Secondary Prevention of Coronary Heart Disease in Elderly Patients

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ILLUSTRATION BY MARK SCHULER

Coronary heart disease remains a leading cause of mortality in the United States, with 84 percent of persons 65 years or older dying from this disease. Secondary preventive measures, including lifestyle modification and pharmacotherapy, are important for elderly patients because of the variable impacts on morbidity and mortality rates and quality of life. Participating in light to moderate activities significantly decreases mortality rates in elderly patients. Smoking cessation translates into a reduction in overall mortality and morbidity rates at least equal to that of other preventive measures such as aspirin or beta-blocker therapy. Recent studies on the effects of lowering low-density lipoprotein cholesterol levels to below 100 mg per dL have shown a substantial reduction in coronary heart disease mortality and nonfatal myocardial infarction rates, with a persistent effect in patients older than 75 years. Hypertension, manifesting mostly as isolated systolic blood pressure elevation, also should be treated aggressively. Conventional medical therapies for hypertension (e.g., diuretics, beta blockers) and newer agents (e.g., calcium channel blockers, angiotensin-converting enzyme inhibitors), together with sodium restriction, have had a positive effect on cardiovascular mortality and morbidity rates in older patients. With the increasing prevalence of obesity, insulin resistance, and type 2 diabetes, interventions targeting weight reduction and glucose control should be emphasized. Whereas weight-loss strategies are poorly defined in this population, the management of diabetes through dietary modification, exercise, and medications is similar across age groups. The target hemoglobin A1C level is less than 7 percent. Elderly patients are prone to depression and social isolation, and they are more likely to have a lower socioeconomic status than younger patients, which may negatively affect participation in rehabilitation programs and compliance with medical advice and therapy. Strategies aimed at these factors have shown variable results and remain ill-defined. (Am Fam Physician 2005;71:2289-96. Copyright© 2005 American Academy of Family Physicians.)

See page 2237 for strength-of-recommendation labels.

Coronary heart disease (CHD) is responsible for significant morbidity and mortality in elderly patients (i.e., 65 years and older), translating into a substantial financial burden on the health care system. In recent decades, novel approaches to prevention and treatment have resulted in increased survival of patients with CHD. These interventions, mostly validated in large, randomized clinical studies, have provided strong evidence on which to base recommendations. The limited representation of elderly patients has resulted in fewer data about the effectiveness of various strategies in this population.[1] Moreover, the atypical clinical presentations of CHD in elderly patients, and the consequent difficulty in diagnosis, have resulted in suboptimal implementation of secondary preventive measures by health care professionals. CHD in the elderly may manifest as dyspnea or congestive heart failure with pulmonary edema, and some patients may be asymptomatic.[2] This article, which is based on the 2002 statement of the American Heart Association (AHA),[3] reviews the scientific evidence for the secondary prevention of CHD in the elderly.

Exercise

Exercise training in elderly patients is advocated as part of a multidisciplinary approach to secondary prevention. A standardized exercise program improves functional capacity

Strength of Recommendations

Key clinical recommendation	*Label*	*References*
Lipid lowering with statins in elderly patients with CHD is advisable for reducing morbidity and mortality rates.	A	22, 23
Patients with CHD should be referred for structured cardiac rehabilitation services, including exercise and counseling.	B	7
Patients with CHD should be encouraged to do light to moderate physical activity, such as regular walking, frequent recreational activities, or once-weekly sporting activities.	B	9
Smoking cessation is recommended for patients with CHD to reduce overall mortality and morbidity rates.	B	13, 14
Dietary counseling, exercise prescription, and pharmacologic therapies are recommended for diabetic patients with the goal of reducing hemoglobin A1C levels to less than 7 percent.	C	25
The targets for lowering blood pressure for secondary prevention of CHD are similar for patients of all ages. The goal blood pressure is less than 140/90 mm Hg, except in patients with type 2 diabetes, chronic renal disease, and heart failure, in whom a level of less than 130/80 mm Hg is recommended.	C	31

CHD = coronary heart disease.

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, opinion, or case series. See page 2237 for more information.

and reduces activity-related symptoms. These changes occur as early as 12 weeks after training initiation, and modest improvement persists with extended participation.[4,5] Despite lower absolute functional levels and smaller improvements in measures of exercise capacity, elderly patients derive significantly greater benefit in total functional scores and quality of life from increased physical activity than younger patients.[4-6] In addition, exercise training positively impacts CHD risk factors such as obesity, hypertension, and insulin resistance, even in patients older than 75 years.[4,5,7,8] The ability of exercise training to reduce morbidity and mortality rates has not been well established for elderly patients, but limited data suggest some benefit *(Table 1)*. In the British Regional Heart Study, which enrolled men with known CHD (mean age, 63 years), light to moderate physical activity in the form of regular walking, frequent recreational activities (e.g., gardening), or once-weekly sporting activities (e.g., jogging, swimming), was associated with a significant reduction in all-cause mortality at five years of follow-up.[9] More vigorous types of activities did not show a statistically significant reduction in that same endpoint.[9]

The exercise prescription should not be limited to participation in structured programs, but should include occupational, leisure, and daily life activities. The program should promote all aspects of physical conditioning and encourage socialization in an effort to improve quality of life.[10] Particular attention should be paid to the avoidance of

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high-intensity exercises that can adversely affect the knees and shoulders. The exercise prescription should be individualized, taking into account comorbidities that impair mobility, such as arthritis and peripheral vascular disease. Increasing the frequency and duration of exercise sessions should take precedence over increasing the intensity of the activities, with an emphasis on strength training to promote independence in activities of daily living.[11]

Smoking Cessation

Tobacco smoking has deleterious effects on the cardiovascular system, manifesting as an increased incidence of myocardial infarction (MI), stroke, and death. Smoking affects the neurohormonal balance (increases catecholamine levels), metabolic profile (lowers high-density lipoprotein [HDL] cholesterol levels), vasomotor tone (impairs arterial vasodilation), and hemostatic system (increases clotting tendency).[12] Smoking cessation reduces overall morbidity and mortality rates in MI patients and post-coronary artery bypass graft surgery patients, including those older than 70 years.[13,14] The relative benefit in elderly patients is comparable with that in younger patients.[14] One review[14] found a 36 percent reduction in overall mortality with smoking cessation in patients with CHD; this reduction is greater than that resulting from many other secondary prevention therapies, including aspirin, beta blockers, and angiotensin-converting enzyme (ACE) inhibitors. Interventions advocated to promote smoking cessation include physician counseling, support groups, nicotine replacement, and other pharmacologic therapies.[15-18]

Dyslipidemia

The scientific evidence strongly supports lipid lowering for primary and secondary prevention of CHD. Trials specifically designed to define the role of such therapy in older patients are limited, and current recommendations are derived mainly from subanalyses of available data. In a post-hoc analysis[19] of the Scandinavian Simvastatin Survival Study, the relative risk reduction of major coronary events such as CHD and hospitalization was similar in patients younger than 65 years randomized to simvastatin and in treated patients 65 years and older. Because of higher mortality rates in the elderly population, the absolute risk reduction for all-cause and CHD-related mortality in treated patients was twice as great in older patients.[19] These findings were further supported by the Cholesterol And Recurrent Events trial[20] and the Prospective Pravastatin Pooling Project.[21] More recent data from the Prospective Study of Pravastatin in the Elderly at Risk (PROSPER),[22] which evaluated the impact of pravastatin on vascular morbidity and mortality rates in high-risk patients 70 years and older, showed a persistent benefit of statins in these patients, with a significant reduction in rates of CHD-related mortality and nonfatal MI. Statin use in PROSPER did not have a significant impact on stroke risk and was associated with an increased incidence of cancer.[22] The value of statin use in elderly patients with CHD, other vascular disease, or diabetes is further supported by subgroup analyses of the Heart Protection Study.[23] Simvastatin significantly reduced rates of all-cause mortality, coronary death, and nonfatal MI in patients older than 70 years, including patients with low-density lipoprotein (LDL) cholesterol levels less than

Smoking cessation may be more effective in reducing mortality rates in patients with coronary heart disease than therapy with aspirin, beta blockers, or angiotensin-converting enzyme inhibitors.

TABLE 1
Impact of Interventions on All-Cause Mortality and Cardiovascular Morbidity in Elderly Patients

Intervention	*Reduces mortality*	*Reduces morbidity*
Control of diabetes mellitus	Yes	Yes
Control of obesity	Not clear	Not clear
Dyslipidemia therapy	Yes	Yes
Exercise	Yes*	Not clear
Hypertension therapy	Yes	Yes
Psychosocial interventions	Not clear	Not clear
Smoking cessation	Yes	Yes

**—Based on limited data.*

116 mg per dL (3.00 mmol per L). The benefit occurred in men and women, and in persons with and without diabetes.[23] An ongoing trial specifically recruiting elderly patients (Fluvastatin Assessment of Morbidity/Mortality in the Elderly) should provide additional data about this population.

The goals for therapy, as outlined in the National Cholesterol Education Program (NCEP) report,[24] are similar for younger and older patients: the target LDL cholesterol level is less than 100 mg per dL (2.60 mmol per L), and, if possible, the HDL cholesterol level should be greater than 40 mg per dL (1.05 mmol per L). If the triglyceride level is 200 mg per dL (2.26 mmol per L) or higher, the non-HDL cholesterol level (i.e., total cholesterol level minus HDL cholesterol level) should be less than 130 mg per dL (3.35 mmol per L).[24,25] This is achieved through a combination of dietary modifications (Adult Treatment Panel III diet) and pharmacologic interventions. A more recent NCEP report[26] suggests that a goal LDL cholesterol level of less than 70 mg per dL (1.80 mmol per L) should be considered in very-high-risk patients, including those with established cardiovascular disease plus multiple major risk factors (especially diabetes), severe and poorly controlled risk factors (especially continued cigarette smoking), and patients with acute coronary syndromes. Despite these recommendations, adherence to statin therapy has been less than satisfactory in elderly patients, with a significant discontinuation rate as early as six months after initiation of therapy.[27,28] This might be particularly detrimental in patients on chronic statin therapy whose medication is discontinued in the setting of an acute coronary event.[29]

For secondary prevention of coronary heart disease, the target low-density lipoprotein cholesterol level is less than 100 mg per dL. A goal of less than 70 mg per dL should be considered in very-high-risk patients.

Hypertension

Hypertension is a common risk factor for heart failure and chronic kidney disease, and it is present in more than two thirds of patients older than 65 years.[30] The targets for lowering blood pressure are similar for patients of all ages: less than 140/90 mm Hg, except in patients with type 2 diabetes, chronic renal disease, or heart failure, in whom a level of less than 130/80 mm Hg is recommended.[31] Elderly persons are more likely than younger patients to have poorly controlled blood pressure. Isolated systolic hypertension (i.e., systolic blood pressure 140 mm Hg or higher with a diastolic blood pressure of less than 90 mm Hg) is the most common form of hypertension in the elderly, and a wide pulse pressure (i.e., 50 mm Hg or higher) in this population is probably a better marker of cardiovascular risk than mean or diastolic blood pressure.[32] The benefits of antihypertensive therapy in patients 60 to 80 years of age are manifest as a reduction in rates of all-cause mortality, stroke, and heart failure, with a smaller impact on coronary events.[33,34] Newer antihypertensive agents such as ACE inhibitors and calcium channel blockers have been shown to be as effective as more conventional therapies (e.g., diuretics, beta blockers) in controlling blood pressure and improving clinical outcomes.[35] For patients 80 years or older, guidelines for initiation of antihypertensive therapy are not well defined. A large international study, the Hypertension in the Very Elderly Trial,[36] may provide guidance as to the risk-benefit profile of antihypertensive therapy in patients 80 years and older. Pharmacologic therapy for elevated blood pressure in elderly patients should follow the guidelines from the seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.[31] However, nonpharmacologic approaches (e.g., decreased sodium intake, weight reduction, exercise) also should be emphasized because they are more effective in older patients than in younger patients.[37]

Type 2 Diabetes

Diabetes is a strong predictor of recurrent ischemic events in patients with known CHD. Its prevalence is increasing, partly as a result of the increasing average body mass index of the U.S. population.[38,39] In elderly patients, lifestyle modifications leading to loss of body fat have a sizable positive impact

on insulin and glucose metabolism. Exercise training improves insulin resistance and glucose control in healthy elderly persons.[40] It is likely that the impact of exercise on glycemic control in this population is mediated mostly through its effect on body fat content and distribution.[4,41] The recommended therapeutic interventions are similar across age groups and include dietary counseling, exercise prescription, and pharmacologic therapies, with the goal of reducing the hemoglobin A1C level to less than 7 percent and achieving near-normal fasting blood glucose levels.[25]

Obesity

The role of obesity as a risk factor for CHD is likely mediated through its association with insulin resistance, hypertension, and hyperlipidemia. Not only fat content, but fat distribution, seems to dictate the metabolic derangement in obese patients with the metabolic syndrome, generally affecting patients with androgenic truncal obesity.[42] One study[43] of obese patients with CHD (mean age, 60 years) demonstrated that a mean weight loss of 11 kg (24 lb, 3 oz) in patients on the AHA step 1 diet was associated with a 10 percent decrease in total and LDL cholesterol levels, a 24 percent reduction in triglyceride levels, and an 8 percent increase in HDL cholesterol levels. Another study[44] showed that lifestyle modification (i.e., dietary and exercise interventions) aimed at preventing weight gain in a group of perimenopausal women was associated with a blunting of the increase in LDL cholesterol and triglyceride levels, and the prevention of a decrease in HDL cholesterol levels observed in the control group during 54 months of follow-up. A more recent publication[45] by the same investigators further showed a slowing of the menopause-related progression of atherosclerosis, as measured by carotid artery intima-media thickness, in women randomized to the diet and exercise program when compared with the control group.

The recommended approach to weight reduction is not well defined because of the paucity of data on the impact of exercise and diet on obesity in the elderly. The available literature suggests a small role for exercise alone.[4,41] This probably is caused by the low levels of physical activity achieved by older patients with CHD.[46] It is advisable to recommend more frequent and more prolonged periods of walking as an adjunct to dietary therapy in obese elderly patients with CHD.[47]

Psychosocial Interventions

The impact that addressing the psychosocial needs of elderly patients may have on the secondary prevention of CHD has not been well defined. Recommendations mostly are derived from studies in younger patients with CHD and elderly populations with noncardiac illnesses.[48] In general, socioeconomic status, mood, social support, and level of functioning (including sexual activity) must be assessed for possible intervention. A low socioeconomic status is associated with increased CHD mortality rates, and it negatively impacts participation in cardiac rehabilitation programs.[48] Depression and social isolation, which can affect elderly patients, in part as a result of personal and financial losses,[49] have been associated with increased morbidity and mortality rates in older patients after MI.[50] A recently published study, the Enhancing Recovery in Coronary Heart Disease Patients Randomized Trial,[51] evaluated the effect of cognitive behavior therapy in combination with selective serotonin reuptake inhibitor antidepressants for depression and interventions for low perceived social support on the morbidity and mortality rates of a large cohort of patients (mean age, 61 years) with recent MI. Despite improvement in the psychosocial outcome at six months, the proposed interventions had no significant impact on the endpoint of death or recurrent MI across age groups.[51] This lack of significant benefit could have been affected by factors such as patient selection and type of intervention, suggesting the need for further studies to clarify the roles of enhancing social support and reducing depression in elderly patients with CHD. Recently, an evaluation of the impact of social support on participation in cardiac rehabilitation programs after coro-

nary artery bypass graft surgery failed to show a strong correlation between participation in rehabilitation and social support.[52]

A routine psychosocial assessment by health care professionals using simple screening tools may identify potential issues that can be addressed with the aim of improving secondary prevention outcomes in elderly patients with CHD.[53]

Cardiac Rehabilitation Programs

Once the diagnosis of CHD is established, it is incumbent on the physician to educate the patient and address risk factors. Structured cardiac rehabilitation services offer the optimal setting, providing personnel trained in education and counseling.[7] The exercise prescription is individualized, with an intensity targeting 75 percent of the patient's maximal heart rate at exercise testing. A typical session starts and ends with 10 minutes of stretching and warm-up. In between, the patient performs 30 to 40 minutes of continuous aerobic activity (e.g., treadmill walking, bicycle ergometry) and light isometric exercises. During the second phase of the program, supervised sessions are scheduled three times per week for 12 weeks. The patient is encouraged to exercise outside of the program. Historically, cardiac rehabilitation services have been underused, especially by elderly women.[54] Participation in secondary prevention programs has been estimated at 20 percent of eligible patients, with even worse long-term adherence rates.[55-57] A number of barriers have been identified: notably, lack of recognition and referral by physicians and perceived or real financial and logistic impediments by patients wishing to enroll.[58] The strength of the recommendation for rehabilitation participation by the referring physician favorably affects adherence.

Exercise prescription is individualized, with an intensity targeting 75 percent of the patient's maximal heart rate at exercise testing.

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