
Interventions for Health Promotion

1. 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 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 who 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.

Advantages and the Disadvantages of Screening:

Preclinical illness and previously unrecognized disease in individuals may be detected via screening efforts.¹⁻⁴ Screening tests offer several advantages. They are often simple, and frequently a trained technician administers them. The simplicity of the screening procedure decreases the time and cost of involved health care personnel and enables less skilled technician to administer the test. This also reduces cost and permits the more appropriate use of highly skilled costly professionals at the definite, diagnostic tests.

A second advantage is the ability to apply the screening process to both individuals and large groups. In an individual screening program, one person is tested by a health professional who has designated the individual as high. The practitioner can make this selection independently, the health care agency can

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define a specific policy, or a legislation body can require the screening body law as in the case of phenylketonuria (PKU) or lead-screening programs. Group or mass screening occurs when a target population is selected on the basis of an increased incidence of a condition or a recognized element of high risk within the group. An example of this would be lower-income populations or cultural groups that exhibit a significant prevalence of a particular condition, such as hypertension.

A third advantage is the ability to provide one-test specific screening or multiple test screenings. A one-test disease-specific screening is the administration of a single test that searches for a characteristic that indicates a high risk of developing a disorder. An example of this would be blood pressure screening to evaluate the risk of hypertension. Multiple test screening is the administration of two or more tests to detect more than one disease. In some cases, one sample can be used to evaluate the possibility of several conditions, saving time and money and making the process efficient and economical. For example, a blood sample can be evaluated for both elevated glucose and cholesterol levels. Ultimately, the combination of the relatively low cost and flexibility of a screening test makes screening adaptable to all levels of the health care delivery system.

The disadvantage of screening stem largely from the imperfection of modern science, which results in a margin of error for most instruments and tests. When program effectiveness depends on the test's ability to distinguish those who probably do have the disease from those who do not, the margin of error can precipitate serious consequences. Some individuals who do not have the condition will be referred for further tests and some who do have the disease will not. Those incorrectly referred suffer needless anxiety while awaiting more definitive diagnostic procedures. They must also bear the burden of the cost, follow-up visits, lost time, and inconvenience.

The effects on those whose disorders have been missed are even more important. These individuals leave with a false sense of a healthful state that will be shattered eventually, and they lose the opportunity to receive early treatment that could prevent irreversible damage. The difficulty of balancing the

benefits to some against the losses to others in an ethical issue of most screening programs. The significance of this disadvantage can vary; therefore, it should be assessed for each project, disease, and population.

Selection of a Screenable Disease:

The selection of a screenable disease goes beyond examination of the disease alone. The selection process must also encompass less tangible factors, such as the emotional and financial impact of the disease's detection on the screened population. Even after gathering data and reviewing the critical issues, the final decision to screen or not to screen must often be reached with incomplete evidence or with answers that raise ethical issues. The potential uncertainties confounding the decision emphasize the need to conduct an exhaustive analysis of available material to obtain a decision that is as objective and scientific as possible. The answers to the following three questions provide a basis for designating a disease as screenable or not screenable:

1. Does the significance of the disorder warrants consideration as a community problem?
2. Can the disease be detected by screening?
3. Should screening for the disease be done?

As simplistic as these questions may appear, the answers or lack of answers may expose numerous complex issues that determine whether or not a well-informed decision can be made on screenability.

Significance:

The significance of a disease refers to the level of priority assigned to the disease as a public health concern. Although the opinions of political and public interest groups may enter into the evaluation, significance generally is determined by the quantity and quality of life affected by the disorder. The greater the physical and psychological harm experienced by the population, the greater is the need to designate the disease as a priority health problem. The first step in assigning screenability is evaluation of this significance to decide if the disorder warrants the time, effort, and funds that must be allocated. Estimating the quality of life affected by a disease presents a problem. The perception of quality is subjective and individual evaluations may differ. For example, not all people equally perceive the disability resulting from a disease; some make adjustments and cope, whereas

others do not. Those who do not would be more likely to say that the quality of their lives is significantly lower than that of the people around them.⁵⁻⁷

By contrast, measures of the quantity of life affected by the disease are more readily obtainable. Disease-specific mortality rates present one picture of this effect, whereas prevalence and incidence rates provide another. Prevalence is the proportion of existing cases during a specific time; incidence is the frequency of new cases during a specified period.⁸ Usually chronic conditions are measured by their prevalence, whereas acute conditions are assessed by their incidence.

In this area of cost-conscious health care, a new dimension has been added to the evaluation of significance: the cost required to treat the disease. In some cases the prevalence of the disorder may not be great, but the problem requires disproportionate amounts spent on maintenance or management after the condition is fully expressed. For example, with PKU the incidence is not significant, but the cost of a case undetected at birth is a lifetime of case management. Given the costly outcome if undetected and the reasonable price of the test itself, the cost of screening all newborns is nominal.

Can the Disease Be Detected by Screening?

With the relative significance of the disease established, the next step is to determine if health professionals can screen for the disease. Do well-documented diagnostic criteria for the disorder exist? .to support a screening program?

Diagnostic Criteria:

Detection of a disease requires knowledge of characteristics that indicate its presence or, as in screening, its early pathogenic, asymptomatic state. Selected diagnostic criteria should be well documented; they should not be merely accepted or commonly used indicators. The impact of uncertainty in detecting disease is amplified when considering the application of the screening design. Some diseases, such as sickle cell anemia, are defined by the presence or absence of a single, isolated factor. Other conditions, such as hypertension, are indicated by the measurement of statistically derived numerical values for which a normal range has been set.

Disagreement over the parameters of the normal range, combined with contentions that what is abnormal for one individual may not be abnormal for another, make these conditions more controversial to designate as screenable diseases.

Screening Instruments:

The next step is to determine if methods exist to detect the disease during early pathogenesis. If instruments are available, a careful analysis should determine if any of them fulfill the requirements for the screening process: safe, cost-effective, and accurate. Ultimately the question is how well the instrument can distinguish those individuals who probably do not have and will not develop the condition from those who are likely to develop it. The variables that aid in instrument evaluation include reliability and validity.

Reliability:

Reliability is an assessment of the reproducibility of the test's results when different individuals with the same level of skill perform the test during different periods and under different conditions. If the same result emerges when two individuals perform the test, inter-observer reliability is shown. If the same individual is able to reproduce the results several times, intra-observer reliability is shown. Therefore testing for instrument reliability can yield data on the accuracy and quality of the test.⁹

Validity:

Validity reflects the test's ability to distinguish correctly between diseased and non-diseased individuals, or the accuracy of the test.^{7,10} In a controlled setting, validity is evaluated by testing the instrument on a group of individuals who have positive or negative results. The ideal result is to have the instrument pick out 100% of the disease people (positive reactions) and 100% of the nondiseased people (negative reactions). Such accuracy rarely occurs in practice; therefore, the measure of validity has been divided into two components that quantify the margin of error in the screening instrument.

Sensitivity measures the first component. This refers to the proportion of people with a condition who correctly test positive when screened. A test with poor sensitivity will miss individuals with the condition and there will be a large number of false-negative test results;

individuals actually have the condition but were told they are disease free.

Specificity measures the test's ability to recognize negative reactions of non-diseased individuals. A test with poor specificity will result in false-positive test results. Individuals with false-positive test results are told that they have a condition when in actuality they do not. The issues emerging from investigation of the screening instrument demonstrate the significant influence it has on the entire process. Data on the reliability and validity of the test and screening programs in general provide valuable information to evaluate anticipate, and ideally control these influences, enabling the program to work effectively toward its goal.

Community Resources:

Implementing a screening program depends on availability of appropriate community resources, such as funds, health care workers, follow-through, treatment resources, and administrative personnel. Judicious organization of the overall programs key to its success. Knowledge of the disease's characteristics and the screening instrument are useless without financial and organized human support to apply it. The overall approach is complex, requiring intense efforts in the area of partnership development.

A lead agency is identified to oversee the development process of the community health program. For the lead agency to develop and develop a screening program, partnerships are essential. The agency must contact and organize necessary stakeholders. Examples of stakeholders include key community organizations including houses of workshop, community centers, schools, transportation agencies, and volunteer organizations. Key community individuals are those who are considered leaders within the community.

Should Screening for the Disease Be Done?

After determining that the disease is significant and can be screened for, establishing whether health professionals should do so is the final step. Screening for a particular disorder and ultimately treating those with the early-identified disorder should improve the chances of a favorable outcome in comparison with those whose disorder is not found until signs

and symptoms become evident. Therefore, several questions must be considered. If a test is accurate in the identification of a condition in the early stages, is there any benefit to the individual? Are there effective treatment modalities for the condition?

Interventions and Treatment Modalities:

Screening is based on the disease's asymptomatic period; therefore, adequate information must exist concerning (1) the optimal time for screening, (2) specific intervention during this time, and (3) knowledge as to the effect of early detection and treatment on the prognosis. Without this knowledge, health care professionals are unable to explain how the consequences of the detected disease differ from those undetected. They can neither evaluate nor explain the health benefits derived from the screening program.

Not intervening can be almost as detrimental as the adverse effects of a disorder. In this situation, not only has the program misled the screened population that has a health benefit will result from their efforts, but the development and implementation of the screening program has used both personal and community resources that can not possibly alter the course of a particular disease.

Follow-up is critical to determine if intervention strategies prescribed are in fact taking place. The prescribed regimen may be very broad and include a wide variety of intervention strategies such as diet, exercise, and drug therapy. Follow up may include an evaluation and review of the literature that discusses evidence-based practice pertaining to a particular drug, as well as identification of intervention characteristics that impair follow-up, such as cost, inconvenience, or side effects. Safety of the intervention is a concern when considering the widespread application of a remedy after a screening program. Risks or harmful side effects can be costly in terms of human health and the increased medical care required to correct the iatrogenic effects resulting from the intervention. Health care professionals must decide if these risks significantly diminish the success of the treatment and outweigh the benefits derived from the treatment.

References:

1. Anderson, E. & Mc Farlane J. Community as partner: Theory and practice in nursing. New York: Lippincott. Williams & Wilkin. 2000.
2. American Cancer Society. Colorectal cancer: early detection. <http://www.cancer.org/docroot/home/index.asp>. 2000.
3. Centers for Disease Control and Prevention. Lead fact sheet. 2004. <http://www.cdc.gov/exposurereport/2nd/lead-factsheet.htm>.
4. Centers for Disease Control and Prevention. The adult blood lead level epidemiology and surveillance program. 2004. [Http://www.cdc.gov/niosh/ables.html](http://www.cdc.gov/niosh/ables.html).
5. National Cancer Institute. Prostate cancer: Screening and testing. 2004 <http://www.nci.nih.gov/cancerinfo/screening/prostate>.
6. U.S. Department of Health and Human Services. National Institute of Health, National Heart, Lung and Blood Pressure. Seventh report of the Joint National Committee: On prevention, detection, evaluation, and treatment of high blood pressure. 2004. <http://nhlbi.nih.gov/guidelines/> hypertension.
7. Sackett, D., Straus, S., Richardson, W., et al. Evidence-based medicine: How to practice and teach EBM. NEW York: Church Livingstone. 2000.
8. Lundy, K. & Janes, S. Community health nursing: Caring for the public's health. Boston: Jones and Bartlett.
9. Polit, D., Beck, C., & Hungler, B. Essentials of nursing research: Methods, appraisal, and Utilization. New York: Church Livingstone. 2000.
10. U.S. Preventive Services Task Forces. Guide to clinical preventive services. Baltimore: Williams & Wilkins.1996.