- Choice varies depending on
- Availability
- Distance to program
- Patient preference
- Physical, functional, psychosocial status

Exercise training

- Does not alter underlying respiratory impairment unfortunately!
- Targets endurance training of 60% of VO_2 max for 20-30 minutes, repeated 2-5 times a week
- Interval training of 2-3 minutes high intensity (70-80% VO_2 max) with equal periods of rest or low level exercise is tolerated well.

Strength training

- Few studies performed all show benefits.
- 50-85% of 1 Rep Max increases peripheral muscle function
- Improved quality of life
- Reduced ventilation [25-29].

Upper extremity training

- Endurance training of upper extremity to improve arm function also important
- Ergometry
- Free weights

- Therabands

Respiratory muscle training

- Inspiratory muscle function compromised in COPD
- Start at low resistance and increase to achieve 60-70% of PI MAX
- Definitely improves respiratory muscle strength
- Not clear if reduces dyspnoea or improves exercise capacity.

Education

- Encourages active participation in health care
- Better understanding of disease including exacerbation management
- Improved compliance

Medication and other therapies

- Types of medication, action, adverse effects, dose and proper us of inhaled medications
- Instructions in inhaler technique
- Appropriate use of oxygen
- Exacerbation packs

Psychosocial intervention

- Anxiety, depression, difficulties coping with chronic disease
- Aided by regular patient education session or support groups
- Instruction in progressive muscle relaxation, stress reduction, panic control

Nutritional assessment

- Diet history, BMI
- Over or under weight.
- Classes in weight management and/or nutritional counseling to improve weight management

Outcome assessment

- Individual response
- Effectiveness of overall program

Outcomes measured

- Smoking status
- QoL- CRQ, CAT, HADS
- Exercise capacity – ISWT, 6MWT, Borg scale

Future directions of CPR

- Impact of elective and acute PR on Health Care Costs and survival
- Effectiveness of individual educational components
- Best intensity, duration and optimum form of exercise training
- Best means of maintaining benefits.
- More cooperation between the medical team in the delivery of that service

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