

A Critical Review of Adult Health Maintenance: Part 4. Prevention of Metabolic, Behavioral, and Miscellaneous Conditions

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This is the last article in a four-part series that presents an updated protocol for selective longitudinal health maintenance of asymptomatic adults. Nine metabolic, behavioral, and miscellaneous conditions are reviewed with reference to six generally accepted screening criteria. A recommendation is made for each condition and is compared, when appropriate, with the recommendations of the Canadian Task Force on the Periodic Health Examination. The recommendations for all 30 conditions reviewed in this four-part series are combined into a practical health maintenance flow sheet for use by primary care physicians.

The purpose of this series is to provide primary care physicians with an updated health maintenance protocol for asymptomatic adults that can be used in the everyday practice of medicine. The background and methods for this work were fully described in the first article of this series.¹

This article will consider nine metabolic, behavioral, and miscellaneous conditions with regard to six generally accepted screening criteria for useful health maintenance interventions:

1. The condition must have a significant effect on the quality or quantity of life.
2. Acceptable methods of treatment must be available.
3. The condition must have an asymptomatic period during which detection and treatment significantly reduce morbidity or mortality.
4. Treatment in the asymptomatic phase must yield a therapeutic result superior to that obtained by delaying treatment until symptoms appear.
5. Tests that are acceptable to patients must be available at reasonable cost to detect the condition in the asymptomatic period.
6. The incidence of the condition must be sufficient to justify the cost of screening.

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It is necessary for a disease to meet all six criteria before inclusion in the health maintenance plan. Failing a single criterion is adequate reason for exclusion.

A brief discussion of the rationale for or against including each condition in a health maintenance program is presented, and a specific recommendation is compared with the most recent recommendation of the Canadian Task Force on the Periodic Health Examination (CTF).²

DIABETES MELLITUS

Recommendation. No screening for diabetes is justified.

Canadian Task Force. Same recommendation.

Diabetes mellitus is commonly divided into two types: type I, or insulin-dependent diabetes, and type II, or non-insulin-dependent diabetes. Type I is associated with a lack of insulin production, usually has an acute onset, and is common in children with a peak incidence between ages 10 and 14 years. Type II diabetes is associated with insulin resistance and obesity and has a gradual and frequently insidious onset. The incidence increases progressively after the age of 20 years.³ This discussion is concerned only with type II diabetes, since it is not worthwhile screening adults for an acute-onset disease found mainly in children.

It is estimated that 0.23 percent of the population

has type I diabetes and 2.4 percent has a diagnosis of type II.⁴ An additional 1.8 percent has type II diabetes that has not been diagnosed. Another 2.3 percent of the population has impaired glucose tolerance not severe enough to be classified as diabetes.⁴

Diabetes causes macrovascular complications, including coronary heart disease, stroke, and peripheral vascular disease, and microvascular complications, including retinopathy and nephropathy. It is not certain whether diabetic neuropathy is vascular or metabolic in origin. Macrovascular complications, especially coronary heart disease, account for the majority of diabetic mortality.³ Diabetics whose disease started before age 15 years have 11 times the mortality of nondiabetics. Those whose diabetes is diagnosed at age 60 years have two to three times greater mortality than nondiabetics.⁵ Because it is more common, most morbidity and mortality is due to type II diabetes.

Diabetes is defined as persistent fasting blood glucose levels greater than 140 mg/dL or two-hour postprandial blood glucose levels over 200 mg/dL.⁶ Blood glucose determination is, therefore, a good screening test for diabetes. The two-hour postprandial blood glucose test is more sensitive than the fasting blood glucose test. The oral glucose tolerance test is not needed to screen for diabetes and is usually not needed to make a definitive diagnosis.⁶

The major question with regard to screening for type II diabetes is; Does treatment of asymptomatic disease reduce complications? Borderline diabetes, or impaired glucose tolerance, has been shown to be associated with mortality rates intermediate between those of diabetics and normal controls.⁷ Many of those who study diabetes believe that tight control will reduce complications.⁵ Much of the data to support this feeling, however, come from animal studies and may not apply to humans.⁸ The results of human studies have been inconclusive. The University Group Diabetes Program (UGDP) study did not show a significant decrease in mortality with tight control of blood glucose.⁹ Recently the Kroc collaborative study¹⁰ failed to show that tight control could slow the progression of retinopathy. To complicate matters further, there has been some controversy about whether use of oral hypoglycemic drugs increases coronary heart disease in diabetics.¹¹

At the present time there is little evidence that early detection and treatment of type II diabetics will reduce future complications from the disease. Therefore, screening by fasting or two-hour postprandial blood glucose testing is not indicated. Obesity is a significant risk factor for diabetes, which should be treated whenever possible.

THYROID DYSFUNCTION

Recommendation. No screening for thyroid dysfunction in healthy asymptomatic adults is indicated.

Canadian Task Force. Same recommendation.

Undetected thyroid dysfunction is common in adults, especially older women. Many, if not most, of these patients are not truly asymptomatic but rather have vague nonspecific symptoms not severe enough to be brought to medical attention.¹² Exact prevalence and incidence data are difficult to obtain because no single test is diagnostic of thyroid dysfunction and normal values of thyroid function tests change with age. Thyroxine (T₄), triiodothyronine (T₃), and the free thyroxine index (FTI) tend to be lower in older patients while the T₃ resin uptake is unchanged.¹³ Using the FTI to screen for thyroid dysfunction, dos Remedias et al¹² found a 0.31 percent prevalence of undetected hyperthyroidism and a 0.5 percent prevalence of undetected hypothyroidism in a health maintenance organization population. They estimated an annual incidence of hypothyroidism of 0.05 percent and an annual incidence of hyperthyroidism of 0.08 percent. Falkenberg et al¹⁴ found a 0.5 percent prevalence of undetected hypothyroidism and a 1.9 percent prevalence of undetected hyperthyroidism in a population of Swedish women aged over 60 years.

A newer entity of subclinical hypothyroidism has been described and includes patients with normal T₄, FTI, and T₃ uptakes but with elevated serum thyrotropin levels (TSH).¹⁵ As many as 7.1 percent of older women and 2.7 percent of older men have elevated TSH levels.^{16,17} The natural history of subclinical hypothyroidism has been studied.^{18,19} Patients with elevated TSH levels and antithyroid antibodies have a 5 percent per year chance of becoming overtly hypothyroid. Patients having an elevated TSH level with no antithyroid antibodies, however, have only a 1 percent per year chance of overt hypothyroidism. This finding has led Tunbridge et al¹⁸ to recommend treatment of asymptomatic patients with elevated TSH levels and antithyroid antibodies.

If one wishes to screen rigorously for thyroid dysfunction, a combination of tests such as the FTI and TSH would have to be used. Less rigorous screening for undetected overt disease could employ just the FTI.

Proponents of screening for thyroid disease argue that reversing even mild nonspecific symptoms improves the quality of life for those patients.^{12,15} Cooper and colleagues¹⁵ did a controlled study of treating subclinical hypothyroidism with L-thyroxine. Eight of 14 treated patients had a decrease in symptoms while only 3 of 12 placebo patients had decreased symptoms. Dry skin was the most common complaint.

The major obstacle to a recommendation for screening adults for thyroid dysfunction is that no one has demonstrated significant morbidity or mortality from mild undetected thyroid disease.²⁰ There is no evidence that waiting until symptoms occur is harmful, a marked contrast to the situation with congenital hypothyroidism, in which delay of the diagnosis can lead

to permanent mental retardation.

OSTEOPOROSIS

Recommendation. No periodic screening for osteoporosis is indicated. Women should be evaluated clinically at menopause for osteoporosis risk.

Canadian Task Force. Not reviewed.

Osteoporosis is a gradual loss of bone substance of unknown cause in older persons. The metabolically more active trabecular bone of the spine and metaphyses of the wrist and hip are lost faster than is cortical bone.²¹

Two types of osteoporosis occur. The first, related to estrogen deficiency, results in a rapid loss of trabecular bone in women during the first few years after menopause.²² The second, which is due to negative calcium balance, results in a gradual loss of cortical and trabecular bone in both men and women. Cann et al²³ report men lose an average 0.72 percent of bone density per year and women 1.2 percent per year. Women are at greater risk for osteoporosis because of the estrogen effect and the fact that they have an average of 30 percent less bone mass than men.²² Other risk factors besides female sex include (1) Caucasian race, (2) early menopause, (3) small body frame, (4) family history of osteoporosis, (5) sedentary lifestyle, (6) low dietary calcium intake, and (7) treatment with corticosteroids.

Osteoporosis causes significant morbidity especially from fractures of the spine, wrists, and hips. Twenty-five percent of women aged over 60 years have evidence of compression fractures of the spine.²⁴ Not all of these fractures are symptomatic, but many are associated with severe pain and disability. In addition, hip fractures in older persons have a mortality as high as 15 percent.²⁵

There is no treatment known to reverse established osteoporosis, although short-term experimental results using calcium carbonate and sodium fluoride have shown a histologic increase in bone mass.²⁶ Estrogen, calcium, fluoride, and weight-bearing exercise have all been shown to slow the rate of bone loss in short-term studies. Each treatment has advantages and disadvantages. No long-term (10- to 20-year) studies of prevention of osteoporosis have been reported, but experts emphasize prevention must be started in the perimenopausal years to be effective.²⁵

Estrogen, given as 0.625 mg of conjugated estrogens each day or its equivalent²⁷ 25 days each month, is the most effective method of preventing osteoporosis.²⁸⁻³⁰ Estrogen, however, causes a six-fold increase in the incidence of endometrial cancer.³⁰ The endometrial cancer associated with estrogens is 90 to 95 percent curable, and estrogen does not increase the death rate from endometrial cancer.²⁵ Nonetheless, it is cancer. The patient must be informed of the risk, and the phy-

sician must monitor patients on estrogens for signs of endometrial cancer. Unfortunately there is no uniform agreement about what such monitoring should include: whether endometrial sampling is necessary, how often, or by what method. Giving a progesterone along with estrogen on days 15 through 25 of the month has been shown to reduce the excess risk of endometrial cancer.²⁵ Progesterone increases the number of side effects, however, and is associated with poorer patient compliance.³¹ In addition, some progestogens have an adverse effect on lipid metabolism by lowering high-density lipoprotein cholesterol and could predispose patients to coronary artery disease. Medroxyprogesterone, 10 mg/d, does not have this effect and is the drug of choice if a progestogen is to be added to the cyclic estrogen regimen.³²

Calcium has been shown to be effective in reducing bone loss, although perhaps not so effective as estrogen.^{28,29} A dose of 1 to 1.5 g/d of elemental calcium is needed, usually given as calcium carbonate. Physiologic amounts of vitamin D must be available for calcium therapy to be effective. Calcium has fewer side effects than estrogen but can cause gastrointestinal upset and hypercalciuria.

Sodium fluoride is also effective in preventing osteoporosis,^{26,29} but large doses are needed, 1 mg/kg/d, and frequent arthritic and gastrointestinal side effects have limited its use.

Several methods of measuring bone density, including radiogrammetry, photodensitometry, single- and dual-energy absorptiometry, and quantitative computed tomography, could potentially be used to screen for osteoporosis. Traditional spine roentgenograms are not useful, as 40 percent of bone mass must be lost before a roentgenogram will detect osteoporosis. Dual-energy photon absorptiometry and quantitative computed tomography can measure loss of trabecular bone and are therefore most useful. They cost, however, \$100 to \$350 per examination. Single-energy photon absorptiometry is less expensive (\$35 to \$120) but measures only peripheral cortical bone.³³

Photon absorptiometry and computed tomography can identify populations at high risk for osteoporosis, but there is a wide overlap between the bone densities of normal and osteoporosis-prone persons. Cann et al²³ report only 21 percent of osteoporotic women had bone densities below the 95th percentile of the normal population. Thus these tests have a low sensitivity for identifying the osteoporosis-prone individual.

Osteoporosis is a common condition among white women, with significant morbidity, which must be treated early in the asymptomatic stage if prevention is to be effective. Available screening tests are expensive and not sensitive or specific enough to justify using them routinely instead of identifying high-risk persons on the basis of the presence of risk factors.

Estrogen is the most effective prevention, but because of side effects and the increased risk of endometrial cancer, many experts are reluctant to rec-

ommend its routine use.^{22,24,34} Calcium supplementation is also effective for reducing the rate of bone loss and has fewer side effects than estrogen therapy. The physician must individualize therapy to the particular patient.

No blanket recommendation for screening for or preventing osteoporosis is justified. The physician should assess the individual woman's risk at menopause and individualize treatment to that patient.

OBESITY

Recommendation. All patients' weight should be recorded and compared with a table of desirable weights every four years.

Canadian Task Force. Not reviewed.

Obesity, defined as being at least 20 percent heavier than ideal weight, affects 15 percent of men and 25 percent of women. Five percent of men are more than 30 percent overweight, whereas 7 percent of women are more than 50 percent overweight.³⁵ Morbid obesity is defined as weighing more than twice one's ideal weight. The prevalence of obesity increases to about the age of 50 years and then decreases slightly.

Obesity is associated with multiple health hazards including type II diabetes, hypertension, and hyperlipidemia.³⁵⁻³⁷ The strongest association is with diabetes. Two thirds of type II diabetics are obese. Many of these persons would not be diabetic if they lost weight.³⁶ Whether obesity is an independent risk factor for coronary heart disease has been controversial³⁸; recent long-term follow-up data from the Framingham study indicate a mild increase in risk due to obesity.³⁷

Moderate obesity has been overrated as a health hazard.³⁶ Studies have not shown increased mortality from moderate obesity.³⁹ In contrast, morbid obesity is a serious health hazard. Drenick et al⁴⁰ report a 12-fold excess mortality for morbidly obese men aged between 25 and 34 years and a six-fold excess mortality for those aged between 35 and 44 years.

The diagnosis of obesity is simple. A number of methods are available, but for most purposes comparing the patients weight and height to a table of ideal weights is cheap, quick, and accurate.

Methods of treating obesity include balanced deficit diets, unbalanced deficit diets, behavior modification, exercise, group therapy, drugs, and surgery. The results of nonsurgical therapy are disappointing with 95 percent failure rates common if long-term follow-up is included.^{41,42} Only 7 percent of obese patients are under a physician's care for this problem.³⁹ Some authors report somewhat better results. Currey et al,⁴¹ using behavioral modification, found after one-year follow-up 70 percent of patients had regained their previous weight; however, 30 percent had maintained

their weight loss, and two thirds of those persons had lost further weight. Stamps and colleagues⁴² describe one practice where a mean weight loss of 30 lb has been achieved and 84 percent of patients have maintained their weight loss for three to 24 months.

Surgical treatment of morbid obesity by one of several gastric stapling or bypass procedures is becoming more common. Eighty-five percent of patients lose 24 to 50 percent of their excess weight initially, although many regain some of that weight.³⁵ The average weight loss after two years is 26.2 percent.⁴³ Surgical procedures have a 9 percent rate of major complications and a 2 to 3 percent mortality. The technical failure rate is 23.5 percent, and the long-term failure rate may be as high as 48 percent if persons lost to follow-up are included.⁴³

A good argument can be made both for and against screening for obesity depending on the interpretation of the data and screening criteria. Reasons against screening for obesity include the following: obesity is not truly asymptomatic, moderate obesity is not a major independent health risk, and treatment of obesity is not very effective. In favor of screening for obesity are the following: even if obesity is not asymptomatic, it is often unrecognized; morbid obesity is a major health hazard, and moderate obesity increases the risk of diabetes, hypertension, and elevated cholesterol, all of which are health risks; and although the overall odds are not good, treatment can be successful if the patient is motivated. Furthermore, surgical treatment, albeit with risks, is often successful for morbid obesity. For these reasons screening for obesity at an arbitrary four-year interval is recommended.

DEPRESSION

Recommendation. No screening for depression is indicated.

Canadian Task Force. Same recommendation.

Depression is a common illness with significant morbidity. Population-based studies have shown a lifetime prevalence of 3 percent of men and 8 percent of women.⁴⁴ Within the past six months 1.5 percent of men and 3 percent of women have had a major depressive episode.⁴⁵ Morbidity from depression includes decreased quality of life, decreased productivity, and family and job disruption. The ultimate morbidity from depression is suicide, which occurs at a rate of 12 to 14 persons per 100,000.⁴⁶ Risk factors for suicide, in addition to depression, include a previous suicide attempt, alcoholism, and being single or divorced.⁴⁷

Depression is defined by its symptoms and therefore cannot be truly asymptomatic. Nevertheless, depression is often unrecognized by medical practitioners.⁴⁸ Several questionnaires, including the Beck Depression

Inventory,⁴⁹ the Zung Self-Rating Depression Scale (SDS),⁵⁰ the General Health Questionnaire (GHQ),⁵¹ and others, have been introduced and validated for the diagnosis of depression.

These tests have been shown to detect unrecognized depression, but it is not clear that treatment of subtle unrecognized symptoms is better than waiting until more overt symptoms occur. Most of the studies of screening for depression have lacked adequate outcome analysis. Zung et al⁵⁰ report that patients with depression diagnosed by the SDS and treated with medication had improved SDS scores after four weeks compared with controls. Johnstone and Goldberg,⁵¹ using the GHQ found that patients diagnosed and treated for depression had fewer symptoms immediately than did controls, but at the end of one year the control subjects had also gotten better and there was no significant difference between the two groups. Thus, although screening tests can increase the recognition of depression, there is no evidence that this results in long-term benefit to the patient.

Efforts to prevent suicide have also been disappointing. No test has been developed with adequate sensitivity and specificity to predict which patients will attempt suicide.^{47,52} The proliferation of suicide prevention centers has not resulted in a significant decrease in suicide rates.⁵³ Miller et al⁴⁶ report that only among women aged less than 24 years has the presence of suicide prevention centers seemed to decrease rates of suicide.

Screening for depression is not indicated because there is no evidence that early diagnosis of unrecognized symptoms results in net benefit to the patient.

ALCOHOLISM

Recommendation. There is no evidence that screening asymptomatic people for alcoholism leads to a decrease in morbidity or mortality from this disease.

Canadian Task Force. There is no good evidence that prevention of alcoholism is effective.

Abuse of alcohol is a problem for 9 percent of men and 5 percent of women.⁴⁴ It is most devastating for young adults but affects all ages. The morbidity from alcohol abuse is enormous. It is a major cause of accidents. Fifty percent of motor vehicle accidents⁵⁴ and up to 22 percent of accidents at home⁵⁵ are related to alcohol. Alcoholism can adversely affect almost every part of the body, especially the nervous system, liver, and gastrointestinal tract. It causes social disruption for the patient and anyone associating with him. In one study⁵⁶ 30.7 percent of all deaths of middle-aged men were alcohol related.

The natural history of alcoholism is chaotic, characterized by a series of ups and downs, crises and relative remissions, until the patient either gains control,

usually by abstinence from alcohol, or succumbs to the disease.

Several screening tests for the detection of alcohol abuse are available. The simplest and most often used is taking a history of alcohol consumption from the patient or his family. Alcoholics will usually underreport their alcohol consumption, but the alert clinician can frequently compensate for this event. The Michigan Alcoholism Screening Test (MAST) is a 25-item questionnaire that has been shown to be sensitive and specific for the detection of alcoholism. A 13-item short version and a self-administered version are also available.⁵⁷ Even simpler but still reliable is the four-item CAGE questionnaire.⁵⁸

The liver enzyme, gamma glutamyl transferase (GGT), has been used as a screen for alcoholism. It is reported to be elevated in 60 to 80 percent of alcoholics.⁵⁹ However, 24 percent of elevated GGT tests will be due to causes other than alcohol.⁶⁰ The blood alcohol level is of limited use in the physician's office, as it will be positive only if the patient has been drinking recently.⁶¹

Methods of treating alcohol abuse include group therapy such as Alcoholics Anonymous, behavior modification, psychotherapy, residential therapy and medication such as disulfiram. No one therapy is clearly superior to any other. Multiple therapies are often used in combination, and whether any therapy is effective is controversial.⁶¹⁻⁶³ Vaillant et al⁶³ report an eight-year follow-up of treated patients in which 25 percent had achieved stable abstinence, 26 percent continued to have serious alcohol dependence, and 29 percent were dead. In this study, as well as others, greater social stability was strongly related to a favorable outcome and may be more important than the specific therapy used. Conversely, patients with less social stability, a history of other drug abuse, and psychiatric disease have a poor prognosis.

A serious problem in the evaluation of any treatment for alcoholism is the difficulty of following a comparable untreated control population. Kristenson and colleagues⁶⁰ report a novel approach to studying the efficacy of screening for and treatment of alcoholism in a controlled study. As part of a population-based study, patients with GGT levels in the top decile were randomized to a control and treatment group. The goal of therapy was moderation of drinking (not abstinence) to lower the GGT to an acceptable level. Twenty-five percent of the treatment group dropped out of therapy. After four years of follow-up both the treatment and control groups had lower GGT levels. The treatment group had a significantly lower rate of sick days, hospitalizations, and death.⁶⁰

If identification of alcoholics were the problem preventing cure of alcoholism, the solution would be straightforward. One or several of the available screening tests could be used to identify most alcoholics. The problem is treatment, not identification. Although treatment efficacy is unproven, its success depends on

the patient recognizing the consequences of his disease and being motivated to change. There is no evidence that early identification of alcoholics can prevent the progression to crisis necessary for the patient to become amenable to treatment. Therefore, periodic screening for alcoholism is not justified. A history of alcohol use is an important item to include in the patient's initial database.

ACCIDENTS

Recommendation. All persons should be encouraged to wear seatbelts whenever riding in a motor vehicle.

Canadian Task Force. There is no evidence that screening for or educating about specific behaviors will prevent accidents.

Accidents are the fourth most common cause of death at all ages and the leading cause of death for persons aged less than 45 years.⁶⁵ Accidents can be classified by the place of occurrence or type of injury. The home is the most common place where accidents occur followed by occupational locations and motor vehicles. Motor vehicles account for most accidental fatalities, however. The death rate per 100,000 population for motor vehicle accidents is 23.4, followed by falls (7.0), drowning (3.1), poisoning (2.9), fire (2.8), and industrial accidents (2.6).⁶⁵

The causes of accidents are multiple including environmental factors, which are largely outside the influence of medicine, and human factors, some of which might potentially be influenced by physicians. The human factors contributing to accidents include youth, inexperience, alcohol, aging, and medical impairment.⁶⁵

Alcohol is specifically a major cause of motor vehicle accidents. Forty to 55 percent of fatally injured drivers are intoxicated.^{54,65}

Falls are the most frequent cause of home fatalities followed by fire, burns, and drowning. Eighty-one percent of fatal falls involve older people.⁶⁶ It is not clear whether physicians can reduce the occurrence of home accidents. Studies of patient education strategies have not shown a reduction in the incidence of such accidents involving children.⁶⁷⁻⁶⁹

Two interventions, getting people to wear seatbelts and getting drunk drivers off the road, have tremendous potential for reducing motor vehicle fatalities. Laws requiring the use of seatbelts in Ontario, Canada, New York State, and in other countries increased seatbelt use from 15 percent of automobile passengers to over 50 percent and have reduced highway fatalities by 27 to 40 percent.^{70,71}

Most of the strategies for preventing accidents are outside the domain of physicians. Physicians do have a responsibility to identify medically impaired persons and prevent them from driving. There is no evidence

that physician intervention alone is effective in preventing home accidents, preventing drunk driving, or increasing use of seatbelts. Given the established efficacy of mandatory seatbelt laws, however, physicians should be supportive of these efforts and encourage people to use seatbelts.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Recommendation. Avoidance of tobacco smoking should be encouraged to prevent COPD. No specific screening for COPD is indicated.

Canadian Task Force. Same recommendation.

Chronic obstructive pulmonary disease (COPD) includes three related conditions: asthma, chronic bronchitis, and emphysema. The prevalence of these conditions varies greatly in different populations. Burrows⁷² reports 20 percent of the population has less than normal pulmonary function, while 2.7 percent has a diagnosis of chronic bronchitis by clinical and spirometric criteria. Three to 4 percent of the population has a diagnosis of asthma. COPD causes significant morbidity; it is the second most common cause of disability in persons aged over 40 years.⁷³ Of all physician office visits, 2.4 percent are for COPD.⁷³ Once serious disease has developed, the five-year survival is 50 percent.⁷⁴

Cigarette smoking is by far the major cause of COPD. Other causes include occupational exposure to dust, especially among asbestos workers, coal miners, textile workers, and grain handlers.⁷⁵ Genetic predisposition, specifically a deficiency of alpha 1 antitrypsin, is also a risk factor.

The natural history of chronic bronchitis and emphysema is not completely understood. A gradual deterioration of lung function with age is normal. Smokers as a group have rates of deterioration of function, as measured by the 1-second forced expiratory volume (FEV₁) three times as great as nonsmokers.⁷⁵ There is, however, a wide variation of decline in lung function among smokers. Most smokers never develop severe COPD. A minority have rapid deterioration of lung function and develop severe COPD.⁷² More men than women develop COPD at any given rate of cigarette consumption. No method of predicting which smokers will develop severe COPD is available.⁷⁶

Treatment of COPD, other than avoiding pulmonary irritants, consists of medication to relieve symptoms. Short-term symptomatic relief can be achieved with medication, but this medication will not prevent continued deterioration of lung function.⁷⁷ Hughes et al⁷⁸ have shown that the pulmonary function decline of ex-smokers was significantly less than that of continuing smokers with COPD. Thus avoidance of pulmonary irritants, especially cigarettes, is the only way to

slow or arrest the progression of COPD.

Screening for early or asymptomatic COPD by spirometry usually measuring the 1-second forced expiratory volume and forced vital capacity has been suggested.⁷³ This screening procedure is relatively easy to do and inexpensive. There are a number of problems with such screening, however: (1) reactive airway abnormalities are quite common and cannot uncritically be called COPD,⁷² (2) a low-current FEV₁ does not predict the rate of later decline in lung function,^{72,76} (3) normal spirometry may give false reassurance to smokers that their lungs are healthy,⁷⁶ and (4) treatment, other than smoking cessation, does not prevent progression of the disease.⁷⁷

All smokers should be encouraged to quit for many reasons including the prevention of COPD. Spirometry is not indicated as a routine procedure to screen for COPD because medical treatment does not prevent progression of the disease. Spirometry may be indicated in industrial situations where extra precautions could be taken to ensure that persons with decreased lung function are not exposed to pulmonary irritants.

PRIMARY OPEN-ANGLE GLAUCOMA

Recommendation. No screening for primary open-angle glaucoma is justified.

Canadian Task Force. Same recommendation.

Primary open-angle glaucoma is defined using three criteria: (1) an increase in intraocular pressure, (2) cupping and pallor of the optic disk, and (3) typical visual field defects not due to other causes.⁷⁹ The finding of increased ocular pressure (greater than 21 mmHg) in the absence of the other two criteria is termed *ocular hypertension*. In the past glaucoma was sometimes diagnosed solely on the basis of ocular hypertension. Ocular hypertension is a risk factor for glaucoma, but fewer than 10 percent of patients with ocular hypertension will develop disk changes or visual field loss.^{79,80} Ocular hypertension affects 5 percent of persons aged 40 to 44 years, 10 percent of persons aged 55 to 59 years, and 15 percent of persons aged between 70 and 75 years.⁸¹ The prevalence of glaucoma is much less. Glaucoma affects 0.4 to 0.8 percent of persons aged over 40 years, rising to 4.4 percent of persons aged over 80 years.⁸⁰

Current thinking about the pathogenesis of glaucoma includes the concept that each eye has a threshold of intraocular pressure above which damage to the optic nerve occurs. Although this critical threshold is variable from person to person, the higher the intraocular pressure, the greater the risk of glaucoma. Thirty to 50 percent of glaucoma, however, occurs in eyes with intraocular pressures less than 21 mmHg.⁸⁰ The concept of a pressure threshold is important also in therapy for glaucoma. It is necessary when

treating glaucoma to lower the pressure below the critical threshold for that eye. Lowering pressure to an arbitrary level is not necessarily adequate.

The natural history of glaucoma is not well known. Ocular hypertension has been shown to be rather benign, with less than 10 percent of persons developing visual field defects over a five- to ten-year follow-up.^{79,80} Cross-sectional population-based studies (in contrast to studies from referral centers) have shown an even lower progression to visual field loss of 0.5 to 3.1 percent.⁷⁹ No studies following untreated glaucoma after visual field loss has occurred have been reported.

Glaucoma blindness affects 16.2 persons per 100,000 population and accounts for 11 percent of all blindness.⁸⁰

The treatment of open-angle glaucoma is usually medical, with surgical treatment reserved for refractory cases. Most ophthalmologists believe that treatment of glaucoma is highly effective. Data to support this belief, however, are weak.^{80,82} No controlled studies comparing treated and untreated cases of glaucoma have been reported. Grant and Burke⁸³ reported a series of glaucoma patients followed five to 20 years. As would be expected, those patients with no visual field loss and normal disks (ie, ocular hypertension) when first seen did very well with or without treatment. Patients with abnormal disks but normal visual fields had mixed results. Only four of 200 eyes with abnormal disks and visual field loss when first seen had no further visual field loss.

Three methods are used to diagnose glaucoma: tonometry, inspection of the optic disk, and visual field testing. Each has serious problems when used as an independent screening test.

Tonometry is a reliable inexpensive method of diagnosing ocular hypertension. As has been discussed, however, ocular hypertension is not glaucoma. If a pressure of 21 mmHg is used to differentiate normal from abnormal eyes, 30 to 50 percent of cases of glaucoma will be missed, while greater than 90 percent of those patients with abnormal results detected will never develop glaucoma.

Examination of the optic disk for cupping and an increase in the cup-disk ratio has been reported to be a reliable predictor of visual field loss.⁸⁴ Gloster⁸⁵ reported that defining a vertical cup-disk ratio of greater than 0.7 abnormal correctly separated 89 percent of eyes with visual field defects from normal eyes. Examining optic disks is highly subjective, and there is great observer variability even among expert ophthalmologists looking at fundus photographs.⁸⁶ There is no evidence that primary care physicians can separate normal from abnormal disks accurately without the aid of fundus photography.

Visual field testing, either using a tangent screen or automated techniques such as the Goldmann perimeter, could, if feasible, be a good screening procedure for glaucoma. It is a procedure not usually done by primary care physicians because considerable exper-

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Blood Pressure		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●
Serum Cholesterol		●				●				●				●				●				●				●				●				●
Weight		●				●				●				●				●				●				●				●				●
Td Booster						●								●												●								
Facal Occult Blood		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pap Smear		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●
Breast Examination		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mammogram		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Eval Osteoporosis Risk		●				●																												
EDUCATION																																		
Use of Seat Belts		●				●				●				●				●				●				●								●
Self Examination of Skin, Oral Cavity, Testes		●				●				●				●				●				●				●								●
Breast Self Examination		●				●				●				●				●				●				●								●
Teach to Report Post Menopausal Bleeding		●				●				●				●				●				●				●								●

Figure 1B. Adult health maintenance flow sheet, ages 50-81 years

are important factors that should discourage doing a long list of marginally worthwhile procedures.

Several changes have been made to improve the current flow sheet compared with the original one published in 1975: It has been extended to age 81 years. Educational procedures and procedures that apply only to women have been grouped together. One-time only database items, such as a complete history and physical examination, history of alcohol use, and need for endocarditis prophylaxis, have been taken out of the flow sheet and would be recorded in the database section of the patient's chart. Extra blank lines have been added for the physician to add specific procedures needed by a particular patient.

Many of the screening recommendations are controversial. Perhaps the most controversial are not recommending flexible sigmoidoscopy, rectal examinations, or screening for glaucoma. Complete references have been included so the interested reader can go to the primary sources and form his own opinion. Although a tremendous amount of research has been done in the past ten years on the subject of health maintenance, large gaps in knowledge still exist, and more research in many areas is needed. New findings will undoubtedly lead to changes in screening recom-

mendations, which the clinician will have to evaluate critically.

The primary care physician is the best and perhaps the only person who can provide coordinated selective longitudinal health maintenance for all adults. It is a challenging task with the promise of tremendous rewards.

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