Prevention, Screening, and Disease Detection

Preventive Medicine

Prevention and screening are powerful tools with complementary goals. The object of preventive care is to decrease a patient's risk of disease; screening is performed to identify a disease before the onset of symptoms. The natural history of a disease is an important determinant of the value and appropriateness of screening. For some diseases (for example, lung cancer), primary prevention is stressed because specific risks have been clearly identified, and the effect of early detection on prognosis has been disappointing. In other diseases, preventive care is less well defined but early detection through screening (for example, mammography) can favorably influence survival. Once a disease becomes symptomatic, steps taken to diagnose it are no longer considered screening. Obstacles to effective prevention and screening include patient risk behaviors and cooperation, and the relatively small proportion of medical resources dedicated to these activities.

Not all disorders are appropriate for screening, and screening tests are most effective when applied to patients with a high-risk profile. Targeting at-risk populations for disease screening is more cost effective than mass screening programs. Identifying specific risk factors (genetic predisposition, at-risk behaviors) can help identify patient groups most likely to benefit from screening procedures. Physicians must be prepared for external pressures for screening from patients, as well as medical-legal implications as screening techniques gain wider media exposure.

Because primary care physicians occupy a unique role in utilization of medical resources, they must scrutinize the appropriateness of general screening recommendations for individual patients, especially as advancing technology provides more (and costly) screening options. Many screening recommendations are based on limited data, or are controversial within the medical community.

Screening Test Characteristics

For screening to be effective, not only must early detection of the disease be associated with improved survival, but the screening test must be available, reliable, and acceptable to the population being screened. Appropriate interpretation of screening tests demands that physicians consider the test's sensitivity (proportion of persons with disease having a positive test result) and specificity (proportion of persons without disease having a negative test), and the pretest probability of disease (prevalence of disease in the population being screened). In general, high sensitivity is important for screening (to miss as few of the disease as possible while accepting some false-positive results), and a high specificity is desirable for confirmation.

Some screening tests are underutilized because of poor patient acceptance related to expense, discomfort, or inconvenience. Also, physicians must explain to patients that a positive screening test often implies the need for additional, sometimes invasive or expensive confirmatory diagnostic or therapeutic intervention. Because of the long-term physician-patient relationship, the general internist is well positioned to counsel patients and tailor screening procedures to each patient's risks and needs.

The accuracy of screening tests may vary according to the expertise of health care professionals (for example, pathologists examining cervical smears) or the standardization of testing assays (for example, prostate- specific antigen).

Screening for Specific Disorders

Widely recognized disease screening guidelines are published by the United States Preventive Services Task Force (USPSTF), the American College of Physicians, and the Canadian Task Force on the Periodic Health Examination. The National Cancer Institute and American Cancer Society issue guidelines directed to cancer screening. Uncertainty about optimal selection and frequency of tests is reflected in these organizations' guidelines. The National Cancer Institute guidelines, for example, generally reflect more aggressive screening recommendations, with a goal of detecting cancer in as many asymptomatic patients as possible. The fewer recommendations in the USPSTF guidelines stem from a more rigorous requirement for proof of screening efficacy.

Skin Cancers

Skin cancers of epidermal origin (example: basal cell squamous cell carcinomas) are the most common malignancies in humans and are usually curable. Melanoma, a tumor of melanocyte(skin cell) origin, is more aggressive, but recognition and excision in early stages (Clark's level, <0.76 mm thick) usually result in cure and normal survival. Exposure to solar ultraviolet radiation is a common risk factor for all skin cancers, with fair-skinned patients at highest risk. Patients at high risk also include those with a family or personal history of skin cancer. All patients, especially those with diagnosed congenital or dysplastic(abnormal cells) nevi, should be counseled on precautions with sun exposure, and on skin-examination to detect early changes in existing lesions.

Breast Cancer

The combination of physician examination and mammography has improved detection and survival rates in breast cancer, particularly in woman over age 50. Mammography complements patient and physician examination and should be performed annually or biennially in woman beginning at age 50.Mammography should begin earlier in patients at increased risk, with screening beginning at age 40 for patients with a family history of breast cancer. Increased risks for breast cancer include personal or family history of breast cancer, advanced age, menarche before age 12, and exposure to ionizing radiation (such as to the thymus or to the skin for acne). Genetic and

environmental factors are both important in the epidemiology of breast cancer. For example, Asian woman living in Asia generally have lower breast cancer rates than woman in western countries, but their rates increase following immigration to the West side of the Continent. Detection of breast cancer in young women (between ages 20 and 40) is especially challenging, as normal breast tissue density often limits sensitivity of conventional mammographic examination.

Colon & Rectal Cancer

Response to therapy and survival in colorectal cancer are strongly influenced by the stage of disease at diagnosis. Screening and detection methods for colorectal cancer are limited by patient and physician dislike of digital rectal examination and the limited sensitivity and specificity of fecal occult blood testing. Unfortunately, the majority of cases are diagnosed after tumors have invaded local tissues or spread to distant sites.

Disagreement exists on the appropriateness of mass screening. The recent randomized study of over 45,000 patients, comparing patients receiving annual or biennial fecal occult blood testing with a control group, found a lower cumulative mortality, improved survival in those found to have colon cancer, and a shift towards detection of the cancers at an earlier stage in patients screened annually, compared with controls. There is no agreement on the role of flexible sigmoidoscopy in screening for colorectal cancer. The American College of Physicians recommends testing every 3 to 5 years beginning at age 50, or barium enema every 5 years. Patients with increased risk of colorectal cancer include those who have colitis from inflammatory bowel disease, familial polyposis syndromes, or a personal or family history of previous colorectal cancers. Presence of these risk factors may justify screening more frequently or at an earlier age.

Prostate Cancer

Carcinoma of the prostate is the second most common malignancy and the third most common cause of cancer deaths in men in the United States. Over 80% of all prostate cancer cases occur in men over age 65. Digital rectal examination is recommended by the National Cancer Institute, although there is no evidence that any screening technique prolongs life in patients with this malignancy. The reliability of digital rectal examination is highly dependent on the skill of the examiner. Studies of rectal examinations performed by urologists reveal sensitivity and specificity rates of 69% and 89% respectively, when compared with prostate biopsy as a reference. Data on the skill of general internists are not available. Newer diagnostic tools proposed for screening include serum prostate- specific antigen (PSA blood testing) levels and transrectal ultrasonography, but data are insufficient to support their generalized use. Although PSA had a sensitivity of 79% in one large study, it is often elevated in benign prostate disease (specificity 59%).The level of PSA may also reflect prostate volume (gram weight)-men with benign prostate hyperplasia (BPH) and high gland volume tend to have higher PSA levels than men with normal gland volume. The American Cancer Society recommends annual PSA testing for all men age 50 and older.

Cervical Cancer

Like the prognosis in colorectal cancer, the prognosis in cervical cancer is closely linked to the degree of local invasion and spread. The long pre invasive period in the natural history of cervical cancer and the wide availability of a screening test make this condition suitable for periodic screening. The Papanicolaou test (PAP test) of cervical cytology is a specific test with a reported sensitivity between 69% and 85% in young woman. The reliability may be substantially lower in older woman because of atrophic mucosal changes. No controlled trails have been done to demonstrate the effect of screening on cancer mortality, although rates of invasive cancer tend to fall in populations in which screening is introduced.

While Papanicolaou testing is generally recognized as an effective screening tool, the optimal timing and frequency are uncertain. Risk factors include multiple coital experiences at a young age, cigarette smoking, and genital viral infections (herpes, papilloma). Because early sexual intercourse raises the risk of this malignancy, initiation of screening with onset of sexual activity is prudent regardless of age. Screening frequency recommendations vary from yearly to every 3 years. Young woman, especially those who are sexually active and those infected with HIV, appear to be at increased risk for more aggressive forms of cervical cancer and should be considered for yearly screening.

Cardiovascular Disease

Elevated serum cholesterol is a powerful predictor of mortality from coronary heart disease. A 1% reduction in total serum cholesterol- particularly a reduction in low-density lipoprotein cholesterol (LDL-Cholesterol) is associated with at least a 2% reduction in the risk of symptomatic coronary heart disease. Although evidence from primary prevention trials indicates a reduction of deaths from coronary causes with lowered cholesterol, all cause mortality has not been reduced, with excess non coronary deaths due to malignancy, violence, accidents, and other causes. The reason for these increases is not known.

Screening for elevated cholesterol is generally inexpensive, convenient, safe and well accepted by patients. The National Cholesterol Education Program recommends that all adults be screened with a non fasting total cholesterol level. Patients with cholesterol levels below 200 mg/dl require reassessment at 5 –year intervals. Values between 200mg/dl and 239mg/dl (borderline elevated) in the absence of established coronary heart disease or two risk factors (one of which is male sex)should prompt dietary instruction and annual reassessment. The presence of risk factors, established coronary heart disease, or a cholesterol level of 240mg/dl or higher is an indication for fasting lipoprotein analysis.

These recommendations are based on data from large randomized trials but have been criticized because (1) few data are available for women, the young, and the elderly; (2) study results in patients with coronary heart disease may not apply to primary

prevention; and (3) studies have failed to demonstrate a favorable effect on all cause mortality.

Substance Abuse

General internists should consider screening for depression and alcohol dependence in their patients. Screening questions are available for both disorders and have a known sensitivity and specificity, especially for alcohol dependence (CAGE questions: Have you ever tried to cut down on your drinking? Have you ever been annoyed by criticism of your drinking? Have you ever felt guilty about your drinking? Have you ever had a morning eye opener?). Several organizations stress the importance of routinely counseling adults about the hazards of tobacco and alcohol use when the opportunity arises on any patient visit. Particular emphasis should be placed on smoking cessation in patients who take oral contraceptives, have other risk factors for atherosclerotic disease, or have underlying lung disease.

HIV Infection

Screening of the general population for HIV infection is not recommended because of the low prevalence of infection in persons without identifiable risk factors. Screening is appropriate for sexually active men and woman who are at increased risk because of sexual practice or intravenous drug use.

Tuberculosis

homes, and correctional facilities)Routine screening for tuberculosis with the tuberculin skin test is not recommended. Selective screening is appropriate for the following groups:

* Persons with identifiable risk factors, including known disease exposure, diabetes, silicosis, gastric resection, renal failure, HIV infection
malignancy, or planned or current treatment with immunosuppressive drugs, including corticosteroids
* Persons who have had recent contact with patients with known or suspected tuberculosis
* Groups at high risk for infection because of socioeconomic condition (recent immigrants from Asia, Africa, Latin America, and Oceania; persons living in institutions such as shelters for the homeless, nursing

Persons with clinical or radiographic findings suggestive of active or past tuberculosis should also undergo skin testing, although testing in this setting would not be considered screening.

Interpretation of skin test positivity, and subsequent initiation of prophylactic treatment with isoniazid, must include consideration of patient characteristics. After application of a 5-unit purified protein derivative, in duration of 5 mm or greater is considered positive for all persons with known or suspected HIV

infection, close recent contacts of persons with active tuberculosis, and persons with evidence of old inactive tuberculosis on chest roentgenography. A reaction of 10 mm or greater is considered positive for all other persons with identified risk factors or those without risk factors known to have had a negative tuberculin skin test result within the past 2 years.

Screening Needs of Special Patient Groups

Adolescents

Office visits by adolescents provide physicians with the opportunity to ascertain immunization status and to provide age-specific counseling and disease screening. The high incidence of violent death by suicide, homicide, and motor vehicle accidents, to which the use of drugs and alcohol often contribute, have led many authorities to recommend using office visits as opportunities to discuss seat belt use (and helmet use for motorcycle riders) and substance abuse. Because of the high incidence of sexually transmitted disease in adolescents, including hepatitis and HIV, education and counseling about prevention of sexually transmitted disease is optimally performed early in the teen years, and with the involvement of parents.

Geriatric Patients

Older patients vary in their basic health, functional status and desire for prevention of disease and death. Quality of remaining life may take precedence over quantity for some, and may alter the goals of preventive care to emphasize independence of function and patient perception of dignity and worth. Careful consultation with the patient and, as end of life nears, frank discussion about advance directives, durable power of attorney, or living will is often appreciated, and can prevent pursuit or withholding of care against a person's wishes.

Elderly patients often are under the care of several physicians, providing the primary care physician with the task of coordinating a complex medication and visitation regimen with patients. Coordination also with home visit nurses, nutritionists, transportation services, social support agencies, and family is essential.

In older persons, examination for affective or cognitive disorders, substance abuse, sensory impairment (in a quiet room), and nutritional status, is often underemphasized. Examination of the skin and oral cavity (for oral lesions and dental and gingival disease) is important but also underemphasized. Disease screening guidelines are generally based on fewer data for the elderly than for the general population. Nevertheless, most guidelines for cancer screening recommend continuation of yearly clinical breast examination and mammography. The American College of Physicians, which advocates annual fecal blood testing and flexible sigmoidoscopy every 3 years beginning at age 50, recommends continuing these procedures for elderly persons. Because of the national history of cervical cancer, screening with the Papanicolaou test of cervical cytology is less important for elderly woman who underwent regular screening at an earlier age and had normal smears. Continuation of influenza vaccination every year

and tetanus-diphtheria boosters every 10 years, and ascertainment of pneumonia vaccination status at age 65 should be a routine of disease prevention for elderly persons.

Homosexual Patients

The essential elements in caring for patients whose sexual preferences place them at greater or lesser risk for specific diseases are (1) identifying the patient's sexual practices and partner preferences and (2) conveying a non judgmental attitude.

All sexually active patients should receive counseling and advice about safe sex techniques and general information about sexually transmitted diseases. Persons engaging in rectal intercourse should be counseled about the increased risk of sexually transmitted diseases with this practice. Homosexual and bisexual patients may be particularly fearful about HIV infection, and candid, compassionate communication by the physician is warranted.

Sexually transmitted diseases are less common in lesbian women than in heterosexual woman or homosexual men. However, vaginal infections are common in lesbian woman; patients and their partners should be evaluated and treated appropriately.

The risk of gynecologic cancers in the lesbian population reflects the individual's lifestyle. Lesbians may be nulliparous (females who are never been pregnant) or older than average when given birth to a child, and thus may be at greater risk for breast cancer. Woman who have neither been pregnant nor used oral contraceptives have a greater risk of ovarian cancer. Nulliparity is a risk factor for endometrial cancer. Cervical cancer and abnormal Papanicolaou smears, both associated with heterosexual activity, are less common in lesbian woman. Current screening guidelines are appropriate.

Travelers and Immigrants

Recent immigrants and persons traveling to foreign countries often require special attention to recognize risks for acquiring or transmitting disease.

Women's Health

Social and scientific forces currently propel attention to woman's health, and studies increasingly generate data and awareness of the health problems unique to women. Though there has been discussion of the creation of a new specialty of medicine to encompass this expanding and challenging field, the general internist is already in a position to acquire, critically analyze, and apply recent insights to the primary care of woman.

Premenstrual Syndrome

Diagnosis

Many woman report physical or emotional symptoms at certain times during their menstrual cycle.The continuum of symptom severity ranges from minor inconvenience to major disruption of normal activities. To be consistent with the diagnosis of premenstrual syndrome, symptoms must occur in the luteal phase (from ovulation to the onset of menses) of woman who have spontaneous menstrual cycles. There must be a symptom-free interval during the month, and symptoms must be responsible for an identifiable dysfunction in social or occupational activities.

Differential diagnoses include luteal-phase exacerbation of migraine headache, convulsive disorder, irritable bowel syndrome, and hypothyroidism. Depression and anxiety, idiopathic cyclic edema, side effects of oral contraceptives, chronic fatigue syndrome, and fibromyalgia may also cause similar symptoms.

After a thorough history and pertinent physical examination (most woman will have a normal examination), the patient should be instructed to complete a daily diary of her most prominent symptoms for 2 to 3 months, during which she takes no medications. The days of menstrual flow must be clearly marked on the calendar. The doctor and the patient should agree on the grading system for the diary.

The data from the diary should be divided by the doctor into three phases: the premenstrual or luteal phase (following ovulation, about 14 days before the onset of menstrual flow); the menstrual phase (all days of bleeding); and the postmenstrual phase (the 7 days after menstrual flow ceases).

A biphasic pattern of premenstrual syndrome has been described, in which symptoms begin with ovulation, abate in a few days, and return later in the luteal phase. Cyclic dysmenorrheal, in contrast, presents in the late luteal or early menstrual phase.

Therapy

The etiology of premenstrual syndrome has not been determined, though alteration of central nervous system neurotransmitter is suspect, especially of serotonin. Also, although ovulation appears to be a trigger, personal and psychosocial factors appear to affect severity of symptoms. Studies do not confirm a biochemical marker, a distinct personality type, or a direct relationship of premenstrual syndrome with stressful events.

Many therapies have been successful but lack firm scientific evidence of efficacy. Dietary manipulations include decreasing simple sugar intake and increasing complex carbohydrates, and decreasing salt, caffeine, and alcohol consumption. Increased exercise is advocated because it improves the patient's sense of well being and because it may affect endorphin production. Cognizant of her symptoms, the patient may learn to avoid particularly stressful situations and may develop specific coping mechanisms.

Calcium and magnesium supplementation have been shown some efficacy in improving symptoms of negative mood, fluid retention, and pain. Vitamin B6 (pyridoxine) has been more widely used but has less scientific support. Daily dose of vitamin B6 should be lower than 100mg because of the risk of peripheral neurotoxicity.

If symptoms of premenstrual syndrome are unaffected by minimal intervention strategies, symptom-specific therapy can be tried. Spironolac-tone in dosages up to 100mg/d may decrease fluid retention. A tricyclic antidepressant in low doses (for example, doxepin, 10-25 mg at bedtime) may reduce sleep disturbance. Exacerbation of migraines may be treated with B-blockers, calcium- channel blockers, or low-dose tricyclic antidepressants. A trial of fluoxetine, clomipramine, or buspirone can be suggested for significant mood lability.

Oral contraceptives have empiric efficacy in some younger woman with premenstrual syndrome. Medroxy-progesterone acetate, danazol, transdermal estradiol, and leuprolide have all been used to suppress ovulation in woman with disabling symptoms. Consultation with a gynecologist is advisable for these latter therapies. A diary for documentation of symptoms is the best method to evaluate therapy.