Chapter 6: Screening and Prevention of Disease

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INTRODUCTION

A primary goal of health care is to prevent disease or detect it early enough that intervention will be more effective. Tremendous progress has been made toward this goal over the past 50 years. Screening tests are available for many common diseases and encompass biochemical (e.g., cholesterol, glucose), physiologic (e.g., blood pressure, growth curves), radiologic (e.g., mammogram, bone densitometry), and cytologic (e.g., Pap smear) approaches. Effective preventive interventions have resulted in dramatic declines in mortality from many diseases, particularly infections. Preventive interventions include counseling about risk behaviors, vaccinations, medications, and, in some relatively uncommon settings, surgery. Preventive services (including screening tests, preventive interventions, and counseling) are different than other medical interventions because they are proactively administered to healthy individuals instead of in response to a symptom, sign, or diagnosis. Thus, the decision to recommend a screening test or preventive intervention requires a particularly high bar of evidence that testing and intervention are both practical and effective.

Because population-based screening and prevention strategies must be extremely low risk to have an acceptable benefit-to-harm ratio, the ability to target individuals who are more likely to develop disease could enable the application of a wider set of potential approaches and increase efficiency. Currently, there are many types of data that can predict disease incidence in an asymptomatic individual. Germline genomic data have received the most attention to date, at least in part because mutations in high-penetrance genes have clear implications for preventive care **(Chap. 467)**. Women with mutations in either *BRCA1* or *BRCA2*, the two major breast cancer susceptibility genes identified to date, have a markedly increased risk (five- to twentyfold) of breast and ovarian cancer. Screening and prevention recommendations include prophylactic oophorectomy and breast magnetic resonance imaging (MRI), both of which are considered to incur too much harm for women at average cancer risk. Some women with *BRCA* mutations opt for prophylactic mastectomy to dramatically reduce their breast cancer risk. Although the proportion of common disease explained by high-penetrance genes appears to be relatively small (5–10% of most diseases), mutations in rare, moderate-penetrance genes, and variants in low-penetrance genes, also contribute to the prediction of disease risk. Most recently, polygenic risk scores combining information about variants across hundreds of genes are being evaluated for identifying individuals at high risk of coronary heart disease and other conditions. The advent of affordable whole exome/whole genome sequencing is likely to speed the dissemination of these tests into clinical practice and may transform the delivery of preventive care.

Other forms of "omic" data also have the potential to provide important predictive information. Proteomics and metabolomics can provide insight into gene function, but it has proven challenging to develop reliable, predictive measures using these platforms. More recently, it has become possible to measure the presence of mutations in DNA circulating in the bloodstream and in stool, with early promising evidence that these assays can be used to detect cancer before existing screening tests.

In addition to "omic" data, imaging data are increasingly being integrated into risk-stratified prevention approaches as evidence grows about the predictive ability of these data. For example, coronary computed tomography (CT) scans are used in many preventive cardiology programs to inform decisions about beginning statin therapy when there is conflicting or uncertain information from other risk assessment approaches. Of course, these data may also be helpful in predicting the risk of harms from screening or prevention, such as the risk of a false-positive mammogram.

In addition to advances in risk prediction, there are several other reasons that screening and prevention are likely to gain importance in medical care in the near term. New imaging modalities are being developed that promise to detect changes at the cellular and subcellular levels, greatly increasing the probability that early detection improves outcomes. The rapidly growing understanding of the biologic pathways underlying initiation and progression of many common diseases has the potential to transform the development of preventive interventions, including chemoprevention. Furthermore, screening and prevention offer the promise of both improving health and sparing the costs of disease treatment, an issue that will continue to gain importance as long as health care costs in the United States remain a concern to patients, government agencies, and insurers.

This chapter will review the basic principles of screening and prevention in the primary care setting. Recommendations for specific disorders such as cardiovascular disease, diabetes, and cancer are provided in the chapters dedicated to those topics.

BASIC PRINCIPLES OF SCREENING

The basic principles of screening populations for disease were published by the World Health Organization in 1968 **(Table 6-1)**.

TABLE 6-1

Principles of Screening

The condition should be an important health problem.
There should be a treatment for the condition.
Facilities for diagnosis and treatment should be available.
There should be a latent stage of the disease.
There should be a test or examination for the condition.
The test should be acceptable to the population.
The natural history of the disease should be adequately understood.
There should be an agreed policy on whom to treat.
The cost of finding a case should be balanced in relation to overall medical expenditure.

In general, screening is most effective when applied to relatively common disorders that carry a large disease burden **(Table 6-2)**. The five leading causes of mortality in the United States are heart diseases, malignant neoplasms, chronic obstructive pulmonary disease, accidents, and cerebrovascular diseases. Thus, many screening strategies are targeted at these conditions. From a global health perspective, these conditions are priorities, but malaria, malnutrition, AIDS, tuberculosis, and violence also carry a heavy disease burden **(Chap. 472)**.

TABLE 6-2

Lifetime Cumulative Risk

Breast cancer for women	10%
Colon cancer	6%
Cervical cancer for women[a]	2%
Domestic violence for women	Up to 15%
Hip fracture for white women	16%

[a]Assuming an unscreened population.

Having an effective treatment for early disease has proven challenging for some common diseases. For example, although Alzheimer's disease is the sixth leading cause of death in the United States, there are no curative treatments and no evidence that early treatment improves outcomes. Lack of facilities for diagnosis and treatment is a particular challenge for developing countries and may change screening strategies, including the development of "see and treat" approaches such as those currently used for cervical cancer screening in some countries. A long latent or preclinical phase where early treatment increases the chance of cure is a hallmark of many cancers; for example, polypectomy prevents progression to colon cancer. Similarly, early identification of hypertension or hyperlipidemia allows therapeutic interventions that reduce the long-term risk of cardiovascular or cerebrovascular events. In contrast, lung cancer screening has historically proven more challenging because most tumors are not curable by the time they can be detected on a chest x-ray. However, the length of the preclinical phase also depends on the level of resolution of the screening test, and this situation changed with the development of chest CT. Low-dose chest CT scanning can detect tumors earlier and has been demonstrated to reduce lung cancer mortality by 20% in individuals who had at least a 30-pack-year history of smoking. The short interval between the ability to detect disease on a screening test and the development of incurable disease also contributes to the limited effectiveness of mammography screening in reducing deaths from some forms of breast cancer. At the other end of the spectrum, the early detection of prostate cancer may not lead to a difference in the mortality rate because the disease is often indolent and competing morbidities, such as coronary artery disease, may ultimately cause mortality **(Chap. 70)**. This uncertainty about the natural history is also reflected in the controversy about treatment of prostate cancer, further contributing to the challenge of screening in this disease. Finally, screening programs can incur significant economic costs that must be considered in the context of the available resources and alternative strategies for improving health outcomes.

METHODS OF MEASURING HEALTH BENEFITS

Because screening and preventive interventions are recommended to asymptomatic individuals, they are held to a high standard for demonstrating a favorable risk-benefit ratio before implementation. In general, the principles of evidence-based medicine apply to demonstrating the efficacy of screening tests and preventive interventions, where randomized controlled trials (RCTs) with mortality outcomes are the gold standard. However, because RCTs are often not feasible, observational studies, such as case-control designs, have been used to assess the effectiveness of some interventions such as colonoscopy for colorectal cancer screening. For some strategies, such as Pap smear screening for cervical cancer, the only data available are ecologic data demonstrating dramatic declines in mortality.

Irrespective of the study design used to assess the effectiveness of screening, it is critical that disease incidence or mortality is the primary endpoint rather than length of disease survival. This is important because lead time bias and length time bias can create the appearance of an improvement in disease survival from a screening test when there is no actual effect. Lead time bias occurs because screening identifies a case before it would have presented clinically, thereby creating the perception that a patient lived longer after diagnosis simply by moving the date of diagnosis earlier rather than the date of death later. Length time bias occurs because screening is more likely to identify slowly progressive disease than rapidly progressive disease. Thus, within a fixed period of time, a screened population will have a greater proportion of these slowly progressive cases and will appear to have better disease survival than an unscreened population.

A variety of endpoints are used to assess the potential gain from screening and preventive interventions.

1. *The absolute and relative impact of screening on disease incidence or mortality.* The absolute difference in disease incidence or mortality between a screened and nonscreened group allows the comparison of size of the benefit across preventive services. A meta-analysis of Swedish mammography trials (ages 40–70) found that ~1.2 fewer women per 1000 would die from breast cancer if they were screened over a 12-year period. By comparison, at least ~3 lives per 1000 would be saved from colon cancer in a population (aged 50–75) screened with annual fecal occult blood testing (FOBT) over a 13-year period, and an estimated 20–24 lives per 1000 would be saved over the entire 25-year period. Based on this analysis, colon cancer screening may actually save more women's lives than does mammography. However, the relative impact of FOBT (30% reduction in colon cancer death) is similar to the relative impact of mammography (14–32% reduction in breast cancer death), emphasizing the importance of both relative and absolute comparisons.

2. *The number of subjects screened to prevent disease or death in one individual.* The inverse of the absolute difference in mortality is the number of subjects who would need to be screened or receive a preventive intervention to prevent one death. For example, 731 women aged 65–69 would need to be screened by dual-energy x-ray absorptiometry (DEXA) (and treated appropriately) to prevent one hip fracture from osteoporosis.

3. *Increase in average life expectancy for a population.* Predicted increases in life expectancy for various screening and preventive interventions are listed in **Table 6-3**. It should be noted, however, that the increase in life expectancy is an average that applies to a population, not to an individual.

In reality, the vast majority of the population does not derive any benefit from a screening test. A small subset of patients, however, will benefit greatly. For example, Pap smears do not benefit the 98% of women who never develop cancer of the cervix. However, for the 2% who would have developed cervical cancer, Pap smears may add as much as 25 years to their lives. Some studies suggest that a 1-month gain of life expectancy is a reasonable goal for a population-based screening or prevention strategy.

TABLE 6-3

Estimated Average Increase in Life Expectancy for a Population

SCREENING OR PREVENTIVE INTERVENTION	AVERAGE INCREASE
Mammography:	
Women, 40–50 years	0–5 days
Women, 50–70 years	1 month
Pap smears, age 18–65	2–3 months
Getting a 35-year-old smoker to quit	3–5 years
Beginning regular exercise for a 40-year-old man (30 min, 3 times a week)	9 months–2 years

ASSESSING THE HARMS OF SCREENING AND PREVENTION

Just as with most aspects of medical care, screening and preventive interventions also incur the possibility of adverse outcomes. These adverse outcomes include side effects from preventive medications and vaccinations, false-positive screening tests, overdiagnosis of disease from screening tests, anxiety, radiation exposure from some screening tests, and discomfort from some interventions and screening tests. The risk of side effects from preventive medications is analogous to the use of medications in therapeutic settings and is considered in the U.S. Food and Drug Administration (FDA) approval process. Side effects from currently recommended vaccinations are primarily limited to discomfort and minor immune reactions. However, the concern about associations between vaccinations and serious adverse outcomes continues to limit the acceptance of many vaccinations despite the lack of data supporting the causal nature of these associations.

The possibility of a false-positive test occurs with nearly all screening tests, although the definition of what constitutes a false-positive result often varies across settings. For some tests such as screening mammography and screening chest CT, a false-positive result occurs when an abnormality is identified that is not malignant, requiring either a biopsy diagnosis or short-term follow-up. For other tests such as Pap smears, a false-positive result occurs because the test identifies a wide range of potentially premalignant states, only a small percentage of which would ever progress to an invasive cancer. This risk is closely tied to the risk of overdiagnosis in which the screening test identifies disease that would not have presented clinically in the patient's lifetime. Assessing the degree of overdiagnosis from a screening test is very difficult given the need for long-term follow-up of an unscreened population to determine the true incidence of disease over time. Recent estimates suggest that as much as 15–40% of breast cancers identified by mammography screening and 15–37% of prostate cancers identified by prostate-specific antigen testing may never have presented clinically. Screening tests also have the potential to create unwarranted anxiety, particularly in conjunction with false-positive findings. Although multiple studies have documented increased anxiety through the screening process, there are few data suggesting this anxiety has long-term adverse consequences, including subsequent screening behavior. Screening tests that involve radiation (e.g., mammography, chest CT) add to the cumulative radiation exposure for the screened individual. The absolute amount of radiation is very small from any of these tests, but the overall impact of repeated exposure from multiple sources is still being determined. Some preventive interventions (e.g., vaccinations) and screening tests (e.g., mammography) may lead to discomfort at the time of administration, but again, there is little evidence of long-term adverse consequences.

WEIGHING THE BENEFITS AND HARMS

The decision to implement a population-based screening and prevention strategy requires weighing the benefits and harms, including the economic impact of the strategy. The costs include not only the expense of the intervention but also time away from work, downstream costs from false-positive results, "incidentalomas" or adverse events, and other potential harms. Cost-effectiveness is typically assessed by calculating the cost per year of life saved, with adjustment for the quality of life impact of different interventions and disease states (i.e., quality-adjusted life-year). Typically, strategies that cost $50,000–100,000 per quality-adjusted year of life saved are considered "cost-effective" **(Chap. 4)**.

The U.S. Preventive Services Task Force (USPSTF) is an independent panel of experts in preventive care that provides evidence-based recommendations for screening and preventive strategies based on an assessment of the benefit-to-harm ratio **(Tables 6-4 and 6-5)**. Because there are multiple advisory organizations providing recommendations for preventive services, the agreement among the organizations varies across the different services. For example, all advisory groups support screening for hyperlipidemia and colorectal cancer, whereas consensus is lower for breast cancer screening among women in their forties and for prostate cancer screening. Because the guidelines are only updated periodically, differences across advisory organizations may also reflect the data that were available when the guideline was issued.

TABLE 6-4

Screening Tests Recommended by the U.S. Preventive Services Task Force for Average-Risk Adults

DISEASE	TEST	POPULATION	FREQUENCY	CHAPTER
Abdominal aortic aneurysm	Ultrasound	Men 65–75 who have ever smoked	Once	
Alcohol misuse	Alcohol Use Disorders Identification Test	All adults	Unknown	453
Breast cancer	Mammography with or without clinical breast examination	Women 50–75	Every 2 years	
Cervical cancer	Pap smear	Women 21–65	Every 3 years	70
	Pap smear and/or HPV testing	Women 30–65	Every 5 years if HPV negative	
Chlamydia/gonorrhea	Nucleic acid amplification test on urine or cervical swab	Sexually active women <25	Unknown	189
Colorectal cancer	Fecal occult blood testing	45–75	Every year	70, 81
	Fecal immunochemical-DNA	45–75	Every 1–3 years	
	Sigmoidoscopy	45–75	Every 5 years	
	Colonoscopy (or occult blood testing combined with sigmoidoscopy)	45–75	Every 10 years	
Depression	Screening questions	All adults	Periodically	
Diabetes	Fasting blood glucose or HgbA1c	Adults overweight, obese, or with hypertension	Every 3 years	403

Hepatitis C	Anti-HCV antibody followed by confirmatory PCR	18–79	Once	
HIV	Reactive immunoassay or rapid HIV followed by confirmatory test	15–65	At least once	
Hyperlipidemia	Cholesterol	40–75	Unknown	407
Hypertension	Blood pressure	All adults	Periodically	277
Intimate partner violence	Screening questions	Women of childbearing age	Unknown	
Lung cancer	Low-dose computed tomography	Adults 50 to 80 years who have a 20 pack-year smoking history and currently smoke or have quit within the past 15 years	Yearly	
Obesity	Body mass index	All adults	Unknown	
Osteoporosis	DEXA	Women >65 or >60 with risk factors	Unknown	411

Abbreviations: DEXA, dual-energy x-ray absorptiometry; HCV, hepatitis C virus; HPV, human papillomavirus; PCR, polymerase chain reaction.

Source: Adapted from the U.S. Preventive Services Task Force 2017. *www.uspreventiveservicestaskforce.org/Page/Name/uspstf-a-and-b-recommendations/.*

TABLE 6-5

Preventive Interventions Recommended for Average-Risk Adults

INTERVENTION	DISEASE	POPULATION	FREQUENCY	CHAPTER
Adult immunization				123, 124
Tetanus-diphtheria		>18	Every 10 years	
Varicella		Susceptibles only, >18	Two doses	
Measles-mumps-rubella		Women, childbearing age	One dose	
Pneumococcal		>64	13 followed by 23 valent	
Influenza		>18	Yearly	
Human papillomavirus		Up to age 27	If not done prior	
Zoster		>60	Once	
Chemoprevention				
Aspirin	Cardiovascular disease	Aged 50–59 years with a ≥10% 10-year cardiovascular disease risk (bleeding risk may = benefit for some groups)		
Folic acid	Neural tube defects in baby	Women planning or capable of pregnancy		
Tamoxifen/raloxifene	Breast cancer	Women at high risk for breast cancer		
Vitamin D	Fracture/falls	>64 at increased risk for falls		

For many screening tests and preventive interventions, the balance of benefits and harms may be uncertain for the average-risk population but more favorable for individuals at higher risk for disease. Although age is the most commonly used risk factor for determining screening and prevention recommendations, the USPSTF also recommends some screening tests in populations based upon the presence of other risk factors for the disease. In addition, being at increased risk for the disease often supports initiating screening at an earlier age than that recommended for the average-risk population. For example, when there is a significant family history of colon cancer, it is prudent to initiate screening 10 years before the age at which the youngest family member was diagnosed with cancer.

Although informed consent is important for all aspects of medical care, shared decision-making may be a particularly important approach to decisions about preventive services when the benefit-to-harm ratio is uncertain for a specific population. For example, many expert groups, including the American Cancer Society, recommend an individualized discussion about prostate cancer screening, because the decision-making process is complex and relies heavily on personal issues. Some men may decline screening, whereas others may be more willing to accept the risks of an early detection strategy. Recent analysis suggests that many men may be better off not screening for prostate cancer because watchful waiting was the preferred strategy when quality-adjusted life-years were considered. Another example of shared decision-making involves the choice of techniques for colon cancer screening **(Chap. 70)**. In controlled studies, the use of annual FOBT reduces colon cancer deaths by 15–30%. Flexible sigmoidoscopy reduces

colon cancer deaths by ~40–60%. Colonoscopy appears to offer a greater benefit than flexible sigmoidoscopy with a reduction in risk of ~70%, but its use incurs additional costs and risks. These screening procedures have not been compared directly in the same population, but models suggest that appropriate frequencies of each technique may be associated with similar numbers of lives saved and cost to society per life saved ($10,000–25,000). Thus, although one patient may prefer the ease of preparation, less time disruption, and the lower risk of flexible sigmoidoscopy, others may prefer the sedation, thoroughness, and time interval of colonoscopy.

COUNSELING ON HEALTHY BEHAVIORS

In considering the impact of preventive services, it is important to recognize that tobacco and alcohol use, diet, and exercise constitute the vast majority of factors that influence preventable deaths in developed countries. Perhaps the single greatest preventive health care measure is to help patients quit smoking **(Chap. 454)**. However, efforts in these areas frequently require behavior changes (e.g., weight loss, exercise) or the management of addictive conditions (e.g., tobacco and alcohol use) that are often recalcitrant to intervention. Although these are challenging problems, evidence strongly supports the role of counseling by health care providers **(Table 6-6)** in effecting health behavior change. Educational campaigns, public policy changes, and community-based interventions have also proven to be important parts of a strategy for addressing these factors in some settings. Although the USPSTF found that the evidence was conclusive to recommend a relatively small set of counseling activities, counseling in areas such as physical activity and injury prevention (including seat belts and bicycle and motorcycle helmets) has become a routine part of primary care practice.

TABLE 6-6

Preventive Counseling Recommended by the U.S. Preventive Services Task Force (USPSTF)

TOPIC	CHAPTER REFERENCE
Alcohol and drug use	**453, 456, 457**
Genetic counseling for *BRCA1/2* testing among women at increased risk for deleterious mutations	**79, 467**
Nutrition and diet	**332, 333**
Sexually transmitted infections	**136, 202**
Sun exposure	**61**
Tobacco use	**454**

IMPLEMENTING DISEASE PREVENTION AND SCREENING

The implementation of disease prevention and screening strategies in practice is challenging. A number of techniques can assist physicians with the delivery of these services. An appropriately configured electronic health record can provide reminder systems that make it easier for physicians to track and meet guidelines. Some systems give patients secure access to their medical records, providing an additional means to enhance adherence to routine screening. Systems that provide nurses and other staff with standing orders are effective for immunizations. The USPSTF has developed flow sheets and electronic tools to assist clinicians (*https://www.uspreventiveservicestaskforce.org/uspstf/information-health-professionals*). Many of these tools use age categories to help guide implementation. Age-specific recommendations for screening and counseling are summarized in **Table 6-7**.

TABLE 6-7

Age-Specific Causes of Mortality and Corresponding Preventive Options

AGE GROUP	LEADING CAUSES OF AGE-SPECIFIC MORTALITY	SCREENING PREVENTION INTERVENTIONS TO CONSIDER FOR EACH SPECIFIC POPULATION
15–24	1. Accident 2. Homicide 3. Suicide 4. Malignancy 5. Heart disease	• Counseling on routine seat belt use, bicycle/motorcycle/ATV helmets (1) • Counseling on diet and exercise (5) • Discuss dangers of alcohol use while driving, swimming, boating (1) • Assess and update vaccination status (tetanus, diphtheria, hepatitis B, MMR, rubella, varicella, meningitis, HPV) • Ask about gun use and/or gun possession (2,3) • Assess for substance abuse history including alcohol (2,3) • Screen for domestic violence (2,3) • Screen for depression and/or suicidal/homicidal ideation (2,3) • Pap smear for cervical cancer screening after age 21 (4) • Discuss skin, breast awareness, and testicular self-examinations (4) • Recommend UV light avoidance and regular sunscreen use (4) • Measurement of blood pressure, height, weight, and body mass index (5) • Discuss health risks of tobacco use, consider emphasis on cosmetic and economic issues to improve quit rates for younger smokers (4,5) • Chlamydia and gonorrhea screening and contraceptive counseling for sexually active females, discuss STD prevention • Hepatitis B, and syphilis testing if there is high-risk sexual behavior(s) or any prior history of sexually transmitted disease • Hepatitis C screening starting at age 18 to 79 HIV testing • Continue annual influenza vaccination
25–44	1. Accident 2. Malignancy 3. Heart disease 4. Suicide 5. Homicide 6. HIV	*As above plus consider the following:* • Readdress smoking status, encourage cessation at every visit (2,3) • Obtain detailed family history of malignancies and begin early screening/prevention program if patient is at significant increased risk (2) • Assess all cardiac risk factors (including screening for diabetes and hyperlipidemia) and consider primary prevention with aspirin for patients at >3% 5-year risk of a vascular event (3) and statin therapy for higher risk patients • Assess for chronic alcohol abuse, risk factors for viral hepatitis, or other risks for development of chronic liver disease • Consider individualized breast cancer screening with mammography at age 40 (2)
45–64	1. Malignancy 2. Heart disease 3. Accident 4. Diabetes mellitus 5. Cerebrovascular disease 6. Chronic lower respiratory disease 7. Chronic liver disease and cirrhosis	• Consider prostate cancer screen with annual PSA and digital rectal examination at age 50 (or possibly earlier in African Americans or patients with family history) (1) • Begin colorectal cancer screening at age 45 or 50 with fecal occult blood testing, flexible sigmoidoscopy, or colonoscopy (1) • Reassess and update vaccination status at age 50 and vaccinate all smokers against *Streptococcus pneumoniae* at age 50 (6) • Consider screening for coronary disease in higher-risk patients (2,5) • Zoster vaccination at age 60 • Begin mammography screening by age 50 • Lung cancer screening at age 50 to 80 years if a 20 pack-year smoking history and currently smoke or have

	8. Suicide	quit within the past 15 years, yearly.
≥65	1. Heart disease 2. Malignancy 3. Cerebrovascular disease 4. Chronic lower respiratory disease 5. Alzheimer's disease 6. Influenza and pneumonia 7. Diabetes mellitus 8. Kidney disease 9. Accidents 10. Septicemia	*As above plus consider the following:* • Readdress smoking status, encourage cessation at every visit (1,2,3,4) • One-time ultrasound for AAA in men 65–75 who have ever smoked • Consider pulmonary function testing for all long-term smokers to assess for development of chronic obstructive pulmonary disease (4,6) • Screen all postmenopausal women (and all men with risk factors) for osteoporosis • Continue annual influenza vaccination and vaccinate against *S. pneumoniae* at age 65 (4,6) • Screen for visual and hearing problems, home safety issues, and elder abuse (9) • Consider fall prevention exercise intervention if at higher risk (9)

Note: The numbers in parentheses refer to areas of risk in the mortality column affected by the specified intervention.

Abbreviations: AAA, abdominal aortic aneurysm; ATV, all-terrain vehicle; HPV, human papillomavirus; MMR, measles-mumps-rubella; PSA, prostate-specific antigen; STD, sexually transmitted disease; UV, ultraviolet.

Many patients see a physician for ongoing care of chronic illnesses, and this visit provides an opportunity to include a "measure of prevention" for other health problems. For example, a patient seen for management of hypertension or diabetes can have breast cancer screening incorporated into one visit and a discussion about colon cancer screening at the next visit. Other patients may respond more favorably to a clearly defined visit that addresses all relevant screening and prevention interventions. Because of age or comorbidities, it may be appropriate with some patients to abandon certain screening and prevention activities, although there are fewer data about when to "sunset" these services. For many screening tests, the benefit of screening does not accrue until 5–10 years of follow-up, and there are generally few data to support continuing screening for most diseases past age 75. In addition, for patients with advanced diseases and limited life expectancy, there is considerable benefit from shifting the focus from screening procedures to the conditions and interventions more likely to affect quality and length of life.

FURTHER READING

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