
Chapter 4

**Health Promotion/Disease
Prevention and Nutrition
in the Elderly**

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Health Promotion./Disease Prevention and Nutrition in the Elderly

Introduction

People are living longer, and an increasing body of evidence is demonstrating that preventive measures begun early in life and maintained throughout life can significantly reduce the prevalence of acute and/or chronic diseases in old age. These measures include diet modification, regular exercise, smoking avoidance, and periodic medical screening, especially for blood pressure and cancer. At the same time, because of increases in life expectancy during the last 50 years, a generation of persons is growing up with the knowledge that if they practice healthy life behaviors, they are likely to live 70 or more years. Efforts to extend knowledge of behaviors that promote health and prevent crippling and chronic disease at older ages are thus becoming more important. Behavior alone cannot ensure longevity; however, the social and economic context is extremely important. People who cannot afford nourishing food, adequate housing, and essential medical care cannot live healthy lifestyles even if they know how to do so.

Because the focus of this study is the elderly, this chapter primarily treats preventive measures for persons 65 or more years of age. This is done, however, in full recognition of the importance of prevention throughout life.

Until recently there was consensus among health professionals, and among the elderly themselves, that after 65 it was too late to think seriously about prevention of disease or disability. For example, a 65-year-old would already have sustained too much lung damage through excessive smoking to justify quitting, or atherosclerosis would have progressed too far to make it worthwhile to undertake exercise and dietary modifications that might reverse the condition. These attitudes are slowly changing, and health promotion is now justified for several reasons:

- increasing life expectancy after 65 (half of those who reach 65 will live to be at least 80);
- more sophisticated definitions of health that recognize variability among and between age groups;
- better understanding of the importance of chronic disease and disability as major threats to health in the elderly and of the relationships between chronic disease and preventable risks;
- the recent improvement in cardiovascular disease mortality due in part to preventive efforts (e.g., control of hypertension);
- the desire of many older people to continue working (73 percent of persons over 65 would prefer to continue some kind of part-time work if they could (this percentage drops significantly for full-time work and for persons over 75) (26); and
- growing uncertainty about Social Security and pension plans that reinforces the desire to stay healthy and continue to work.

In implementing health promotion strategies, both the efficacy and goals of the intervention and the time in the life cycle are important. The efficacy of prevention is often difficult to demonstrate because of the problem of measuring the nonoccurrence of events (19). Preventive steps should be taken early in life in order to show effect in old age; this long time lag makes proving causality difficult. Also, many efficacious programs can increase functional independence or decrease chronic disease incidence; these parameters are more difficult to measure than death rate changes. For people who are ill, the goal of health promotion/disease prevention is to maximize function and prevent deterioration, while for those who are well the goal is the prevention of disease or disability irrespective of age. The goals of risk prevention are quite different for

a 50-year-old than they are for an 80-year-old, and are further complicated by the overall health of the individual. At any age, however, the goal is

to promote the maximum functional independence of which the individual is capable.

Types of prevention

Prevention is usually divided into three components: primary, secondary, and tertiary. Primary prevention refers to preventing the occurrence of disease or injury. Secondary prevention refers to early detection and intervention, preferably before the condition is clinically apparent. The aim of secondary prevention is to reverse, halt, or at least retard the worsening of a condition. Tertiary prevention refers to minimizing the effects of existing disease and disability by surveillance and maintenance designed to prevent complications and premature deterioration (21).

This traditional taxonomy is difficult to apply to specific cases and fits poorly into the chronic disease situations that characterize the elderly. A condition may be both a preventable disease (a problem on its own) and a precursor (risk fac-

tor) to a subsequent condition. For example, falls are not only common in older age groups but also constitute a risk factor for hip fracture. Hypertension is a medical condition that should be treated because it is a risk factor for stroke, heart disease, and kidney disease. When primary prevention of hypertension (e.g., control through diet modification) succeeds, it becomes tertiary prevention; control of hypertension is, in turn, a primary prevention strategy for stroke and arteriosclerosis (19). Control of diet (weight) is primary prevention for diabetes, which is, in turn, a risk factor for arteriosclerosis and stroke. And reducing arteriosclerosis can lower the incidence of stroke. Thus a particular risk factor can be a primary, secondary, or tertiary risk factor, depending on the disease.

Definitions of wellness and functional dependence

Of Americans 65 and over, more than half (56 percent) perceive their health to be excellent or good (26). More than 60 percent of adults 18 to 64 and more than 70 percent of those over 65 believe that health status has improved for older Americans. ("This improvement may be associated with the evidence of increases in life expectancy. See **Appendix A: Morbidity and Mortality.**") Despite disagreement as to the validity of these self-ratings, there is evidence that they are useful measures of health status. Objective definitions of wellness or health are, however, difficult to develop.

The World Health Organization defines health as '(a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.'

Providers and scientists interested in health promotion/disease prevention have found this definition difficult to follow in practice. The linkage of functional dependence with health promotion provides a more fruitful approach. Functional dependence is defined as the inability to attend to one's own needs, which generally include the basic activities of daily living: walking, eating, personal hygiene, shopping, dressing, laundry, meal preparation, paying bills, and recreational and social activities. Dependence may result from changes that accompany natural aging, but is more likely a correlate of disease or a related pathological condition. Dependence can often be prevented, reversed, or reduced (14).

Several measures for assessing the degree of functional independence of the elderly have been

developed. The older Americans Resources and Services (OARS) assessment battery yields information on five functional activity areas. Another approach uses both clinical and epidemiologic criteria to specify health goals and professional services appropriate for 10 different age groups from

birth to 75 years and over. A third method stresses functional independence defined from activities of daily living scales. These assessment measures are discussed further in chapters 7 and 9 and in the *Technical Memorandum* at the end of this chapter.

Morbidity and mortality

Today's leading causes of death—both in the general population and among those over 65—are diseases of the heart, malignant neoplasms (cancer), and cerebrovascular disease (stroke). As noted in chapter 2, these three conditions accounted for three out of every four deaths among the elderly in 1981. Death rates for stroke among the elderly decreased more rapidly during the past 30 years than those for heart disease, especially since the early 1970s, when stroke mortality fell sharply. Death rates for heart disease, which are also falling, showed a rapid decline between 1968 and 1978. In contrast, death rates for some cancers are rising, especially for cancer of the respiratory tract, and in men, genital and colon cancer. Overall cancer mortality among elderly

women actually fell slightly between 1950 and 1978, but the incidence of lung cancer in women is rising.

The incidence of other leading causes of death such as pneumonia, influenza, arteriosclerosis, hypertension, and diabetes mellitus has fallen in recent years. Although the incidence of many of these killers has decreased, their prevalence has risen because the elderly are now more likely to survive stroke and coronary heart disease. The level of chronic disease in the elderly population is therefore rising. Because this burden of morbidity in the population is growing, it is important to examine the risk factors that are correlated with these diseases and chronic conditions.

Risk factors

A risk factor is a characteristic that can identify an individual as having an increased likelihood of developing a given condition. Risk factors are based on statistical probabilities in populations rather than on causal relationships or the certainty that an individual will develop a specific disease or condition. Nevertheless, knowing the risks associated with particular diseases can provide an opportunity for disease prevention or reduction.

Appropriate interventions are not possible without knowledge of risks. Some risk factors can be modified, while others are intrinsic to an individual. For example, personal habits and body weight can be changed, but age and genetic characteristics cannot. In certain circumstances, the effects

of changeable characteristics become irreversible. Excess weight, for example, may be changeable at any age, yet the effects of obesity on risk of heart disease may be unchangeable at a given point. Unfortunately, the relationship between risk and specific interventions to reduce risk has not yet been well researched in the elderly, but enough is known about the effectiveness of certain prevention strategies to argue for their implementation.

The choice of which risk factors to modify should, in part, be made on philosophical and ethical bases. Because the cost of morbidity (especially chronic disease in the elderly), both in human suffering and economic terms, is an area of growing concern, another approach to health promo-

tion is to assess which risks, if reduced, are most likely to significantly reduce human suffering and medical costs.

Risk factors associated with coronary heart disease and stroke

A number of risk factors correlate with both coronary heart disease (CHD) and stroke. One group, underlying physical conditions, includes hypertension, high levels of cholesterol, and impaired glucose tolerance. Another type, behavioral risk factors, includes smoking, lack of exercise, poor diet, and stress. Despite the lack of a direct cause-and effect relationship between risk factors and CHD or stroke, it is clear that the risk of a coronary event increases exponentially as the number of risk factors increases (37).

HYPERTENSION

High blood pressure is the most powerful predictor of risk for CHD; more than half of persons with myocardial infarction and three-fourths of persons with stroke have concurrent hypertension. There is a strong association between increasing blood pressure and advancing age: 33 percent of persons in their 60s have elevated pressure, compared with 11 percent of those in their 30s (19).

Hypertension in the elderly is defined as blood pressure greater than 140/90 mmHg, or systolic blood pressure greater than 160 with normal diastolic blood pressure. Although persons over 75 are often underrepresented or excluded from research, limited findings indicate that control of moderate and high diastolic hypertension is also associated with reduced mortality and morbidity from CHD and stroke.

Isolated systolic hypertension (systolic pressure above 160 mmHg accompanied by diastolic pressure below 90 mmHg), which is found in 25 to 30 percent of persons over 75, is correlated with a twofold to threefold increase in mortality from CHD and stroke. The benefits of treatment are still under investigation; if therapy proves to be efficacious, treatment of this condition may reduce death rates or prevent these two diseases (33).

SMOKING

Cigarette smoking plays a significant role in mortality from cardiovascular disease. It is a significant factor in morbidity, exacerbating hypertension, which, in turn, is a risk factor for cardiovascular disease and stroke. Nevertheless, the elderly and persons working with and for them appear to share the belief that smoking cessation efforts are primarily of concern and importance to younger age groups (25). This is a false assumption for several reasons:

- Many elderly people live more than 10 and often 20 to 25 years beyond age 65. Many benefits of smoking cessation, such as increased pulmonary function, are experienced immediately, and others, such as reduced risk for lung cancer, begin as few as 2 years after smoking cessation. Increased life expectancy of the elderly thus justifies efforts to promote smoking cessation programs.
- Nicotine constricts blood vessels, thereby raising blood pressure (which is already elevated, on average, in older groups). For many elderly persons, elimination of smoking can effectively reduce their risk of stroke, which is the third leading cause of death for those over 65.
- Respiratory function can be improved immediately, even in patients with emphysema. Improvements in breathing are enhanced if a medically supervised program of moderate exercise is coupled with smoking cessation.
- Smoking reduces the ability to taste food. Because loss of this ability contributes to poor nutrition in the elderly, smoking can exacerbate poor eating habits.

Notwithstanding these cogent reasons for smoking cessation, most nonsmoking programs and research on smoking cessation are targeted to persons in younger age groups. Although these programs are important because of the great benefits of smoking cessation at younger ages, they should be expanded to give greater emphasis to their impact on the elderly.

EXERCISE

Although some research has shown an association, a definitive and direct link between physical exercise and reduction in risk of CHD and

stroke has not been established. In addition, because research subjects have typically been younger men, evidence is still lacking for women and the elderly.

Despite gaps in knowledge of the benefits of exercise for the elderly in reduction of risk of CHD and stroke, several things are known about the effects of exercise that warrant implementation of moderate exercise programs. Regular exercise:

- increases lean body mass and reduces body fat (this effect has been associated with reduced CHD and diabetes in older persons);
- increases glucose tolerance (reduces the occurrence of diabetes or improves the functioning of those who are diabetic, a risk factor for CHD);
- increases the strength and speed of contractility in the heart muscle;
- increases oxygen uptake from the blood into the heart and skeletal muscles; and
- decreases heart rate and demand on the heart during rest.

Since exercise reduces other CHD and stroke risk factors, programs that encourage exercise in all age groups are important. Exercise can reduce the emotional tension associated with various diseases. In a study of men 50 and over, a 15-minute walk reduced neuromuscular tension more effectively than a dose of tranquilizer (10,11,12,17).

Exercise also reduces other CHD risk factors. It increases the proportion of high density lipoproteins (HDLs) relative to low-density lipoproteins (LDLs),¹ but the effect is temporary; exercise must be performed at least every other day to maintain the reduction in LDLs and triglycerides. Blood-pressure reduction is more likely to occur in individuals with moderately elevated blood pressure and more likely to affect diastolic than systolic blood pressure. Enforced physical *inactivity* results in increased systolic blood pressure, increased total peripheral resistance, increased

¹High-density lipoproteins have two important functions: 1) they coat the inside of the artery walls and provide a protective layer to prevent fatty deposits from building up; 2) they help dissolve fatty deposits when they occur. Low-density lipoproteins are responsive to dietary habits and form dangerous deposits on the walls of blood vessels. LDLs are the primary culprits in clogged arteries and atherosclerosis. Thus the risk of CHD is reduced if the proportion of HDLs to LDLs is relatively high.



Photo credit: Paul Conklin, Dancers of the Third Age, Dance Exchange, Washington, DC

Carefully developed exercise programs can benefit adults of all ages.

serum levels of cholesterol, and glucose intolerance, all of which are, in turn, risk factors for CHD.

Notwithstanding its beneficial aspects, exercise can have certain risks. Risks and complications depend on a number of factors—the general health of the individual, past exercise habits, and age, as well as type, amount, and intensity of exercise. However, most authorities agree that the majority of adults under 65 do not need prior physical examinations before beginning a carefully developed, progressive exercise program. When weighed against the hazards of not exercising, the benefits clearly outweigh any risks (15).

STRESS

Stress is a normal part of life, but the inability to cope with it can cause health impairment. Two simple techniques, meditation and relaxation, can

reduce the physical and psychological effects of stress. Meditation techniques have been found to reduce blood pressure and residual muscle tension and increase oxygen intake. There is an impressive body of research to substantiate the beneficial effects of relaxation training. These include reduction of elevated blood pressure, heart rate, and gastric motility, increased cardiac output and respiratory efficiency, and aerations in brain-wave patterns (increased ratio of alpha waves to beta waves in EEGs) (25).

NUTRITION

Poor nutrition can be characterized by a lack of essential vitamins and nutrients, leading to deficiencies, or by an overabundance of certain nutrients that can be associated with higher risk for diabetes and high levels of cholesterol, both of which are risk factors for CHD and stroke.

obesity (usually defined as greater than 20 percent over standardized tables of ideal weight for age and height) is associated with increased risk of hypertension, high cholesterol, and glucose intolerance. It is not clear, however, whether the risk factor is current obesity or a history of chronic obesity. If a longstanding history of obesity is shown to be correlated with CHD, an intervention program in the elderly might not be useful because the effects of the earlier obesity would be irreversible.

Diets low in saturated fats and high in vegetables and fiber are recommended for prevention of CHD. These diets can reduce blood pressure in normal subjects (31,32), but whether the incidence of CHD is reduced is unclear (19). Per capita consumption of foods high in cholesterol and saturated fats has decreased since the early 1960s, while consumption of foods high in unsaturated fats and fiber, like fish and vegetables, has increased (38). This change in dietary habits may have contributed to the recent drop in serum cholesterol levels and perhaps to declining CHD mortality. Large doses of the B vitamin, niacin, may reduce blood lipid levels (9) and seem to be helpful in reducing recurrent nonfatal myocardial infarction (7).

*Myocardial infarction is death of tissue in the heart muscle due to insufficient delivery of blood or oxygen, usually due to obstruction of a blood vessel.

High sodium intake has long been associated with high blood pressure (8), but there is as yet no conclusive evidence for a causal link. A recent epidemiological study of over 10,000 individuals aged 18 to 74 found that significant decreases in the consumption of calcium, potassium, vitamin A, and vitamin C were the nutritional characteristics that distinguished hypertensive individuals from those with normal blood pressure (24). Low calcium intake was most consistently correlated with hypertension. While these results do not prove causal effects, they do suggest directions for future research.

DIABETES AND IMPAIRED GLUCOSE TOLERANCE

Impaired glucose tolerance has been implicated as a risk factor for cardiovascular disease because of the high incidence of vascular complications in persons with diabetes mellitus. Fasting levels of blood glucose and the prevalence of adult-onset noninsulindependent diabetes rise with age. This change in blood glucose homeostasis is due in part to the age-related decrease of metabolically active lean body mass accompanied by an increase in fatty tissues. Because of these age-related changes, Williams (39) estimates that more than half of the population over 70 would be diagnosed as having diabetes according to the criteria used to evaluate younger adults in the oral glucose tolerance test. Standards for younger persons thus cannot be universally applied to the elderly.

Obesity is strongly correlated with impaired glucose tolerance: 80 percent of adult-onset diabetics are obese or have a history of obesity, and 60 percent of persons with 125 percent or more of ideal body weight have impaired glucose tolerance tests. Dietary guidelines developed by the American Diabetes Association (2) focus on the restriction of caloric intake and moderate increase in energy expenditure. Because diabetics have two to three times the risk of dying from atherosclerotic CHD as nondiabetics (3), a reduction in total and saturated fat calories is also recommended, and drug or insulin treatment may be necessary to reduce glucose levels. The efficacy of this treatment in the prevention of CHD is not proven, but trends suggest a favorable prognosis with long-term management of diabetes (19).

CHOLESTEROL

The link between lowered cholesterol levels and CHD became definitive only recently, although large studies have shown a consistent association between the intake of foods high in saturated fats and both the level of serum cholesterol and morbidity and mortality rates for atherosclerotic diseases. The National Heart, Lung, and Blood Institute confirmed this link in a study in which men 35 to 59 with very high levels of cholesterol were given drug therapy to reduce cholesterol. The incidence of CHD was significantly reduced in the men given the drug (37).

REHABILITATION

Rehabilitation or tertiary prevention after CHD usually includes exercise regimens with drugs, stress reduction, and various other techniques undertaken to prevent the recurrence of heart attacks. Research in these areas often excludes the elderly. The benefits of intensive rehabilitation after CHD are less well substantiated than the benefits of rehabilitation after stroke.

Interventions to minimize the effects of stroke and help patients to function independently are very important. The mean survival time after the occurrence of stroke is 7 years; 30 percent of patients survive 11 or more years. Results from the Framingham study indicate that following stroke, 33 percent remain dependent for activities of daily living, 20 percent require assistance with walking, and 15 percent require institutionalization. The remaining 35 percent are functionally independent. This level of functional disability is a significant drain on resources, both public and private.

Intensive rehabilitation after stroke is neither effective nor beneficial for all patients. Those who are unconscious during acute stroke are likely to remain dependent, while those who remain conscious and are able to walk unaided immediately after the stroke generally exhibit spontaneous functional recovery. Rehabilitation in a specialized stroke unit results in greater functional recovery; 52 percent of such patients exhibited functional independence as opposed to 32 percent of patients given traditional rehabilitation on the medical wards, and did so in a shorter period



Photo credit: Suburban Hospital, Bethesda, MD

Medically monitored physical activities are one form of rehabilitation or tertiary prevention.

of time (average stay of 55 v. 75 days). The patients selected for this study had remained conscious during acute stroke, but exhibited developing or established hemiplegia (paralysis of one side of the body); they represent patients likely to survive but unlikely to recover spontaneously. Thus, the degree of impairment from stroke is a useful criterion for patient grouping. In addition to functional improvement, there are psychosocial and quality-of-life benefits (19).

Risk factors associated with cancer

Cancer is the second leading cause of death among the elderly. Several risk factors have been identified. For example, 30 percent of all cancer deaths may be attributed to smoking (13). Although it is not possible to accurately quantify the role of diet in cancer, 40 percent of cancer deaths among women and 57 percent of those among men may be associated with diet (13,27). There are synergistic effects between smoking and alcohol, but the effect of tobacco is far more important. Mortality from cancer of the cervix is decreasing, largely due to increased periodic screening with Pap smears. Cancers of the breast, ovaries, and endometrium account for 29 percent of all female cancer mortality (13 percent of total mortality).

Lung, colorectal, and prostate cancers are the most prevalent cancers among men; women are more at risk for breast, lung, and colorectal cancer, respectively. Some cancer death rates for elderly men have continued to increase, but the increase in rates for elderly women is a more recent phenomenon. This is especially true of lung cancer rates for women, probably due to the higher prevalence of smokers among women of recent generations. And although the incidence of cervical cancer has declined in the general population, it has not declined in women past menopause. Because older women may not visit gynecologists for regular checkups, primary care physicians should screen for cancer or, at least, refer women to gynecologists for evaluation (19).

Several types of cancers can be treated successfully if detected early enough. These include prostate (periodic physical exam), and breast and colon (discussion follows). Some evidence indicates a reluctance among the elderly to seek screening services or diagnosis; this is especially true of women who are at increasing risk of breast, cervical, and uterine cancer with advancing age. Some of this reluctance is due to misinformation about the possibilities for effective treatment.

BREAST

Breast self-examination is an effective, inexpensive way to increase the chance of early detection of breast cancer; 80 to 90 percent of primary breast cancers are detected by women themselves (19). The few self-examination programs that exist have concentrated on easy-to-reach populations, usually in work settings, leaving the relatively high-risk woman over 65 effectively out of reach. Only a few programs have been developed for these women. Some older women appear to be more reluctant to examine themselves and may not respond to certain teaching settings. Programs to educate them in self-examination techniques need to be tailored to their values and expectations. Annual mammography and physician examinations for women over 40 are associated with improved early diagnosis and significant decreases in cancer mortality.

There is a significant association between obesity and cancer of the breast and uterus in women, and cancer of the colon and prostate in men. High fat intake is also associated with breast cancer and prostate cancer, perhaps due to the effect on estrogen metabolism, imbalances of which are associated with increased risk of certain cancers.

COLORECTAL

The colon and rectum are the leading sites for overall mortality from cancer in those over 75. The 10-year survival rate for persons with localized cancer is 67 percent, compared with 36 percent for nonlocalized cancer. Since only 41 percent of all colorectal cancers are detected at a localized stage, early detection of this form of cancer is a high priority for prevention programs.

The guaiac test, and other simple tests of occult bleeding from the digestive tract, can be used in screening for colon and rectal cancers. But fewer persons over age 70 (27 percent) accepted an invitation to take a screening test than did younger persons (38 percent) in a recent study, although rates were low for both groups (19). The International Workshop on Colorectal Cancer recommends that the elderly undergo sigmoidoscopy every 3 to 5 years to screen for cancer (19).

Several dietary factors have been associated with cancer of the gastrointestinal tract. The dietary recommendations of the American Cancer Society (1984), though based largely on epidemiological and some experimental data, are meant to help reduce the risk of gastrointestinal and certain other cancers. These recommendations include: avoid obesity; reduce intake of fat, alcohol, and salt-cured, smoked, or nitrite-cured foods; and eat cruciferous vegetables and foods high in fiber and vitamins A and C.

Risk factors associated with fractures

The most important risk factors for fractures are osteoporosis and falls. The incidence of fracture rises dramatically with age: among women 75 to 79, the incidence of hip fracture is 6 per 1,000; among those 85 to 89 the incidence in-

creases to 21.4 per 1,000; and among women over 90 the incidence rises to 48.6 per 1,000 (19).

OSTEOPOROSIS

Osteoporosis is estimated to cause about two-thirds of hip fractures in older people. The incidence of hip fractures resulting from osteoporosis was estimated at 98 per 100,000 in 1977, at a total annual cost for acute care of some \$800 million. The number of hospital patient days resulting from these fractures is ranked both among conditions counted. The mortality rate from falls is estimated at 20 to 30 percent, with an additional 13 percent of survivors who never return to independent ambulation (23). Because 90 percent of fractures in older women are associated with little or no trauma, and in fact may occur simply because of osteoporosis (19), prevention of osteoporosis could sharply reduce the incidence of fractures among the elderly.

current osteoporosis-prevention research centers on the effectiveness and possible risks of estrogen therapy after menopause, supplemental intake of calcium by women both before and after menopause, and the role of exercise in bone strengthening. Although estrogen replacement therapy after menopause seems to inhibit bone resorption, it has also been associated with increased risk of cancer of the uterine lining. Calcium absorption declines with age and can decrease by 30 to 50 percent by age 80 (18). The theoretical daily intake of calcium needed to counteract bone loss has been suggested as 1,000 mg for premenopausal women and 1,500 mg for postmenopausal women (18).

Blood levels of vitamin D, which promotes intestinal absorption of the calcium and phosphate involved in bone mineralization, are often deficient in the elderly and can be up to 50 percent lower than those of younger controls. These low serum levels of vitamin D may be due to reduced intake, reduced intestinal absorption, and/or decreased exposure to the sunlight that drives synthesis of the vitamin in the skin (30).

New evidence indicates that bone mineral content can be increased in older women by exercise. In a study of women whose mean age was 84, one group exercised (nonstrenuous exercise,

sitting in a chair) 30 minutes a day, three times a week. This control group gained bone mineral content while an inactive group lost bone mineral content. Physical activity at any age may thus have a significant effect in reducing the effects of osteoporosis and the likelihood of fracture (34). (For further details see section on osteoporosis in ch. 3).

FALLS

The U.S. Public Health Service estimates that two-thirds of falls by the elderly may be preventable. The risk of fracture associated with falls increases with age, especially for women.

Falls are caused by both environmental and physical factors. As many as half of the falls sustained by the elderly may be caused by such environmental factors as loose, torn, or frayed rugs, poor lighting, icy sidewalks, or broken stairs. Poor vision (which is sometimes correctable), underlying physical conditions such as Parkinson's disease, seizures, cerebrovascular disease, and conditions that cause fainting or dizziness, also contribute to the incidence of falls. The incidence of falls could be reduced by more extensive diagnosis and treatment of these disease conditions and efforts to eliminate environmental obstacles.

Inappropriate or excessive medication—especially of sedatives, hypnotics, psychotropic, anti-convulsives, and antihypertensive agents—often causes falls. In one study, 93 percent of patients who were observed to fall between 10:00 p.m. and 6:00 a.m. had taken a barbiturate (19).

Risk factors associated with sensory loss

VISION

The prevalence of unattended treatable eye pathology rises dramatically after age 60, exceeding 85 percent of the elderly aged 65 to 74. Refractive problems increase less rapidly than cataracts, and cataract correction may be unduly delayed. Screening for glaucoma, which is effective, may be ignored by the elderly. The fragmentation and lack of coordination of services for the elderly, the needy, and the blind and partially sighted constrain the correction of visual problems among the older population (19).

TASTE

Age-related changes in, for example, the gastrointestinal tract may impair food intake, digestion, and absorption of certain nutrients (see app. C). The sense of taste itself changes with age, and this can lead to malnutrition. Compounding the risk of malnutrition is the fact that current Recommended Dietary Allowances (R.DAs) of various nutrients consider the elderly as a single 51-and-over age group, despite wide disparities in individual and age-related nutritional needs.

HEARING

Hearing loss affects the ability to function independently, affects communication, and can lead to a medical diagnosis of cognitive impairment. The prevalence of hearing impairment is 28 percent in persons over 65 and about 40 percent in those over 75 (see OTA background paper on Management of Hearing Impairments in the Elderly). Although many hearing impairments are not correctable with current technologies, simple hearing aids to amplify speech can be very effective in some cases. Hearing aids are expensive, difficult to adjust, not reimbursed by Medicare, and often fraudulently marketed; all of these factors lead to neglected, treatable hearing problems in the elderly.

Risk factors associated with dental disease

In 1971 about 45 percent of Americans over 65 were estimated to have lost all of their teeth (36).

Dental caries and periodontitis are the justification for 90 percent of extractions. Dental disease can limit the food choices and eating practices of the elderly and damage their self-image and social confidence. Clinical studies done in the 1940s reported a high prevalence of vitamin C and B-complex deficiencies among edentulous (lacking natural teeth) elderly, but need to be updated (16,22).

Both nutritional and hygienic practices have been implicated in dental disease. The intake of starches and simple sugars is known to aggravate decay and increase the risk of loss of teeth (4). Intake of simple sugars increased during the early years of this century, while intake of the more nutritious complex carbohydrates declined from 43 percent (1909) to a current 29 percent of dietary food energy (28). Periodontal disease, or recession of the gum and resorption of the bone surrounding the roots of the teeth, is probably related to general age-related loss of bone mass (see section on osteoporosis); possible prevention and treatment of this disease through dietary calcium supplements warrants further exploration.

Despite the impact of dental disease on the elderly, 48 percent of those who still have teeth have not visited a dentist within the last 5 years (6). Because routine dental examinations are not covered by Medicare or most private health insurance, a major obstacle for the elderly may be cost.

Nutritional deficiencies

There are few reliable data on the prevalence of frank or "subclinical" nutritional deficiencies among the elderly. However, it is known that the elderly are particularly susceptible to malnutrition because of the physiological and behavioral changes of aging, and increased prevalence of chronic disease. For example, age-related changes in the gastrointestinal tract may impair intake, digestion, and absorption of certain nutrients. Psychosocial changes associated with aging, such

as senile dementia, isolation, and depression may also suppress appetite and increase the risk of nutrient deficiency (see app. C).

Subclinical malnutrition is difficult to diagnose, both because physicians may not be aware of it and because not enough is known about adequate nutritional levels for the elderly. Current RDAs for the elderly are based on survey and research data from younger groups that have been extrapolated.

elated to the entire over-50 population, which is an extremely heterogeneous group. Direct study of the special nutritional needs of those in age groups over 65 is needed to provide better standards for medical care, food assistance programs, and national nutrition surveys.

The Federal Government has attempted to ameliorate the problem of malnutrition among "high risk" segments of the population, including the elderly, through federally sponsored food assistance programs (see table C-8 in app. C). An estimated 1.9 million elderly persons are now enrolled in congregate and home-delivered meal programs (29), but the food stamp program remains the largest program affecting noninstitutionalized elderly persons (1). In fiscal year 1981, for example, an average of 22.4 million people received food stamps each month. Because currently available evaluations of federally funded food assistance programs that serve the elderly are inconsistent and flawed, they yield little information about dietary and health benefits of these programs. There is general agreement, however, that they are not reaching certain target groups, especially minorities and the socially isolated (see app. C).



Photo credit: Suzanne L. Murphy

Federally subsidized congregate meal programs for the elderly help assure adequate nutrition and promote social interaction.

The Federal Government could effectively promote preventive nutrition through intensified public education. Inasmuch as eating habits are established early in life and many risk factors for age-related conditions are cumulative throughout adulthood (as for CHD and osteoporosis), such nutrition education should be targeted to all adults, not just the elderly.

Conclusions

The central issues in health promotion and disease prevention strategies for the elderly are the efficacy and the cost effectiveness of particular interventions. Further, many of the risk factors require behavior modification and are ultimately the personal responsibility of the individual. Improved quality of life is also important in that many interventions, while they do not significantly alter health statistics, have an effect on functional independence. This quality-of-life factor is often not considered in the present structure of Medicare/Medicaid reimbursement.

The overriding Federal issue is the reimbursement structure of the present Medicare/Medicaid system. At present, reimbursement is principally for acute care, and payments are prohibited for all or most preventive services (exceptions: immunization against pneumococcal pneumonia and

short-term rehabilitation). Many relatively inexpensive preventive measures are not reimbursed, yet the consequences of not applying these measures in fact increase overall Medicare costs. A rethinking of reimbursement categories may, therefore, be in order. Preventive services that are directly linked to reduction in need for acute care but are not presently reimbursed include:

Periodic screening. Among the preventive measures effective here are screening for hypertension, and breast and colorectal cancer. Mammography exams are not reimbursed, but acute care for breast cancer is. The occult blood test, a very simple and inexpensive test for detection and early diagnosis of colorectal cancer, is not reimbursed. Blood-pressure control is an achievable goal because hypertension is easily detected and

usually correctable. Although treatment of hypertensives must be carefully monitored to avoid iatrogenic problems, reduction in blood pressure is a significant factor in lowering stroke and overall mortality rates in the elderly population. The prevalence of hypertension in persons aged 65 to 74 dropped from 49 to 41 percent in the 1960s and 1970s; the CHD death rate in this group showed a similar decline during this period (35).

- **Long-term care.** There is only minimal reimbursement for tertiary prevention, which could aid in increasing functional independence and thus reduce costs of long-term care and related services (see discussion in ch. 7) (25,35).
- **Vision.** Refraction is not reimbursed, yet visual problems are a major component of falls. (Trauma related to falls is reimbursed).
- **Drug and alcohol abuse.** Treatment is not generally reimbursed. When untreated, these conditions can lead to nutritional problems and to increased mental confusion that mimics senile dementia (see OTA Case Study on the Effectiveness and Costs of Alcoholism Treatment for "Medical Technology and Costs of the Medicare Program"),
- **Hearing.** Hearing loss can be a risk factor for injuries and falls, and purchase of hearing aids is not reimbursed (for further information, see the OTA Background Paper on Management of Hearing Impairments in the Elderly).
- **Dental care.** Lack of dental care has both direct effects on health—the occurrence of periodontal disease—and indirect effects in that the individual's opportunity to maintain adequate nutritional levels is compromised. Lack of teeth, or poor teeth, may also lower self-esteem,

Medicaid does pay some of these preventive costs, but eligibility criteria differ from State to State. Billions are being spent for acute care, yet relatively little reimbursement is allocated to prevention, which could potentially reduce these acute care costs. Some evidence of potential savings exists, but there is no available hard evidence of potential levels of cost reduction. Measures for research on the degree to which prevention could reduce acute care costs in the elderly are thus sorely needed. (Note: A proposal for a separate health promotion/disease prevention section of the National Institutes of Health has recently been passed by the House. See ch. 3.) The irony is that while some research is underway, growing numbers of Americans are failing to avail themselves of proven preventive measures—e.g., smoking cessation, diet modification, exercise—and in so doing, increasing the likelihood that they will someday need acute care. The obvious goal is to keep people healthy and functionally independent until they die at a "late" age. How to allocate health care delivery and research resources for prevention is an important component of achieving this goal.

Improving the nutritional status of the elderly clearly calls for establishing nutritional RDAs for subgroups of people over 50. Once these data are available, educational efforts targeted to both the elderly and health care providers can be more effective. But there is little accurate or reliable information on the dietary benefits that these programs provide for the elderly. In general, participants are nutritionally better off than nonparticipants, but food programs are not always reaching target groups, especially the poor and minority elderly.

Congressional issues and options

There is growing evidence that the amelioration of specific risk factors can reduce the incidence of the three leading causes of mortality—coronary heart disease, cancer, and stroke. It is also known that specific actions can be taken,

especially among the elderly, to reduce the probability of other causes of morbidity and mortality, such as falls and fractures. Many of these measures can not only reduce the incidence of specific diseases but can improve the quality of

life. At present, Medicare reimbursement is principally for acute care and prohibits payment for all or most preventive services (exceptions: immunization against pneumococcal pneumonia and short-term rehabilitation). Although many relatively inexpensive preventive measures are not reimbursed, the consequences of not applying these measures are usually more costly to the Medicare system. These measures include screening for hypertension and for breast, cervical, prostate, and colorectal cancers; refraction for visual problems; treatment of drug and alcohol abuse; provision of hearing aids; and dental care.

ISSUE 1: Does research indicate that health promotion interventions are cost effective?

Research on the cost effectiveness of various health promotion/disease prevention strategies is in its infancy. options available to Congress include:

Options:

- 1. 1:** Congress could maintain the status quo.
- 1.2:** Congress could increase its level of involvement in aging research and stipulate that cost effectiveness be a part of new health promotion research within the National Institutes of Health.

The advantages and disadvantages of greater or lesser congressional support of biomedical research and greater or lesser direct involvement with the direction of such research are discussed in chapter 8. Inasmuch as some research is being undertaken in health promotion, more evidence of the cost effectiveness of various interventions will emerge even if the status quo is maintained. But if Congress were to stipulate that some of this research be devoted to potential savings in the cost of acute care because of health promotion interventions by the prevention offices within NIH, reformulation of Medicare reimbursement categories could proceed more swiftly.

ISSUE 2: Should Medicare reimbursement categories be reconsidered with a view to increased reimbursement for health promotion/disease prevention interventions?

Direct links between particular interventions and the occurrence of morbidity and mortality,

and the costs of these interventions compared to those for acute care, are not clearly established. It is known, however, that the potential for cost savings in acute care is significant.

Options:

- 2.1:** Congress could maintain the status quo.
- 2.2:** Congress could adopt option 1.2 above and stipulate that results from these studies be considered by the Prospective Payments Commission.

In maintaining the status quo, research in health promotion would continue and some of these research results might be incorporated into clinical practice activities. For example, research could be initiated to determine the cost effectiveness of fixed-fee payments to physicians who carry out specific preventive services. If the second option were to be adopted, Congress could ensure that results were considered as soon as they became available. One advantage of this approach is that in the case of some health promotion interventions (e.g., cancer screening and correction of vision and hearing problems), it may be relatively easy to quickly demonstrate that simple interventions for specific conditions are cost effective by comparison to later costs for acute care. one disadvantage of this option is that the mandate for the Prospective Payments Commission would have to be changed, since it currently is concerned only with hospital costs.

ISSUE 3: How could Congress obtain more accurate and standardized evaluations of Federal food assistance programs in order to improve their efficacy?

Most currently available evaluations of Federal food assistance programs fail to use representative samples, longitudinal data, and biochemical tests to accurately establish the nutritional status of participants and possible benefits of the program meals. Many examine neither the efficacy of the mandated nutrition education nor the qualifications of the meal program staff. Findings of many evaluations are consequently limited, inaccurate, and cannot be compared with those of other evaluations.

Options:

- 3.1:** Congress could require standardized evaluation techniques for Government-contracted surveys

of food assistance programs. Such techniques would involve standardized biochemical and anthropometric (and, impossible, lotuch"nal) determinants of nutritional status, representative samples, and better evaluations of both program staffs and the quality of the nutrition education offered to program participants.

- 3.2: Congress could establish funding incentives or other sponsorship for private investigators who use such standarized techniques.*
- 3.3: Congress could mandate that the Health and Nutrition Examination Survey (HANES) include age groups over 74 and that it include a sample of elderly foodprogram participants to be compared with the general population.*

Presumably, investigators contracted by the Government would improve their techniques for evaluating food assistance programs after seeing the flaws of past evaluations. Conversely, the lack of accurate, comparable data about such a large government program may be serious enough to warrant development of specific guidelines and requirements for federally contracted evaluations that would create a pool of comparable information. There is a dearth of reliable data on the efficacy of the programs in terms of nutritional impact, nutrition education, and the level of food management training required of meal-site employees.

ISSUE 4: How could Congress approach the failure of the meal programs to reach certain target groups

Many surveys find that food assistance programs, including food stamps, are inadequate to reach some of the target groups specified in the programs' original congressional mandate. For example, persons aged 60 to 64 are at present ineligible for food stamps and most meal programs operate only 5 days a week. While low-income groups seem to be represented among participants, minorities and the socially isolated are not well represented. This could be due to public ig-

norance of the programs, inaccessibility of the programs to these underrepresented target groups, or voluntary lack of participation.

Options:

- 4.1: Congress could require the Administration on Aging to develop guidelines and materials for targeting educational information on food assistance programs to the most needy groups.*
- 4.2: Congress could require that local programs actively seek out the most needy, especially within the underrepresented target groups, within a given community.*
- 4.3: Congress could mandate quotas for target groups according to local demographic characteristics of each program site or area,*
- 4.4: Congress could mandate that the Administration on Aging and the National Institute on Aging prepare and disseminate health and nutrition education materials to consumers.*

There is disagreement as to whether lack of participation in meal programs is a result of ignorance of the programs or lack of mobility. Efforts to educate would be costly but might encourage the most needy in the community to gravitate toward the food assistance programs. There is some evidence that some active intervention on the Government's part is necessary in both education and mobility to ensure that these mandated target groups are served.

RESEARCH PRIORITIES

Current Recommended Dietary Allowances (RDAs) for the elderly fail to take into account the age-related physiological, behavioral, and pathological changes that can affect their nutritional needs. Certain nutrients are especially relevant to the aging process and should be stressed in research on elderly nutrition; these include calcium, vitamin D, B vitamins, vitamin A, zinc, sodium, and fats.

Technical memorandum

The OARS assessment battery yields information on five functional activity areas:

- social resources, quantity and quality of relationships with friends and family, and availability of care in time of need;
- economic resources, adequacy of income and resources;
- mental health, extent of psychiatric well-being, cause of existing disorder, if any;
- physical health, presence of physical disorders, participation in physical activities; and
- activities of daily living, capacity to perform various instrumental and physical (or bodily care) tasks that permit individuals to live independently (for other measures, see ref. 20).

Another approach uses clinical and epidemiologic criteria to identify specific health goals and professional services appropriate for 10 different age groups from birth to 75 years and over. For example, the goals for the elderly (60 to 74 years) are as follows:

- to prolong the period of optimum physical/mental/social activity,
- to minimize handicapping and discomfort from onset of chronic conditions, and
- to prepare in advance for retirement.

The professional services are:

- professional visits with the healthy adult at age 60 and every 2 years thereafter, including the same tests for chronic conditions as in older middle age, and professional counseling regarding changing lifestyle related to retirement, nutritional requirements, absence of children, possible loss of spouse, and probable reduction in income as well as reduced physical resources;
- annual immunization against influenza;
- annual dental prophylaxis; and
- periodic podiatry treatments as needed (5).

Another approach that stresses functional independence has the following criteria:

- the ability to perform activities of daily living, i.e., bathing, dressing, toileting, transfer, continence, and feeding;
- degree of mobility of the individual, including the capacity to move about within the home, the immediate neighborhood, and the larger community;
- mental state of the individual: cognition, psychological level of functioning, and the ability to cope emotionally with problems of daily life; and
- nature of the social and economic environment and the degree of support it offers (20).

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