

Core Components of Cardiac Rehabilitation/Secondary Prevention Programs

A Statement for Healthcare Professionals From the American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation

Writing Group

Gary J. Balady, MD (chair); Philip A. Ades, MD; Patricia Comoss, RN; Marian Limacher, MD; Ileana L. Pina, MD; Douglas Southard, PhD; Mark A. Williams, PhD; Terry Bazzarre, PhD

Cardiac rehabilitation/secondary prevention programs are recognized as integral to the comprehensive care of patients with cardiovascular disease.^{1,2} In 1994, the American Heart Association stated that cardiac rehabilitation programs should consist of a multifaceted and multidisciplinary approach to overall cardiovascular risk reduction, and that programs that consist of exercise training alone are not considered cardiac rehabilitation.¹ This concept has been further developed in the Agency for Health Care Policy and Research clinical practice guideline on cardiac rehabilitation,² which provides the most comprehensive review of the scientific literature and evidence-based recommendations regarding all aspects of the discipline. The American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) recognize that all cardiac rehabilitation/secondary prevention programs should contain specific core components that aim to optimize cardiovascular risk reduction, foster healthy behaviors and compliance to these behaviors, reduce disability, and promote an active lifestyle for patients with cardiovascular disease.

The purpose of this statement is to present specific information regarding evaluation, intervention, and expected out-

comes in each of the core components of cardiac rehabilitation/secondary prevention programs: baseline patient assessment; nutritional counseling; risk factor management (lipids, hypertension, weight, diabetes, and smoking); psychosocial management; physical activity counseling; and exercise training. These recommendations are intended to assist cardiac rehabilitation staff in the design and development of their programs and to assist healthcare providers, insurers and policy makers, and consumers in the recognition of the comprehensive nature of such programs. It is not the intent of this statement to promote a rote approach or homogeneity among programs, but rather to foster a foundation of services upon which each program can establish its own specific strengths and identity and effectively attain outcome goals for its target population. Comprehensive and detailed guidelines regarding cardiac rehabilitation/secondary prevention programs have been published by the AACVPR³ and endorsed by the American Heart Association. Detailed guidelines on specific risk factor modifications are also available.⁴⁻¹⁷ Specific details regarding management of patients with heart failure, valvular disease, arrhythmias, and other cardiovascular diagnoses are beyond the scope of this document and can be found in the AACVPR guidelines.³

Core Components of Cardiac Rehabilitation/Secondary Prevention Programs

Patient Assessment

Evaluation

- Medical history: include cardiovascular (including peripheral vascular and cerebrovascular) diagnoses and prior cardiovascular procedures (including assessment of left ventricular function); comorbidities; symptoms of cardiovascular disease; risk factors for atherosclerotic disease progression; and medications and medication compliance. (See below for physical activity and psychosocial assessment.)
- Physical examination: include vital signs; cardiovascular and pulmonary examination; postprocedure wound sites; and joint and neuromuscular examination. (See below for specified examination for hypertension, weight, and diabetes.)
- Testing: obtain resting ECG; assess quality of life using standard questionnaires (eg, MOS SF-36). (See below for specified tests for exercise, lipids, and diabetes.)

This statement was approved by the American Heart Association Science Advisory and Coordinating Committee in May 2000. A single reprint is available by calling 800-242-8721 (US only) or writing the American Heart Association, Public Information, 7272 Greenville Ave, Dallas, TX 75231-4596. Ask for reprint No. 71-0186. To purchase additional reprints: up to 999 copies, call 800-611-6083 (US only) or fax 413-665-2671; 1000 or more copies, call 214-706-1466, fax 214-691-6342, or e-mail pubauth@heart.org. To make photocopies for personal or educational use, call the Copyright Clearance Center, 978-750-8400.

This statement is also being published in the September/October 2000 issue of the *Journal of Cardiopulmonary Rehabilitation*. (*Circulation*. 2000;102:1069-1073.)

© 2000 American Heart Association, Inc. and Lippincott Williams & Wilkins, Inc.

Circulation is available at <http://www.circulationaha.org>

Core Components of Cardiac Rehabilitation/Secondary Prevention Programs**Patient Assessment (Continued)**

- | | |
|-------------------|--|
| Interventions | <ul style="list-style-type: none"> ● Compose written records that reflect the patient evaluation and contain a patient care plan with detailed priorities for risk reduction and rehabilitation. ● Actively communicate this plan to the patient and the primary healthcare provider. |
| Expected Outcomes | <ul style="list-style-type: none"> ● Development and implementation of short-term (ie, weeks or months) and long-term (ie, years) goals and strategies to reduce disability and subsequent cardiovascular disease risk. ● Improvement in quality of life as identified by positive changes on follow-up questionnaire. ● Generation of a written summary of patient outcomes upon completion of the program that is provided to the patient and to the primary and referring healthcare providers. Written summaries should identify specific areas that require further intervention and monitoring. |

Nutritional Counseling

- | | |
|-------------------|---|
| Evaluation | <ul style="list-style-type: none"> ● Obtain estimates of total daily caloric intake and dietary content of fat, saturated fat, cholesterol, sodium, and other nutrients. ● Assess eating habits, including number of meals, snacks, frequency of dining out, and alcohol consumption. ● Assess target areas for nutrition intervention as outlined in the core components of weight, hypertension, and diabetes, as well as heart failure, kidney disease, and other comorbidities. |
| Interventions | <ul style="list-style-type: none"> ● Prescribe specific dietary modifications aimed to at least attain the saturated fat and cholesterol content limits of the AHA Step II diet.⁹ ● Individualize diet plan according to specific target areas as outlined in the core components of weight, hypertension, and diabetes (as outlined in this table), as well as heart failure and other comorbidities. ● Educate and counsel patient (and family members) regarding dietary goals and how to attain them. ● Incorporate behavior-change models and compliance strategies in counseling sessions. |
| Expected Outcomes | <ul style="list-style-type: none"> ● Patient adherence to prescribed diet. ● Patient understanding of basic principles regarding dietary content of calories, saturated fat, cholesterol, and other nutrients. ● Plan in place to address eating-behavior problems. |

Lipid Management

- | | |
|-------------------|--|
| Evaluation | <ul style="list-style-type: none"> ● Obtain fasting measures of total cholesterol, HDL, LDL, and triglycerides. In those with abnormal levels, as per NCEP,⁹ obtain a detailed history to determine whether diet, drug use, and/or other conditions that may affect lipid levels can be altered. ● Assess current treatment and compliance. ● Repeat lipid profiles at 4–6 weeks after hospitalization and at 2 months after initiation of or change in lipid-lowering medications. |
| Interventions | <ul style="list-style-type: none"> ● Provide nutritional counseling and weight management aiming for at least an AHA Step II diet in those patients with LDL \geq100 mg/dL; consider adding drug treatment in those with LDL 100–130 mg/dL; add or intensify drug treatment in those with LDL >130 mg/dL. ● Provide interventions to increase HDL to >35 mg/dL. These include exercise, smoking cessation, and consideration of targeted drug therapy. ● Provide interventions to reduce triglycerides to <200 mg/dL. These include nutritional counseling and weight management, exercise, alcohol moderation, and drug therapy as per NCEP.⁹ ● Provide and/or monitor drug treatment in concert with primary healthcare provider. |
| Expected Outcomes | <ul style="list-style-type: none"> ● Short term: Continued assessment and modification of intervention until LDL <100 mg/dL. ● Long term: LDL <100 mg/dL. Secondary goals include HDL >35 mg/dL and triglycerides <200 mg/dL. |

Hypertension Management

- | | |
|-------------------|---|
| Evaluation | <ul style="list-style-type: none"> ● Measurement of resting BP on \geq2 visits. ● Assess current treatment and compliance. |
| Interventions | <ul style="list-style-type: none"> ● If BP 130–139 mm Hg systolic or 85–90 mm Hg diastolic: <ul style="list-style-type: none"> ● Provide lifestyle modifications including exercise, weight management, moderate sodium restriction, alcohol moderation, and smoking cessation. ● Drug therapy in patients with heart failure, diabetes, or renal failure. ● If BP \geq140 mm Hg systolic or \geq90 mm Hg diastolic: <ul style="list-style-type: none"> ● Provide lifestyle modification and drug therapy. ● Provide and/or monitor drug therapy in concert with primary healthcare provider. |
| Expected Outcomes | <ul style="list-style-type: none"> ● Short term: Continued assessment and modification of intervention until BP <130 mm Hg systolic and <85 mm Hg diastolic. ● Long term: BP <130 mm Hg systolic and <85 mm Hg diastolic. |

Core Components of Cardiac Rehabilitation/Secondary Prevention Programs**Smoking Cessation**

- Evaluation**
- Document smoking status as never smoked, former smoker, or current smoker (which, because of the high rate of relapse, includes those who have quit in the last 6 months); specify both the amount of smoking (packs per day) and duration of smoking (number of years). Assess use of cigar smoking, pipe smoking, and chewing tobacco, as well as exposure to secondhand smoke.
 - Assess for confounding psychosocial issues.
 - Determine readiness to change by asking every smoker if he/she has considered quitting in the last 6 months.
 - If no (precontemplation), firmly advise that he/she give it some thought; plan to ask again at future visits.
 - If yes (contemplation stage), proceed with interventions below.
 - Ongoing contact: update status at each visit during first 2 weeks of cessation, periodically thereafter for at least 6 months.
- Interventions**
- When readiness to change is confirmed, help the smoker set a quit date and select appropriate treatment strategies (preparation):
- Minimal*
- Provide individual education and counseling by program staff, supplemented by self-learning materials.
 - Encourage physician, staff, and family support.
 - Provide relapse prevention.
- Optimal*
- Provide formal smoking cessation program using group and/or individual counseling.
 - Provide and/or monitor pharmacological support as needed in concert with primary physician.
 - Offer supplemental strategies if desired, eg, acupuncture, hypnosis.
 - Arrange follow-up by return visits or telephone contact for at least 6–12 months.
- Expected Outcomes**
- Short term: patient will demonstrate readiness to change by initially expressing decision to quit (contemplation) and selecting a quit date (preparation). Subsequently, patient will quit smoking and use of all tobacco products (action); adhere to pharmacotherapy, if prescribed; practice strategies as recommended; and resume cessation plan as quickly as possible when relapse occurs.
 - Long term: complete abstinence from smoking and use of all tobacco products at 12 months from quit date.

Weight Management

- Evaluation**
- Measure weight, height, and waist circumference. Calculate body mass index.
- Interventions**
- In patients with BMI >25 kg/m² and/or waist >40 inches in men (102 cm) and >35 inches (88 cm) in women:
 - Establish reasonable short-term and long-term weight goals individualized to patient and associated risk factors (eg, reduce body weight by at least 10% at a rate of 1–2 lb/wk over a period of time up to 6 months).
 - Develop a combined diet, exercise, and behavioral program designed to reduce total caloric intake, maintain appropriate intake of nutrients and fiber, and increase energy expenditure.
 - Aim for an energy deficit of 500–1000 kcal/d.
- Expected Outcomes**
- Short term: Continued assessment and modification of interventions until progressive weight loss is achieved. Provide referral to specialized, validated nutrition weight loss programs if weight goals are not achieved.
 - Long term: adherence to diet and exercise program aimed toward attainment of established weight goal.

Diabetes Management

- Evaluation**
- Identify diabetic patients by initial history and note medication type, dose, and regimen; type and frequency of glucose monitoring; and history of hypoglycemic reactions.
 - Obtain fasting plasma glucose measurements in all patients and HbA_{1c} in diabetic patients to monitor therapy.
- Interventions**
- Develop a regimen of dietary adherence and weight control that includes exercise, oral hypoglycemic agents, insulin therapy, and optimal control of other risk factors. Drug therapy should be provided and/or monitored in concert with primary healthcare provider.
 - Monitor glucose levels before and/or after exercise sessions. Instruct patient regarding identification and treatment of postexercise hypoglycemia. Limit or prohibit exercise if blood glucose \geq 300 mg/dL.
 - Refer patients without known diabetes whose fasting glucose is >110 mg/dL to their primary healthcare provider for further evaluation and treatment.
- Expected Outcome**
- Normalization of fasting plasma glucose (80–110 mg/dL or HbA_{1c} <7.0), minimization of diabetic complications, and control of associated obesity, hypertension (BP <130/85 mm Hg), and hyperlipidemia.

Psychosocial Management

- Evaluation**
- Using interview and/or standardized measurement tools, identify psychological distress as indicated by clinically significant levels of depression, anxiety, and anger or hostility; social isolation; sexual dysfunction/maladjustment; and substance abuse (alcohol or other psychotropics).

Core Components of Cardiac Rehabilitation/Secondary Prevention Programs**Psychosocial Management (Continued)**

- | | |
|-------------------|---|
| Interventions | <ul style="list-style-type: none"> ● Offer individual and/or small group education and counseling regarding adjustment to CHD, stress management, and health-related lifestyle change. When possible, include family members and significant others in such sessions. ● Develop supportive rehabilitation environment and community resources to enhance patient's and family's level of social support. ● Teach and support self-help strategies. ● In concert with primary healthcare provider, refer patients experiencing clinically significant psychosocial distress to appropriate mental health specialists for further evaluation and treatment. |
| Expected Outcomes | <ul style="list-style-type: none"> ● Evidence of emotional well-being indicated by the absence of clinically significant psychological distress, social isolation, or drug dependency. ● Demonstration of self-responsibility for health-related behavior change; relaxation and other stress management skills; ability to obtain effective social support; compliance with use of psychotropic medications, if prescribed; and reduction or elimination of alcohol, tobacco, caffeine, or other nonprescription psychoactive drugs. ● Develop a plan for ongoing management if important psychosocial issues are present. |

Physical Activity Counseling

- | | |
|-------------------|--|
| Evaluation | <ul style="list-style-type: none"> ● Assess current physical activity level and determine domestic, occupational, and recreational needs. ● Question activities relevant to age, gender, and daily life, including driving, sexual activity, sports, gardening, and household tasks. ● Assess readiness to change behavior, self-confidence, barriers to increase physical activity, and social support in making positive changes. |
| Interventions | <ul style="list-style-type: none"> ● Provide advice, support, and counseling about physical activity needs on initial evaluation and in follow-up. Target exercise program to meet individual needs (see "Exercise Training" section of table). Provide educational materials as part of counseling efforts. Consider simulated work testing for patients with heavy labor jobs. ● Set goals to increase physical activity that include 30 minutes per day of moderate physical activity on ≥ 5 days per week. Explore daily schedules to suggest how to incorporate increased activity into usual routine; eg, parking farther away from entrances, walking up 2 or more flights of stairs, walking for 15 minutes during lunch break. ● Advise low-impact aerobic activity to minimize risk of injury. Recommend gradual increases in intensity over weeks. |
| Expected Outcomes | <ul style="list-style-type: none"> ● Increased participation in domestic, occupational, and recreational activities. ● Improved psychosocial well-being, reduction in stress, facilitation of functional independence, prevention of disability, and enhancement of opportunities for independent self-care to achieve recommended goals. |

Exercise Training

- | | |
|-------------------|---|
| Evaluation | <ul style="list-style-type: none"> ● Obtain an exercise test (or other standard measure of exercise capacity) before participation, which is repeated as changes in clinical condition warrant. Test should include assessment of heart rate and rhythm, signs, symptoms, ST-segment changes, and exercise capacity. |
| Interventions | <ul style="list-style-type: none"> ● Develop a documented individualized exercise prescription for aerobic and resistance training that is based on evaluation findings, risk stratification, patient and program goals, and resources. Exercise prescription should specify frequency (F), intensity (I), duration (D), and modalities (M). <ul style="list-style-type: none"> ● For aerobic exercise: F=3–5 d/wk; I=50% to 80% of exercise capacity; D=30–60 min; and M=walking, treadmill, cycling, rowing, stair climbing, arm ergometry, and others. ● For resistance exercise: F=2–3 d/wk; I=8–15 repetitions maximum for each muscle group (where repetition maximum is maximum number of times a load can be lifted before fatigue); D=1–3 sets of 6–10 different upper- and lower-body exercises (20–30 min); and M=elastic bands, cuff/hand weights, dumbbells, free weights, wall pulleys, or weight machines. ● Include warm-up, cool-down, and flexibility exercises in each exercise session. Provide updates to the exercise prescription routinely and when patient condition warrants. Structured outpatient or home-based programs are appropriate and may include ECG monitoring as deemed necessary. Regardless of program site, supplement the formal exercise regimen with at-home activity guidelines as outlined in the "Physical Activity Section" of this table. Caloric expenditure of at least 1000 kcal/wk should be a specific exercise program objective. |
| Expected Outcomes | <ul style="list-style-type: none"> ● As a component of an overall program of cardiac rehabilitation/secondary prevention, exercise will assist in lowering cardiovascular risk and improve overall outcomes. Improved functional capacity through enhanced muscular endurance and strength, flexibility, and weight management will improve symptoms and physiological responses to physical challenges and should assist in the modification of various unhealthy behavior and psychosocial characteristics. ● Patient understanding of safety issues during exercise. |

ECG indicates electrocardiogram; MOS SF-36, Medical Outcomes Study Short Form 36; AHA, American Heart Association; HDL, high-density lipoprotein; LDL, low-density lipoprotein; NCEP, National Cholesterol Education Program; BP, blood pressure; HbA_{1c}, major fraction of glycosylated hemoglobin; and CHD, coronary heart disease.

References

1. Balady GJ, Fletcher BJ, Froelicher EF, et al. Cardiac rehabilitation programs: a statement for healthcare professionals from the American Heart Association. *Circulation*. 1994;90:1602-1610.
2. Wenger NK, Froelicher ES, Smith LK, et al. *Cardiac Rehabilitation: Clinical Practice Guideline No. 17*. Rockville, Md: US Dept of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, National Heart, Lung, and Blood Institute; October 1995. AHCPR publication No. 96-0672.
3. American Association of Cardiovascular and Pulmonary Rehabilitation. *Guidelines for Cardiac Rehabilitation and Secondary Prevention Programs*. Champaign, Ill: Human Kinetics Publishers; 1999.
4. Pate RR, Pratt M, Blair SN, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA*. 1995;273:402-407.
5. American College of Sports Medicine Position Stand: the recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults. *Med Sci Sports Exerc*. 1998;30:975-991.
6. US Department of Health and Human Services. *Physical Activity and Health: A Report of the Surgeon General*. Atlanta, Ga: US Dept of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 1996.
7. American College of Sports Medicine. *ACSM's Guidelines for Exercise Testing and Prescription*. 6th ed. Baltimore, Md: Lippincott Williams & Wilkins; 2000.
8. Smith SC Jr, Blair SN, Criqui MH, et al. Preventing heart attack and death in patients with coronary artery disease. *Circulation*. 1995;92:2-4.
9. National Cholesterol Education Program. *Second Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP II)*. Bethesda, Md: National Institutes of Health, National Heart, Lung, and Blood Institute; 1993. NIH publication No. 93-3095.
10. National Cholesterol Education Program. Second Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel II). *Circulation*. 1994;89:1333-1445.
11. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [published erratum appears in *Arch Intern Med* 1998;158:573]. *Arch Intern Med*. 1997;157:2413-2446.
12. Fiore MC, Bailey WC, Cohen SJ, et al. *Smoking Cessation: Clinical Practice Guideline No. 18*. Rockville, Md: US Dept of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research; April 1996. AHCPR publication No. 96-0692.
13. Ruderman N, Devlin JT, eds. *The Health Professional's Guide to Diabetes and Exercise*. Alexandria, Va: American Diabetes Association; 1995.
14. Executive summary of the clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults. *Arch Intern Med*. 1998;158:1855-1867.
15. Grundy SM, Pasternak R, Greenland P, et al. Assessment of cardiovascular risk by use of multiple-risk-factor assessment equations: a statement for healthcare professionals from the American Heart Association and the American College of Cardiology. *Circulation*. 1999;100:1481-1492.
16. *Rehabilitation After Cardiovascular Diseases, With Special Emphasis on Developing Countries: Report of a WHO Expert Committee*. Geneva, Switzerland: World Health Organization; 1993. WHO Technical Report Series, No. 831.
17. Eckel RH. Obesity and heart disease: a statement for healthcare professionals from the Nutrition Committee, American Heart Association. *Circulation*. 1997;96:3248-3250.

KEY WORDS: AHA/AACVPR Scientific Statement ■ prevention ■ cardiovascular diseases ■ diet ■ exercise ■ risk factors