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THE CLEVELAND CLINIC
Intensive Review of
**Internal
Medicine**

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The Cleveland Clinic Intensive Review of Internal Medicine

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Preface

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This book is the product of contributions by members of the Cleveland Clinic Foundation professional staff and by several other distinguished clinicians, and is born of a passion for excellence in the practice of medicine and of a commitment to education. These core values define the Cleveland Clinic Foundation as an institution and health care facility.

More specifically, this book has its roots in the Foundation's annual "Intensive Review of Internal Medicine Symposium," which celebrates its tenth anniversary this year under the co-direction of two of the editors (JKS, DLL). This course is designed to provide a comprehensive review of Internal Medicine for those preparing for Board Certification (or recertification), as well as for those who simply wish to update their knowledge in the field. The course syllabus in years past has served as a nidus for this book, which is designed to provide a succinct, focused document that will help course participants follow the lectures and also provide a "stand-alone" study guide for later Board preparation. It also serves as a companion text for other educational offerings related to the course, including the CD-ROM, Videotapes and Self-Assessment Test. For some of these activities, CME credit is available; however, in each instance the book is meant to serve as a resource for the educational program, rather than as the basis for CME credit.

This book is not intended to be a comprehensive textbook of internal medicine, but rather attempts to highlight key points identified by clinician faculty. To enhance its utility as a study guide, ample use is made of bullet points. Case-based teaching has become the hallmark of the Course, as we believe that most practicing physicians learn best in a case-driven format. For this reason, case presentations are included in some chapters which pose specific diagnostic or management questions, along with discussions of those issues.

We are delighted to offer this book as a compilation of clinical wisdom from a distinguished roster of clinician-scholars. As editors, we take pride in this volume, no credit for its valuable content, but total responsibility for any of its shortcomings. We hope that you will find the shortcomings to be few in number, and that this book enhances your knowledge and joy of clinical medicine, just as it has enhanced our own.

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The Cleveland Clinic Foundation,
Cleveland, Ohio
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I

Multidisciplinary Skills for the Internist

Health Screening and Immunization

Richard S. Lang

Conceptually, preventive medicine involves three tasks for the clinician: screening, counseling, and immunization and prophylaxis. Preventive interventions have been categorized as primary, secondary, and tertiary. *Primary prevention* is the reduction of risk factors before a disease or condition has occurred. Examples are immunization, use of safety equipment, dietary management, and smoking cessation. Primary prevention aims to reduce the incidence of a disease or condition. *Incidence* is the number of persons developing a condition or disease in a specific period of time. *Secondary prevention* is the detection of a condition or disease in order to reverse or slow the condition or disease and thereby improve prognosis. Examples of secondary prevention are mammography and Papanicolaou (Pap) smears. Secondary prevention ideally detects and intervenes in a condition before that condition is clinically apparent. Secondary prevention therefore aims to reduce the prevalence of a disease. *Prevalence* is the total number of individuals who have a condition or disease at a particular time. *Tertiary prevention* is the minimizing of future negative health effects of a disease or condition.

Considerations in screening for a disease or condition should include the following questions:

- Is the disease or condition an important problem? (What are the morbidity and mortality of the condition?)
 - Is the disease or condition a common problem? (What are its prevalence and incidence?)
 - Is the screening test accurate? (What are its sensitivity, specificity, and predictive value?)
 - Does the screening determine prevalence or incidence?
 - What is the cost of the screening procedure? (Consider both financial and health risks.)
 - What are the available follow-up diagnostic procedures?
 - What is the available treatment for the disease or condition?
- How acceptable to patients is the screening procedure?
 - What are the circumstances for the screening? (What is the context—health maintenance, occupational, preoperative, screening, etc.?)
 - What are the current recommendations for screening and the medical evidence to support these recommendations?

The ideal screening situation uses an inexpensive, noninvasive test with a high level of sensitivity and specificity to detect a common problem that can be treated but, if left untreated, leads to significant morbidity and mortality. Presently, medical practice and literature identify few such interventions.

Sensitivity is the ability of a test to correctly identify those who have a condition or disease. *Specificity* is the ability of a test to correctly identify those who do not have the disease or condition in question. *Predictive values* for a screening test are the proportions of people correctly labeled as having the condition or disease (*positive predictive value*) and those without the condition or disease (*negative predictive value*). Table 1.1 illustrates these terms. This “2 × 2” table is a common method for viewing the application of a screening test in a population.

LEADING CAUSES OF MORTALITY

The optimal use of screening requires a basic understanding of the common causes of mortality. Table 1.2 outlines the most common causes of mortality for adult age groups, and Table 1.3 shows the average life expectancy of males and females at different ages.

Accidents, homicide, and suicide are common causes of mortality in young adults. Motor vehicle injuries account for more than 35% of the deaths in persons aged 15–24. The use of seat belts can reduce crash mortality by as much as 50%. Homicide is the leading cause of death of black males in the

15–24-year-old age group. Counseling regarding hand gun safety is therefore an important intervention for this population. Suicide is another common cause of death in the young age group and is markedly more common in persons who have become HIV positive. Surveillance and counseling for suicide in this patient population are therefore important. HIV continues to rise as a cause of mortality, particularly in the age groups shown in Table 1.2. Preventive efforts related to sexual practices and the use of IV drugs are important interventions.

Heart disease and cancer are the leading causes of mortality in adults in the groups over age 35. Preventive efforts therefore should be directed to these conditions. Projections indicate that cancer will become the leading cause of adult mortality in the near future. Common cancer sites in women are the breast, lung, colon/rectum, uterus, and ovary. Leading cancer sites in males are the prostate, lung, colon/rectum, and bladder. Common causes of cancer death in women are lung, breast, colon/rectum, and ovary cancers; in men, lung, prostate, and colon/rectum cancers. Screening and prevention efforts are therefore targeted at those cancers that are the most common as well as the most common causes of cancer death: lung, colon/rectum, breast, and prostate cancers.

Table 1.1. Predictive Value of Tests

	<i>Disease</i>	<i>No Disease</i>	<i>Total</i>
Test positive	True (+)	False (+)	All (+)
Test negative	False (–)	True (–)	All (–)
Total	All with disease	All without disease	Total patients
Sensitivity	$= \frac{\text{True (+)}}{\text{True (+) + False (–)}} = \text{how well the test correctly detects those with disease}$		
Specificity	$= \frac{\text{True (–)}}{\text{True (–) + False (+)}} = \text{how well the test identifies those without disease}$		
Positive predictive value	$= \frac{\text{True (+)}}{\text{True (+) + False (+)}} = \text{when a test is positive, the proportion of those with the disease}$		
Negative predictive value	$= \frac{\text{True (–)}}{\text{True (–) + False (–)}} = \text{when a test is negative, the proportion of those without the disease}$		

Table 1.2. Leading Causes of Death (1992)

<i>Rank</i>	<i>Overall Population</i>	<i>Age 15–34</i>	<i>Age 35–54</i>	<i>Age 55–74</i>	<i>Age 75 & Over</i>
1	Heart	Accidents	Cancer	Cancer	Heart
2	Cancer	Homicide	Heart	Heart	Cancer
3	Stroke	HIV	HIV	COPD	Stroke
4	COPD ^a	Suicide	Accidents	Stroke	Pneumonia/flu
5	Accidents	Cancer	Suicide	Diabetes	COPD
6	Pneumonia/flu	Heart	Cirrhosis of the liver	Accidents	Diabetes

^a COPD, Chronic obstructive pulmonary disease

SCREENING TESTS BY ORGAN SYSTEM AND DISEASE

CARDIOVASCULAR SYSTEM

For preventive purposes, atherosclerotic heart disease, stroke, and peripheral vascular disease are grouped in terms of their similar risk factors. The risk factors include the following:

- Previous atherosclerotic vascular disease
- Family history of premature vascular disease
- Smoking
- Hypertension
- Diabetes
- Hyperlipidemia
- Age greater than 45 years in men and greater than 55 years in women
- Premature menopause in women without estrogen replacement therapy

An HDL cholesterol level greater than 60 mg/dL is thought to be a negative risk factor, or “protective” factor, for the development of coronary vascular disease. Most policy groups have recommended that total serum cholesterol level in a nonfasting state be measured in “asymptomatic” adults generally every 5 years. Presently, agreement has not been reached by authoritative groups on the use of lipoprotein sub-fractions.

Most authorities advise measurement of the blood pressure in normotensive persons at least every 2 years, particularly in persons with prior diastolic readings of 85–89 or those who are obese or who have a first-degree relative having hypertension. Lifestyle modifications should be made for mild to moderate hypertension. These modifications include optimizing weight, limiting alcohol, participating in regular aerobic exercise, reducing sodium intake, and maintaining adequate dietary potassium, calcium, and magnesium.

Low-dose aspirin therapy should be considered for primary prevention of ischemic heart disease in men over age 40 who are of high risk. The optimal preventive aspirin dosage is not clearly established, however. The side effects and potential complications of chronic aspirin usage should be considered carefully.

The electrocardiogram is not a sensitive screening test

Table 1.3. Average Life Expectancy

<i>Gender</i>	<i>Years of Survival</i>	<i>Life Expectancy</i>
Males		
65	15.1	80.1
70	12.3	82.3
75	9.8	84.8
Females		
65	19.9	84.9
70	16.3	86.3
75	13.0	88.0
85	6.2	91.2

for coronary artery disease in asymptomatic patients and therefore is not generally advised as a screening test. There is no consensus for the use of preoperative electrocardiograms. Considerations for the obtaining of a preoperative EKG include the patient's age, the procedure planned, the anesthesia to be used, the cardiovascular risk factors, and the presence of other systemic disease.

Exercise treadmill testing has limited sensitivity (approximately 65%) and specificity (approximately 75%) for detection of coronary artery disease. Stress testing is most useful when coronary artery disease is more likely. Therefore, treadmill testing is most effectively used for persons with multiple risk factors. Stress testing should also be considered for persons engaging in occupations that demand physical exertion or that may impact on public safety. Otherwise, exercise treadmill testing should not be used routinely.

Similarly, the use of noninvasive vascular evaluation of the carotid arteries should be reserved for patients in whom disease is suspected, based either on symptoms or the presence of carotid bruits. The prevalence of carotid bruits in the adult population is about 4–5%.

Overall, the risk factors for development of vascular disease should be assessed in all patients. Modifiable risk factors should be addressed. Blood pressure and cholesterol should be monitored and treated appropriately. Stress testing and assessment of carotid arteries are best used with patients in whom coronary artery disease or carotid atherosclerosis is most likely to be present.

LUNG CANCER

The numbers of new cancer cases and cancer deaths for specific types of cancers are shown in Figure 1.1. Lung cancer is the most common cause of cancer death in the United States.

Cigarette smoking is the most important risk factor for the development of lung cancer. Generally, smokers are 10 times more likely to die of lung cancer than nonsmokers. The risk for developing lung cancer depends on the number of cigarettes smoked, the age when smoking began, and the de-

gree of inhalation. The risk for lung cancer decreases after smoking is stopped, particularly after 5 years or more. Therefore, the most important preventive interventions for lung cancer are avoidance and cessation of smoking. Other risk factors for development of lung cancer are occupational exposures (asbestos, arsenic, chloromethyl ethers, chromium, polycyclic aromatic compounds, nickel, and vinyl chloride), chronic obstructive lung disease, previous lung cancer, previous head and neck cancer, and radon exposure.

Generally, screening for lung cancer in asymptomatic patients is not advised. Large-scale studies have not demonstrated a reduction in mortality when screening interventions such as serial chest x rays and frequent sputum cytology were applied to high-risk populations. Therefore, routine screening chest x rays should not be done unless clinical evidence suggests the presence of disease. Improved treatment and screening techniques may change the perspective for screening for lung cancer in the future.

BREAST CANCER

Risk factors for breast cancer include the following:

- Family history of breast cancer
- Menarche before age 12
- Late menopause (after age 50)
- Late first pregnancy (after age 35)
- Previous lobular carcinoma in-situ of the breast
- Previous breast cancer
- Previous cancer of the uterus, ovary, or salivary gland

A family history of breast cancer is a particularly important risk factor when diagnosed in a premenopausal first-degree relative or bilaterally in any first-degree relative. A woman with a premenopausal first-degree relative having had breast cancer has three times the risk for developing breast cancer. High socioeconomic status, nulliparity, and prior exposure to high-dose radiation also convey modestly increased risk.

Screening for breast cancer includes breast self-examination, clinical breast examination by a physician or nurse, and mammography. A large number of breast cancers are found by palpation. Breast self-examination has low sensitivity and unknown specificity. Appropriate teaching is required for effective breast self-examination. Although not of proven effectiveness, breast self-examination is recommended by some advisory groups. Annual clinical breast examination by a physician or health care professional is recommended by the major advisory panels for women over the age of 40. Mammography has a variable but good sensitivity for detecting breast cancer, in the range of 74–93%. Specificity is also relatively good at about 90–95%. The positive predictive value of an abnormal mammogram is about 10–20%. A normal mammogram has a negative predictive value of about 99%. All major authoritative groups recommend routine mammography screening after the age of 50. Studies have