
Interventions for Health Promotion

2. Screening

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Abstract:

As a method of preclinical secondary prevention, screening is the rapid administration of a simple test to distinguish individuals who may have a condition from those who probably do not have a condition. It can be an effective, efficient tool in preventive health care if used for conditions applicable to the screening model and directed toward an at-risk population. A unique characteristic and significant advantage of screening is that it can be applied to individuals and groups. Three questions provide a means of analyzing the screen ability of a disease:

1. Is the condition is significant?
2. Can screening for the condition be done?
3. Should screening for the condition be done?

Screening programs are not appropriate for all conditions or all communities. Alternative methods of reaching the desired health outcome should always be considered. Screening in health care presents numerous roles for health care workers and provides them with a valuable preventive tool in the care of healthy individuals.

Keywords: screening, prevention, health care, disease.

Introduction:

Screening has received growing recognition as a valuable tool for health care professionals, particularly as health care delivery moves toward preventive interventions. The primary objective of screening is the detection of a disease in its early stages, to treat it and defer its progression. The basic assumption guiding this process is that detection during the early asymptomatic period allows treatment at a time when the course of the disease can be altered significantly. The screening concept is based on the principle that disease is preceded by a period of asymptomatic pathogenesis (disease development) when risk factors predisposing a person to the pathological condition are building momentum toward manifestation of the disease. Screening takes advantage of the early pathogenic state. The administration of tests during this stage identifies specific variables that distinguish individuals who most likely have the condition from those do not. Screening is not considered a diagnostic measure; it is seen as a preliminary step to direct a health care provider in assessment of the ostensibly healthy individual's chances of becoming unhealthy. The ultimate goal could be curative, but more often it is to prevent further development of the disease or to ameliorate the

possible outcomes. A second, but equally important, objective of screening is to reduce the costs of managing the disease by avoiding the more vigorous interventions required during its later stages. The added attraction of a cost-conscious approach to health care mandates that health care professionals at all levels acquire a basic understanding of the screening process and its application.

Ethical Considerations:

A step taken toward improving health usually is deemed a just and moral act within the health care system's values. However, when approaching health care practices with a more critical eye and realizing that not all the results of a well-intended practice are beneficial, the need to balance the benefit against the detriment becomes an issue. The resulting decision process becomes a value judgment and an ethical issue.¹

Health Care Ethics:

A screening program is in a category separate from interventions offered for established disease processes. Rather than receiving those who have performed a self-assessment and elected to enter the system, a screening program invites apparently well individuals to

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be tested to determine disease risk and the need for follow-up. The request for participation implies that a health benefit will be derived, although at this stage nothing is said about what it will be or what the consumer must do to obtain it. Program planning that attempts to clarify this implication and inform participants of the issues develops the basis for an ethically sound project and enhances the screen ability of the disease.

Most screening programs are called *hypertension screening or diabetic screening*; therefore, it is not surprising that participants enter them assuming the results received are diagnostic and will classify them as disease free or disease laden. This is untrue, because the screening goal is only identification and referral of individuals at risk or who may need further follow up or evaluation. The initial presentation of and contact with the program implies a benefit not being delivered. To alleviate this problem, the planning committee should develop a method of informing participants of the meaning and limitations of the results. Participants need to know whether the ultimate benefit is preventive, ameliorative, or curative and, most importantly, what responsibility they must assume to secure this outcome.

Misinterpretation caused by the screening instrument is of even greater ethical concern than human misperception. As the information on sensitivity and specificity indices, false-positive and false-negative results occur with any screening instrument. One of the more difficult ethical issues in screening is to evaluate whether the benefits received by those who receive correct results are worth the problems experienced by those who receive incorrect results. What obligation does the project have to the latter?

What is an acceptable number of people with false-negative test results, all of whom will both miss the benefit of early treatment and be misled about the need for tests in the near future? What will be the response of an individual who has a false-positive reaction? Answers to these questions are value judgments that vary according to the disease.

Additional issues that confound the medical ethics of screening are cut off points for the screening instrument and borderline cases. How precisely do the instrument's numerical

values define the high-risk disease state? The goal of a screening program, identifying an individual as high risk or not, depends on this numerical value. When the parameter for this distinction is not clear, a cutoff point is set. Above this point, the individual is considered disease positive; below this point, the individual is disease negative. Consequently, readjusting the cutoff becomes a highly controversial issue, because it controls the percentage of positive and negative results. If the disease were potentially life threatening an increase in false-positive (lower cutoff point) would be preferred to missing individuals who may have the disease. In addition, if a disease is relatively benign in terms of potential stigmatization, anxiety, and problems with treatment, lowering the cutoff point could be safe and ethical.²⁻³

A problem closely related to the cutoff point is defining a policy for borderline cases. Hypertension is a common disease in which a variance of 5 to 10 mmHg can make the difference in labeling a person as high risk or not. A more sophisticated approach may be taken to discriminate between a borderline case that should be referred and one that should not. The health professional can specify other risk factors associated with hypertension, such as family history, diet, and smoking, as criteria contributing to the decision to refer an individual. With the increasing interest in and knowledge of risk factors, the effectiveness of this method has improved.

The medical ethics of screening will continue to demand review of the questions and issues; however, the answers may change as more is discovered about the various conditions and their treatments. An updated literature review is imperative before reviewing these issues in relation to a particular screenable disease.⁴

Economical Ethics:

Associating a monetary value with health care outcomes is generally against the nature and ideals of health care professionals. In the past the tendency was to place no limits on the cost of promoting a healthy, disease-free or disease-controlled status, resulting in a philosophy that all care should be given to all people at all costs. This philosophy has evolved to one of conscious recognition of the costs of screening programs. Allocating community funds to a screening program could result in a lack of funds for other projects. Those benefiting from

a screening test will be countered by those suffering from a lack of service for other medical or social needs. These trade-offs result in ethical decisions demanding careful analysis by the screening administration.

Screening can be a costly project for both organizers and consumers. Initial operational costs must be considered, including buying or renting the screening instruments, renting floor space, engaging professionals or technicians to administer the tests, and interpreting the results. These costs are encountered again when people are referred for further evaluation. Consumer costs include follow-up visits, treatment, time, and income that is lost while complying with each. Given the combined operational and consumer costs, several questions are raised. Do the costs result in the desired health outcome to the individual, group, or community? Are the benefits reaped worth the expenditure required?

When program designs are being considered with screening, three main approaches may be used to evaluate the economic resources affected: (1) cost-benefit ratio, (2) cost-effectiveness, and (3) cost-efficiency analysis.⁵⁻⁶

Cost-Benefit Ratio:

Cost-benefit ratio analysis is performed first, because it allows the comparison of various outcomes in monetary values.⁷ The comparison is necessary in health planning when the initial consideration is which health outcome, such as reduction of cardiovascular disease, decreased infant mortality, or reduction of a visual problem, will be most beneficial to the community at the more reasonable cost.

Cost-Effectiveness:

If the reduction of cardiovascular disease is chosen as the desired outcome, the next step is a cost-effectiveness analysis, which determines the optimal use of resources to reach a predetermined constant end point of the desired health outcome.⁷ The outcome remains the same; the best method of deriving it is the issue. For example, considering the selected health outcome, such as the reduction of cardiovascular disease, various methods might be used. These methods include screening for hypertension, performing electrocardiograms on all individuals aged 25 or older who are admitted to the hospital, beginning an

antismoking campaign, or obtaining nutrition counseling. Implementation of all these options would be ideal, but with limited resources a choice must be made.

Cost-Efficiency

The last approach to help bring the economic resources into perspective is cost-efficiency analysis. The purpose is to be efficient and budget a limited amount of money toward achieving as much of the desired outcome as possible. The funds are the central issue, not health benefit.

Selection of a Screenable Population:

The selection of a screenable population is as important as the selection of a screenable disease. The objective is to identify a high-risk group that, when tested, will yield a significant number of diseased individuals. With such results, the efforts and cost of screening the population are minimized and the health benefit received is maximized. The main criterion used to define an appropriate population is the definitive presence of risk factors related to the disorder. To ensure a thorough examination of possible risk factors, both person-dependent and environment-dependent factors should be reviewed.

Person-Dependent Factors:

One characteristic related to the person, age, is increasingly important because its distribution changes throughout the population. Practice has always placed a high priority on screening the vulnerable, at-risk infant population, partly because of the health outcomes that affect the child's growth and development. As the average life span increases, however, the effects of longer-range risk factors are becoming apparent, making certain prevalent and costly chronic conditions equally important to control. Therefore ideal populations for screening can be found in senior citizen housing projects or elderly day-care settings. Middle-aged adults are also being recognized as a screenable group for certain conditions, such as breast cancer, glaucoma, and heart disease, which commonly appear during this period. Gender has obvious implications for screening programs. For example, women are tested commonly for two conditions, breast cancer and cervical cancer.⁸⁻¹⁰

A population representing a particular ethnic or racial group is also appropriate to consider

when planning screening programs. *Race* refers to a biologically related group of people whose features are inherited.¹¹ It is known that some disorders occur more frequently in certain racial or ethnic groups. For example, Africans Americans have a higher prevalence of and mortality rate from hypertension and cancer of the prostate than whites, and Native Americans have higher rates of diabetes than do other cultural groups.¹¹⁻¹⁷

Although these health disparities are of great concern, their cause is not easy to ascertain. It is believed that these differences are actually the result of complex interactions among genetic variations, environmental factors, and health behaviors.^{11,17}

Income level has been associated repeatedly with the presence or absence of a healthy state, and it underlies many health disparities. Often lower-income groups have the least education. Such differences in both income and education are associated with disparities in the occurrence of disorders, including heart disease, diabetes, obesity, elevated blood lead levels, and low birth weight. Poverty accompanies poor environmental conditions, inadequate housing, occupational hazards, violence, unemployment, and limited access to health care.^{8,18}

Personal behavioral characteristics related to lifestyle may suggest the need to screen an individual or group. When health care practitioners consider lifestyle, they are looking at daily habits that affect health and wellness, such as diet, exercise, smoking, alcohol, and drug use, stress management, and use of seat belts. Engaging in some of these behaviors while avoiding others is essential for living a healthy life. Therefore screening for those personal behavioral characteristics that are considered risky suggests the likelihood of a longer, disease-free life. Once screening suggests those behaviors that are considered risky, the development of healthy behaviors via programming and a conscious transformation in lifestyle is key.

Health care providers bear a responsibility to educate individuals about the next step in the evaluation of their potential condition once a screening is completed. Those being screened

bear a responsibility to seek treatment, follow up, and ultimately engage in behavioral change toward a healthy lifestyle if the screening is to serve a purpose.

Environment-Dependent Factors:

The area of environmental health and protection has expanded over the years and is becoming more complex. Environmental health and protection has been defined as that science which is concerned with elements of the environment that influence people's health and wellbeing. These factors include conditions of the workplace, home, and communities including chemical, physical, and psychological forces.¹⁶ Environment-related risk factors relevant to screening designs are derived from an individual's surroundings. Areas that may be considered include overpopulation; indoor and outdoor air pollution; water pollution; safe drinking water; noise pollution; radiation exposure; biological pollutants; hazardous waste management and disposal garbage; vector and pesticide control; deforestation, wetlands destruction, and desertification; energy depletion; inadequate housing; contaminated food and foods with toxic additives; safety in the home, worksite, and community; and psychological hazards.¹¹

In Occupational health, a legitimate population for screening is in the high-risk work area, where harmful chemicals, airborne particles, or high-decibel machinery put the worker at risk of cancer, respiratory conditions, or auditory problems. At the other extreme is the sedentary executive work life, in which stress and lack of exercise are prevalent. The use of an occupational health nurse to provide individual and mass screening for such problems is recognized as an integral role by both the health professions and the business world.

Environment-dependent factors have long been associated with the presence or absence of certain conditions. Primary prevention would be the preferred mode of protection; considering the shortsightedness of present society, secondary prevention appears to be the preferred choice. Screening must be focused on the short-term results of certain environmental conditions and on monitoring the long-term trends.

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