Cardiac Rehabilitation Past, Present and Future: A Cardiologist's Perspective

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Cardiac Rehabilitation: Definition

- "CR services are comprehensive, long-term programs involving medical evaluation, prescribed exercise, cardiac risk factor modification, education and counseling." (USPHS)
- Goals:
  - Enhance the physical, psychosocial and vocational status of the cardiac patient
  - Stabilize/reverse the atherosclerotic process


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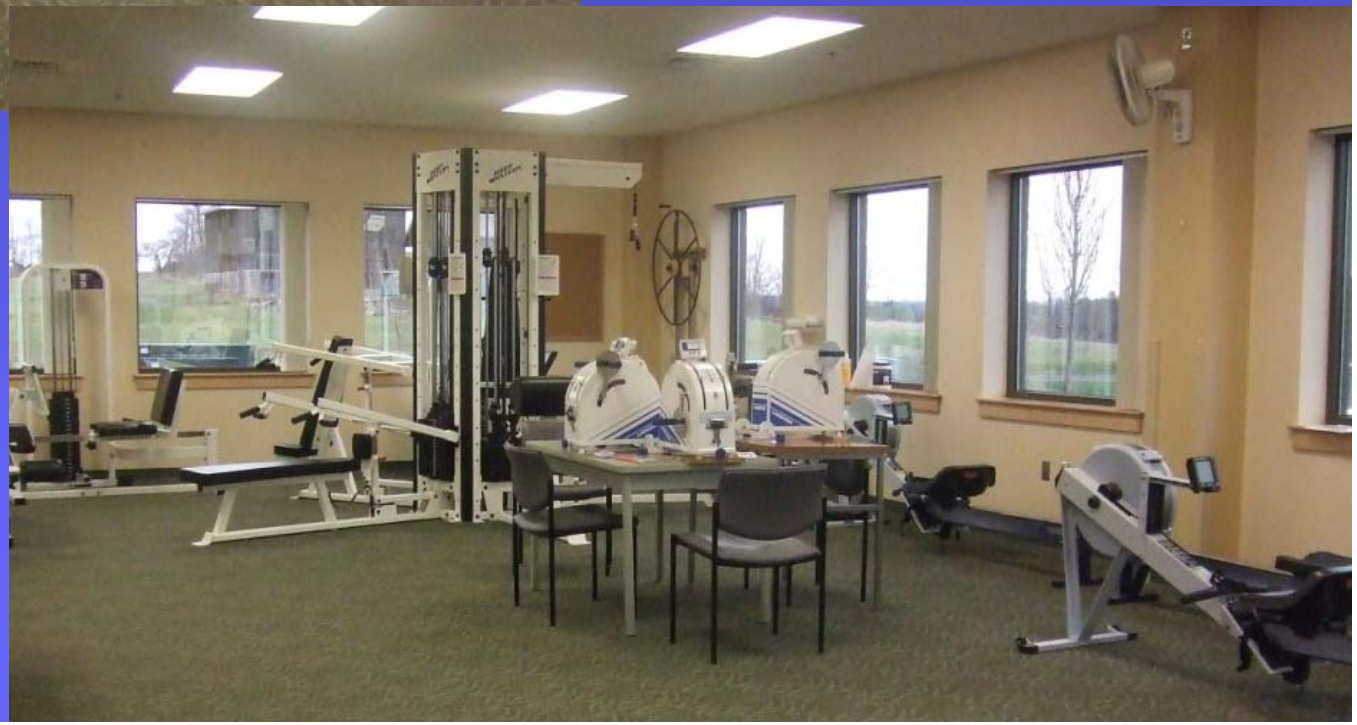
Cardiac Rehabilitation and Prevention
University of Vermont College of Medicine

Indoor View



Outline

- Historical Perspective
- Present Status of CR: Strengths and Challenges
- The Future of Cardiac Rehabilitation
  - Population Trends in U.S. and Far East
    - Aging of the Population
    - Increasing rates of Obesity and Type II Diabetes
- Treatment Programs in Cardiac Rehabilitation
  - Prevention of Disability
  - Treatment and Prevention of Obesity and Type II Diabetes
- CR Performance Measures
- Conclusions

Cardiac Rehabilitation: Historical

Safety of Physical Activity Post M.I.

- 1930's: 6 weeks bedrest
- 1940's: Chair Therapy
- 1950's: 3-5 minutes walking/day at 4 weeks
- 1960's: In hospital re-ambulation (Phase I)
- 1970's: Outpatient C.R. (Highly structured ECG monitoring, MD on-site)
- 2000's: 3-day MI Admits, Minimal Deconditioning, ***Focus on Risk Reduction***

Cardiac Rehabilitation: Historical

- CR through the 1980's was focused almost entirely on exercise.
- The assumption was that exercise alone would "fix" other risk factors such as hypertension, hyperlipidemia, Obesity

Present Status of CR

Cardiac Rehab as Secondary Prevention

The 1990's

- **Mortality Data**-Exercise Alone: N= 4000
- 25% Decrease Overall and Cardiac Mortality
- **Angiographic Trials**: Exercise and low-fat diet Decreased progression CAD and CV events.
- **Multi-risk Interventions**: Exercise, Diet, Meds: Decreased progression, CV events, Hospitalization

O"Connor GT: Circulation 1989,80;234
Schuler G:Circulation 1992,86;1
Ornish D: Lancet,1990;336
Haskell WL:Circulation:1994,89;975

Core Components of Cardiac Rehabilitation/Secondary Prevention Programs

- Patient Assessment
- Exercise Training
- Risk Reduction:
  - Nutritional/Behavioral/ *Medical*
    - Lipids
    - Smoking Cessation
    - Diabetes
    - Physical Activity Counseling
    - Hypertension
    - Weight Management
    - Psychosocial
- Long-Term Follow-up

Circulation 2007;115;2675. Balady, Williams, Ades et al.

Strengths of U.S. CR Model

- CR is a recognized “standard of care” for patients after coronary event: Supported by Position Statements of AHA, ACC, AACVPR, Medicare.
- Effective at inducing a short-term increase in exercise capacity that is sometimes sustained and is associated with a survival benefit.
- Evolving towards individualized preventive care
- Staffed by caring, patient-oriented professionals (RN, PT, Ex.Phys., MD)

Weaknesses of U.S. CR Model

- Low overall participation (14-50%) with substantial geographic variations of availability.
- In many settings, a “Cookie-Cutter” exercise-only approach.
- Fairly ineffective for Rx of Risk Factors, Obesity and other nutritional issues
- Unavailable to uninsured and under-insured (10-20%)
- Long-term exercise compliance < 50%
- Relative lack of support by Physician Community

The Future of Cardiac Rehabilitation

- Population Trends
  - **Aging of the Cardiac Population**
    - 50% of CR patients in the U.S. are now over 65 years
    - 16% of CR patients now over 75 years
  - **Increasing Rates of Obesity and Type II Diabetes.**
    - 80% of patients entering CR are overweight (BMI>25)
    - > 50% have metabolic syndrome

Cardiac Rehabilitation in the Elderly

Goals

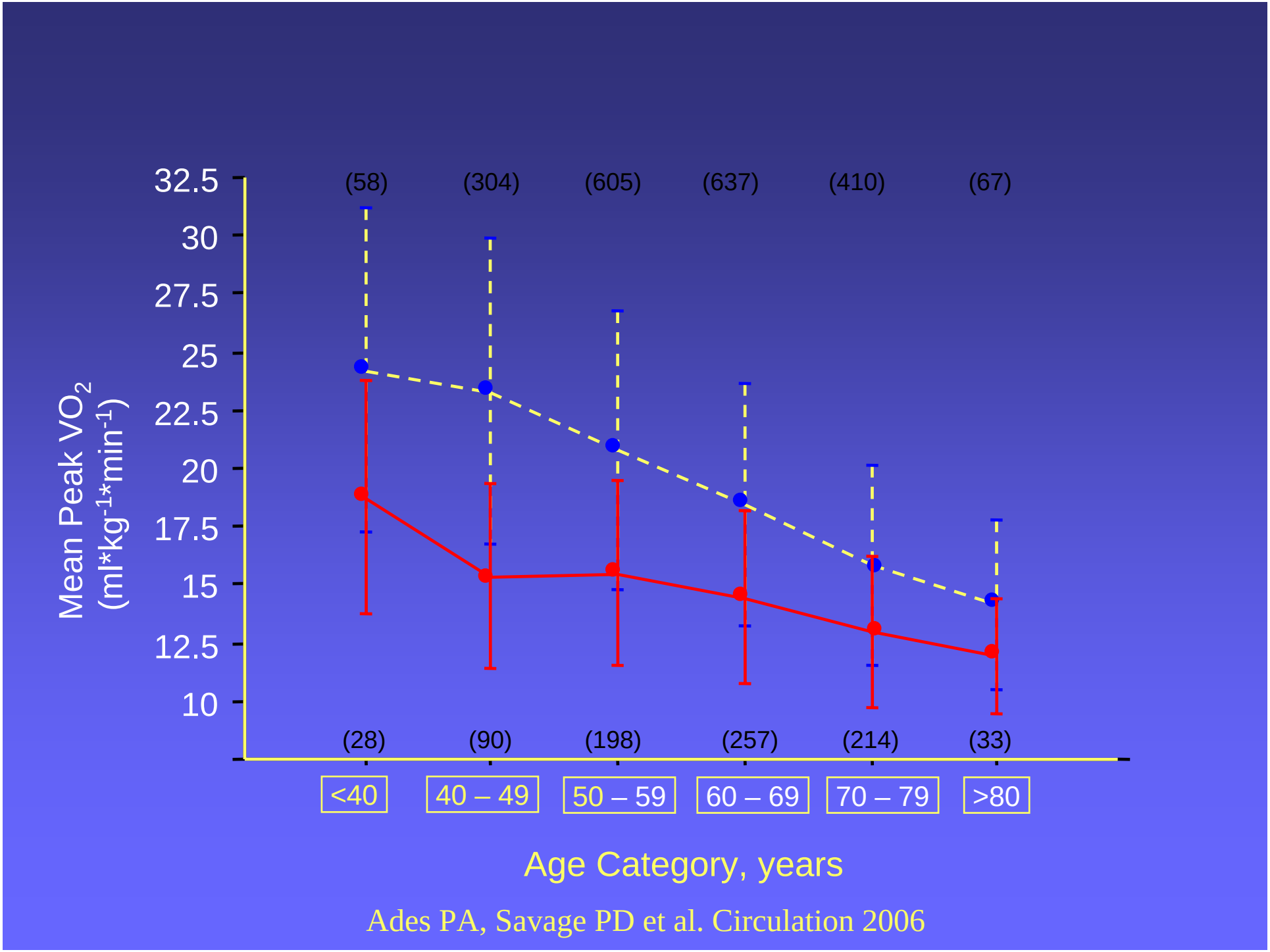
- 1. Treat/Prevent Coronary Disability
- 2. Extend Disability-Free Survival

Background

Framingham Disability Study

Age	With C.A.D. (%)	No C.A.D. (%)
55-69 years	**67**/49 (Female/Male)	**25**/9 (Female/Male)
70-88 years	**79**/49	**49**/27

Pinsky et al. Am J Pub Health 1990;80:1363



Ades PA, Savage PD et al. Circulation 2006

CR in the Elderly

- Standard CR programming (primarily treadmill walking and cycling) associated with increased Physical Function by questionnaire (SF-36)
- Resistance training in older coronary patients associated with increase in measured performance of daily activities (climbing stairs, carrying groceries etc.)

Ades PA Archives Int Med 1992
Brochu M J Appl Physiol 2002

CR in the Elderly: Survival Benefit

- Study of 601,099 U.S. Medicare participants, all age 65 or older
- *21-34% decrease in 5-year mortality* rates depending on statistical techniques.
- Dose-response noted: > 24 sessions CR had 19% lower mortality than < 24 sessions.

Suaya J et al. JACC 2009

Treatment of Obesity in C.R.

- Prevalence of Overweight/Obesity in CR > 80% in U.S.
- Prevalence of Metabolic Syndrome in CR > 50% in U.S.
- Weight loss *does not occur spontaneously* in CR
  - Treatment Options:
    - Decrease Caloric Intake
    - Increase Caloric Expenditure

Dietary Weight Loss in CHD Patients:

Weekly Behavioral Weight Loss Program

- **Calorie Goals**
- **Dietary Records**
- **Weekly Review**
- **“Troubleshooting”**
- **Nurse or Dietician Coordinated**

J Harvey Berino Ph D. Cor Art Dis:1998 9:795-798

Weight Loss in Cardiac Rehabilitation

(BMI > 27)

	Weight Loss Group (N= 26)		Control Group (N= 151)	
	Pre	Post	Pre	Post
Weight (lb)	211	201*+	208	204*
Triglycerides (mg/dL)	196	162*	185	173
LDL-Chol (mg/dL)	95	94	111	116
HDL-Chol (mg/dL)	38	40	34	36
Chol/HDL ratio	4.5	4.1*+	5.3	5.2
Waist (cm)	109	105*	107	104*

*** =P<0.05 vs. baseline, + = P<0.05 vs. other group**

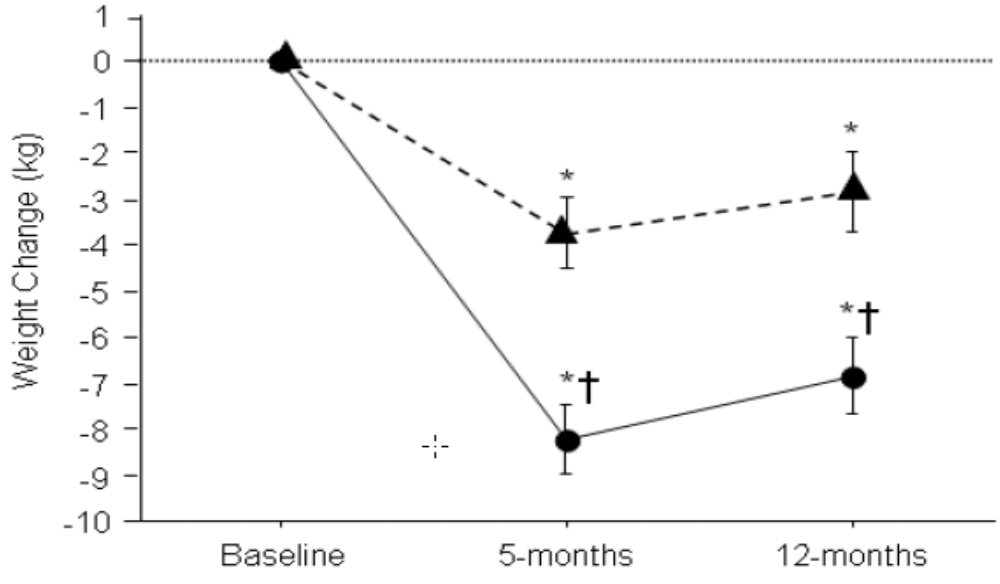
Savage et al. **JCR** 22:154-160, 2002

Weight Loss in CR: Role of Exercise

- Exercise should be oriented towards increasing caloric expenditure
- “Walk Daily and Walk far”
- Can eventually accomplish 2-3000 kcal calories burned per week by walking 3-4 Km per day

Weight Loss Over 5 and 12 months: High-Caloric Expenditure Exercise vs. “Standard” CR.

Figure 2



Ades PA, Savage PD, Toth MJ et al. Circulation May 2009

Weight Loss in CR: Risk Factor Benefits

- Diminished insulin resistance
- Improved lipid profile
- Decreased blood pressure
- Decreased HS-CRP
- Decreased PAI-1

Conclusions: The Future of CR

- Cardiac Rehabilitation is standard of care after an acute coronary event in the U.S.
- Needs to respond to demographic trends of aging and obesity
- Needs to optimize functional and medical outcomes on a long-term horizon
- Needs to maximize participation rates in CR through referral by hospital computer systems
- CR should be considered a “Quality Indicator” as with the use of preventive medications such as aspirin and statins.

Thank You Kindly