Cardiac Rehabilitation: An Under-utilized Resource

Making Patients Live Longer, Feel Better

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I have no disclosures.
What if there were one prescription that could prevent and treat dozens of diseases such as diabetes, hypertension, and obesity?

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Effects of Exercise

**Cardioprotective Effects**

- **Anti-atherosclerotic**
  - Lipids
    - BPs
    - ↓ adiposity
    - ↑ insulin sensitivity
    - ↓ inflammation

- **Psychologic**
  - Depression
  - Stress
  - ↑ Social support

- **Anti-thrombotic**
  - Platelet adhesiveness
  - Fibrinolysis
  - ↓ fibrinogen
  - ↓ blood viscosity

- **Anti-ischemic**
  - Myocardial O2 demand
  - Coronary flow
  - ↓ endothelial dysfunction

- **Anti-arrhythmic**
  - Vagal tone
  - ↓ adrenergic activity
  - HR variability
Causes of Behavioral-based Death

HISTORY OF CARDIAC REHABILITATION

- In 1930’s, 6 weeks bed rest post-MI
- In 1940’s, chair therapy is introduced
- In 1950’s, 3-5 mins. daily walking at 4 weeks post-MI
- 1950’s, Hellerstein advocated a comprehensive program w/ a multidisciplinary approach
GOALS OF CARDIAC REHABILITATION

Pharmacological Therapy
- lipid lowering
- blood pressure management
- glucose control
- symptom management
- other proven treatments in secondary prevention (beta-blockers, etc.)

Behaviour
- depression / anxiety counselling
- time management
- self-support counselling
- spousal/family support
- hostility intervention
- support groups

Smoking Cessation
- smoking cessation counselling
- pharmacological therapy (nicotine replacement)
- smoking status confirmed by biochemical measures

Education
- one on one education
- group education sessions

Exercise
- exercise prescription
- exercise counselling
- on-site exercise sessions
- ECG monitoring
- exercise stress testing

Diet
- dietary assessment
- dietary counselling
- weight management
- cholesterol management
- blood sugar management

Current Controlled Trials in Cardiovascular Medicine
PHASES

I. Inpatient – concentrate on mobility and education. Facilitate referral to outpatient

II. Outpatient
   - Telemetry monitored and requires a referral (MD, DO, PA, NP)
     - Patients exercise following an individualized program
     - Patients improve cardiovascular fitness and muscular strength and attend education classes.
     - Usually 36 sessions in duration.
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Getting Fitter through Cardiac Rehab has its benefits

48 Trials: N=8,940; Rx < 6 mos; F/UP average 15 months

- Total Mortality: 20%
- Cardiac Mortality: 26%
- Nonfatal MI: 21%

HEDBACK SHOWED A DECREASE IN NONFATAL MI OVER 5 YEARS AND LESSER NEED FOR ANTIANGINAL MEDICATION AT 1 AND 5 YEARS, FEWER REHOSPITALIZATIONS FOR CARDIAC PROBLEMS, AND FEWER EMERGENCY ROOM VISITS.

EUR HEART J 1993
From Jan. 1, 2000 to Dec. 31, 2005, Duke University studied records on 30,000 Medicare recipients who went for at least one rehab session

- **14% lower risk of death** and a **12% lower risk of MI** than those who attended 24 sessions
- **22% lower risk of death** and a **23% lower risk of MI** than those who attended 12 sessions
- **47% lower risk of death** and a **31% lower risk of MI** than those who attended 1 session

Bradley, Circulation, Jan. 2010
Mayo Clinic researchers looked at 2400 records of Percutaneous Intervention patients from 1994 to 2008

40% decrease in all-cause mortality in CR participants.

Thomas, Circulation, May 2011
**Impact on Risk Factors:**
**Blood Pressure Reduction/Smoking**

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<th>Overall</th>
<th>Normotensive</th>
<th>Hypertensive</th>
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<td><strong>Systolic</strong></td>
<td>-3.4</td>
<td>-2.6</td>
<td>-7.4</td>
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<tr>
<td><strong>Diastolic</strong></td>
<td>-2.4</td>
<td>-1.8</td>
<td>-5.8</td>
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44 Trials, n = 2,674

Useful as adjunct to behavioral programs

Results of 12 week exercise program in 281 women

19% abstain after program (vs 10%)
12% abstain at 1 year (vs 5%)
Impact on Risk Factors: Cholesterol Reduction

- LDL decrease of 5% (8 – 12% decrease with combined exercise and diet therapy)
- HDL increase of 4.6%
- Triglyceride decrease of 3.7%
- Meta-Analysis (2001) of 52 trials (n = 4700, > 12 weeks of training)
Incidence of Diabetes

Percent developing diabetes

All participants

- Lifestyle (n=1079, p<0.001 vs. Met, p<0.001 vs. Plac)
- Metformin (n=1073, p<0.001 vs. Plac)
- Placebo (n=1082)

Diabetes Prevention Program NEJM 2002
Psychological and social support

- Psychological intervention as part of a cardiac rehabilitation program (e.g. risk factor counselling / theory behaviour change) reduces the risk of depression, anxiety and non-fatal MI
  - Rees et al 2004 systematic review

- Social isolation or lack of a social support network associated with increased mortality and morbidity
  - Mookadam et al 2004 systematic review

- 29% reduction in recurrence of MI, and significant beneficial effects on risk factor modification
  - Dusseldorp Health Psych 1999
Exercise Is As Good As Other Treatments for Clinical Depression

% of Patients with Remission of Depression

Drug therapy and cognitive behavioral therapy produce remission in approximately 40% of clinically depressed individuals

HEART FAILURE AND CARDIAC REHABILITATION

- EXERCISE TRAINING SHOULD BE PRESCRIBED TO ALL STABLE HEART FAILURE PATIENTS
- ASSOCIATED WITH IMPROVEMENTS IN SOB, ABILITY TO PERFORM ADL’S, ANXIETY, DEPRESSION, AND GENERAL WELL-BEING
- MONITORS FOR DECOMPENSATION
PERIPHERAL ARTERIAL DISEASE

- SUPERVISED EXERCISE TRAINING IS A CLASS 1 RECOMMENDATION OF THE AHA
- EXERCISE SHOULD CONSIST OF A MINIMUM OF 30-45 MINUTES AT LEAST 3X/WEEK FOR A MINIMUM OF 12 WEEKS
- SIGNIFICANT INCREASES IN THE DISTANCE WALKED WITHOUT PAIN
- OUTCOMES IMPROVED IN SUPERVISED EXERCISE RATHER THAN NON-SUPERVISED EXERCISE
Cardiac Rehab is feasible and effective for secondary prevention after transient ischemic attack or mild, non-disabling stroke, offering a promising model for vascular protection across chronic disease entities.
BENEFITS DO NOT APPEAR TO BE AGE LIMITED AND ARE BENEFICIAL AND COST-EFFECTIVE INTO THE 9TH DECADE OF LIFE

(VONDER MUHLL AM J CARDIOL 2002, PANIAGUA CARDIOLOGY 2002)
SAFETY IN CARDIAC REHABILITATION

- 8.9 CARDIAC ARRESTS PER MILLION PATIENT-HOURS OF EXERCISE
- 3.4 MI’s PER MILLION PATIENT HOURS
- 1.3 FATALITIES PER MILLION PATIENT HOURS

ADES NEJM 2001
COST-EFFECTIVENESS

- The cost-effectiveness of cardiac rehabilitation in 1995 dollars was $4900 per year life saved.
- Compares favorably with other preventive therapies used in the post-myocardial infarction setting, such as pharmacologic lipid lowering, beta-adrenergic blocking medications, and thrombolysis.
- Exercise rehabilitation studies from the United States, Sweden, Norway, and Italy support the effect of cardiac rehabilitation on decreasing cardiac rehospitalizations.

Ades, J Cardiopulm Rehabil, 1997
Ades, Am Heart J, 1992
Bellardinelli, Circulation, 1999
Bondestam, Am J Cardiol, 1995
Goble, Br Heart J, 1991
BENEFITS OF CARDIAC REHABILITATION

- Reduction in symptoms
- Improvement in exercise tolerance
- Improvement in lipid levels
- Reduction in tobacco abuse
- Improved glucose tolerance
- Improvement in psychosocial well-being and stress management
- Attenuation of the atherosclerotic process
- Decreased rates of subsequent coronary events
- Reduced hospitalization
- Decreased morbidity and total mortality
BENEFITS OF CARDIAC REHABILITATION

- About 50% of eligible patients are referred to Cardiac Rehab

- Only 20% actually try Cardiac Rehab

WHY?

Thomas, Circulation, May 2011
HEALTH DISPARITIES

AFRICAN-AMERICAN WOMEN LESS LIKELY TO BE REFERRED AND ENROLLED IN CARDIAC REHABILITATION THAN CAUCASIAN WOMEN

Allen, J Gen Inter Med, 2004

MAJOR REFERRAL PREDICTORS:
- English speaking
- Prior MI
- Inpatient at hospital with CR
- Insurance
- Physician Endorsement (strongest predictor)

Cortes, American Heart Journal, 2006
Ades, Arch Intern Med, 1992
Physicians, their Patients & Exercise

- 47% of primary care physicians include an exercise history as part of their initial examination
- Only 13% of *patients* report physicians giving advice about exercise
- Physically active physicians are more likely to discuss exercise with their patients

Abramson, Clin J Sport Med, 2000
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Exercise Training

“An agent with lipid-lowering, antihypertensive, positive inotropic, negative chronotropic, vasodilating, diuretic, anorexigenic, weight-reducing, cathartic, hypoglycemic, tranquilizing, hypnotic and antidepressive qualities.”

William C. Roberts, M.D.
Editor-in-Chief
American Journal of Cardiology 1984;53:261
"EXERCISE"

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