

Review (Narrative)

Preventive Strategies in Medicine

Cancer Screening

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SUMMARY

The early detection of cancer by screening has been shown to decrease both cancer incidence and cancer mortality and is an important part of primary care practice. There are several important issues to consider when screening for cancer. Are the treatments for cancer acceptable, feasible and effective and for patients in this age group? How often does screening lead to further evaluation, such as breast biopsy after mammography, which may prove unnecessary, yet result in morbidity? Finally, does screening improve the quality of life and functional status of older adults? Cancer screening is an evolving technology, and therefore the role that psychologists will play can change with advances in biomedicine. One vital future direction is that the use of risk-stratified screening; potentially reducing harms by targeting screening to groups that stand to achieve more. Screening for certain types of cancer can decrease disease-related mortality. When making any decision about cancer screening, physicians must weigh the risks and benefits for each patient. These risks and benefits include factors such as co-morbid diseases and associated life expectancy, the feasibility of surgical intervention, the acceptability of cancer treatments, and, most important for the elderly, the effects of screening and the resulting diagnostic evaluations and therapies on the quality of life.■

KEYWORDS Preventive medicine; Cancer screening; Evidence-based medicine; Mortality; Survival rate

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Up till the later part of twentieth century cancer was only diagnosed if symptoms of tumor growth were observed. In many of these cases the cancer would have spread already, limiting the efficiency of radiological and surgical treatment. Even today Systematic presentation is predominant way to treat all sorts of cancer, but tests have been developed that identify tissue changes that result from early stage tumor or cancer precursors. When precursor stage is recognized, removal of affected tissue stops the further development of cancer; this method of prevention is called primary prevention.

CANCER SCREENING IN PATIENTS

The early detection of cancer by screening has been shown to decrease both cancer incidence and cancer mortality and is an important part of primary care practice.

These characteristics of a disease determine whether it is appropriate for screening or not.

- The disease should have a high prevalence among those screened.
- It should have serious consequences.
- It should have a pre clinically detectable phase.
- The disease should have a treatment that, when applied to pre symptomatic disease, is more effective than if applied after symptoms develop.
- The tests used should be simple, inexpensive, and acceptable with a high sensitivity and specificity.

There are several important issues to consider when screening for cancer. Are the treatments for cancer acceptable, feasible and effective and for patients in this age group? How often does screening lead to further evaluation, such as breast biopsy after mammography, which may prove unnecessary, yet result in morbidity? Finally, does screening improve the quality of life and functional status of older adults?

SCREENING FOR CERVICAL CANCER

Cervical cancer continues to be the third commonest feminine cancer worldwide (International Agency for analysis on Cancer, World Health Organization (1). However, incidence and mortality rates have reduced dramatically in countries that offer screening; and also the reductions are even more prominent when one takes under consideration the raised exposure to cervical cancer risk factors that followed the sexual revolution of the Nineteen Sixties (2). Cytological examination of exfoliat-

ed cells from the cervix (the Pap test or Papanicolaou) continues to be the most widely used test, primarily centered on detecting very early neoplastic changes, and termed pre cancers. If abnormalities are detected, the smear test is followed up with a colposcopy examination, and in some cases biopsy, to confirm the grade of disease. Treatment involves removal of abnormal cells utilizing excisional or destructive techniques (3). the discovery that infection with high-risk human papillomavirus (HPV) is the primary reason for cervical cancer (4) has been one of the greatest breakthroughs in cancer analysis, for which Harald zur hausen won the Nobel prize in 2008. It paved the path for the development of vaccines to stop HPV infection (5; 6), which can ultimately reduce the requirement for frequent screening and can even eradicate the sickness. Testing for HPV deoxyribonucleic acid within the cervix is also being introduced both as a primary screen and to triage women with abnormal cytology. HPV testing has the extra advantage that tissue samples will be self-collected and send for analysis; probably reducing a number of the barriers to cervical screening uptake, notably in less developed countries. The suggested age range for and frequency of cervical screening vary internationally, however screening sometimes begins between the ages of twenty and thirty years and is repeated every 3–5 years till ages 60–65 (7). There are not any randomized controlled trials (RCTs) of the efficacy of smear test screening, however the well-understood course of the sickness, the acceptability and safety of the test to spot precancerous changes, the provision of effective and low risk treatment for pre cancers, and also the reduction in incidence that followed the introduction of screening together make it one of the most productive of all cancer screening strategies.

SCREENING FOR PROSTATE CANCER

Prostate cancer occupies an important position within the screening spectrum. It is the second most typical cancer in men worldwide (9), and also the second most typical reason for male cancer death in several countries (10; 11). A biopsy measuring blood serum levels of prostate specific antigen (PSA) is commonly used as an indicator of prostate cancer risk, alongside a digital rectal examination to assess the prostate. This is often followed up with a biopsy if the prostate specific antigen test and the digital rectal examination suggest high risk. However, several prostate cancers are slowing growing and unlikely to

cause issues within a man's lifespan, whereas treatments for prostate cancer have significant negative side effects. The USPSTF has thus recently suggested against screening, suggesting that "the benefits of PSA-based screening for prostate cancer, as presently used and studied in randomized, controlled trials, don't outweigh the harms" (12). Given the high rates of prostate specific antigen testing in the US (41% of men over the age of fifty reported having a recent prostate specific antigen test; 13), adherence to the new recommendation can involve substantial behavior modification. Prostate specific antigen testing isn't suggested in the UK, however asymptomatic men can discuss prostate specific antigen testing with their medical care doctors, and once they perceive the risks, could elect to have the test. Uptake rates in the UK are considerably less than those in the United States; one study found that 6 percent of men ages 45–89 years had had a prostate specific antigen test in 2007 (14).

SCREENING FOR COLORECTAL CANCER

Colorectal cancer (CRC) is the third most common cancer worldwide when both sexes are considered together (15). The incidence increases markedly with age, with the highest in persons aged 85 years and older. Important risk factors include inflammatory bowel disease, familial polyposis, a family history of colorectal cancer, and a personal history of breast, endometrial, or ovarian cancer. Approximately 58,300 deaths from colorectal cancer are expected to occur in 1992; substantial morbidity includes that related to colostomies, surgical therapy, radiation therapy, and chemotherapy. The treatment of early-stage disease is associated with a better prognosis than that of late-stage disease. Those who present with localized disease have a 74% ten-year survival rate, as compared with those who present with disseminated disease, who have a 5% ten-year survival rate. Colorectal cancer does have a preclinical phase-localized disease, such as polyp or adenoma-that can be detected by screening. The central issue in screening for colorectal cancer involves the screening. Ideally a screening test should be simple, inexpensive, and acceptable. The screening tests available for colorectal cancer include fecal occult blood testing, digital rectal examination, and various types of sigmoidoscopy. The digital rectal examination is simple and acceptable, but only about 10% of colorectal cancers develop in the area that can be reached by an examining finger. Even if the digital rectal examination was extremely sen-

sitive, 90% of cases of colorectal cancer would be missed using this method alone. Fecal occult blood testing is simple, cheap, and acceptable but has a high false-positive rate. It has been estimated that from 1% to 5% of unselected persons will have a positive fecal occult blood test. Of those with positive tests, 10% will have cancer and 20% to 30% will have adenomas. The positive predictive value of fecal occult blood testing for detecting cancer has been estimated at 5% to 10%. Because about 20 ml of blood loss per day is needed for a persistently positive fecal occult blood test, there is a high false-negative rate as well. At present, clinical trials are evaluating the effectiveness of fecal occult blood testing in reducing mortality. Visual examination of the colon is the most effective way of detecting colon cancer. Sigmoidoscopy and colonoscopy have disadvantages, especially like patient discomfort. In addition, because most colonic polyps will not develop into malignancy, there is a high false-positive rate. Perforation, although rare, is a serious iatrogenic complication. Finally, sigmoidoscopy is expensive, and the cost of doing annual sigmoidoscopies in all persons older than 50 would be prohibitive. At present, there is no direct evidence to support or refute screening for colorectal cancer, although indirect evidence suggests that screening with various tests can decrease the disease-related incidence and mortality. Eddy presents a mathematical model of screening in which performing endoscopic evaluation or barium enema at three- to five-year intervals preserves 90% of the effectiveness of annual examinations with much less costly and less inconvenience." Because of the absence of clear evidence, decisions about colorectal cancer screening should be made on an individual basis. There are several important factors to consider. First, what effect will a diagnosis of colon cancer have on a person's quality of life and functional status? The early diagnosis of colon cancer in an otherwise healthy 75-year-old man will probably have more effect on quality of life than a similar diagnosis in a person with end-stage congestive heart failure. Second, because any positive screening test will lead to further evaluation, such as flexible sigmoidoscopy after a positive fecal occult blood test, how acceptable is that for the patient? Third, if cancer is discovered, are the treatment options, such as surgery or chemotherapy, acceptable, feasible, and effective? Finally, the screening threshold should probably be lower for persons at higher risk for colorectal cancer, for example, those with a posi-

tive family history or a history of inflammatory bowel disease.

Screening individuals at higher risk of colorectal cancer is going to be more practical and cost-efficient than screening the general population. High-risk people are classified into many categories. However, very little specific knowledge exists to evaluate interventions in most of these categories, and expert opinion is usually the guide for high-risk screening protocols

SCREENING FOR BREAST CANCER

Breast cancer is the most typically diagnosed cancer in women worldwide (15), and its incidence in several wealthy developed nations is rising, partly as a consequence of changes in reproductive practices and lifestyle however probably also as a result of detection of early breast cancers through screening. The sole widely suggested screening check is mammography, which uses x-rays of the breasts to find tumors before they become palpable lumps. (16) Eleven RCTs of mammography were carried out between the year 1963 and 1991 in North America, the UK and Scandinavia. Meta analyses have principally found that the relative risk reduction for breast cancer mortality related to mammography is around 20 percent given adequate follow-up (17), however there's very little proof of any impact on all-cause mortality and much debate concerning the balance of harms and benefits (18).

Most guidelines advocate that breast screening ought to start around age fifty and continue till around age seventy, with a recommended frequency of one to three years (19). Survival rates have improved where breast screening is introduced, however reductions in breast cancer mortality haven't been as high as expected; indicating that a proportion – and a few would argue a considerable proportion – of the screen-detected breast cancers might be described as “over diagnosis.” Given the intensive surgical, chemotherapy and radiotherapy protocols that are used for breast cancer treatment, the numbers of women are “over treated” has raised significant concern within the oncology community.

SCREENING FOR LUNG AND OVARIAN

There have been active research efforts to develop various screening tests, with ovarian and lung cancer being vital targets. Lung cancer is the commonest reason for cancer death worldwide It's typically diagnosed in its late

stages, once prognosis is poor, and early identification has the potential for significant health benefits. Trials of lung cancer screening include the utilization of low-dose computerized tomography (CT) scans, sputum cytology and chest x-rays, with efforts centered on high-risk groups like smokers and individuals with pre-existent lung illness (20; 21; 22). A recent review of low-dose CT screening concluded that it's going to be beneficial for very high-risk people however that the harms aren't well understood (23). The USPSTF has recently suggested annual screening for 55–80year-olds with a history of smoking (24).

Ovarian cancer is one among the rarer female cancers, however it generally presents at a complicated stage with a very poor survival rate, making it the seventh commonest reason for cancer death in women worldwide but the fourth and fifth commonest within the UK and the US, respectively (25; 26). As the survival rate is good if the illness is detected early, there has been a long-standing interest in utilizing transvaginal ultrasonography or serum levels of the tumor marker CA125 to provide a sign of illness before symptoms are manifest. However, though there's some proof for a survival benefit in screen-detected cases, the most important randomised trial so far found no reduction in mortality (27). There was also significant morbidity as a consequence of follow-up investigations for women with false positive findings. The USPSTF has thus consistently suggested against population-based screening, though research efforts are ongoing to enhance the screening technology and to risk-stratify the population and screen solely higher risk individuals for whom the risk/benefit payoff is also higher (28).

FUTURE DIRECTIONS

Cancer screening is an evolving technology, and therefore the role that psychologists will play can change with advances in biomedicine. One vital future direction is that the use of risk-stratified screening; potentially reducing harms by targeting screening to groups that stand to achieve more. This could be novel in the United Kingdom's system of national provision of screening (currently restricted solely by age and sex). It might seem to be more compatible with the U.S. approach in which discussions with a provider already include consideration of risk, though the risk stratification algorithms for population screening won't essentially map onto individuals'

Table 1. Screening Strategies for Common Cancers

Screening Procedures	AGE					
	21-29	30-39	40-49	50-59	60-74	75 & older
Women						
<u>Breast Cancer:</u> Mammography	Depending upon risk factors and family history		Annually or shared decision-making	Every 1-2 years		Consider continuing if life expectancy > 10 years
<u>Cervical Cancer:</u> Pap Smear	Every 3 years with cytology only	Every 3 years with cytology or every 5 years with combination cytology and HPV testing			Discontinue >65, not at ↑ risk for CA, with 3 consecutive neg cytology or 2 consecutive neg co-tests within past 10 yrs, with most recent test within past 5 yrs	
Men						
<u>Prostate Cancer:</u> Prostate specific antigen and digital rectal examination			If African-American or family history of prostate cancer, shared decision-making	Either: • No screening • Shared decision-making if life expectancy >10 years		
Both Men & Women						
<u>Colon Cancer, either:</u> Colonoscopy Flexible sigmoidoscopy with high sensitivity FOBT High sensitivity FOBT	Earlier and more frequently based on risk factors			Every 10 years	Flex. sig. every 5 yrs & HS FOBT every 3 years	Annually

sense of raised risk. (PROSPR) Population-based research Optimizing Screening through personalized Regimens is a National Cancer Institute-sponsored research initiative taking the above-mentioned approach. In one study, participants used touchscreen computers to assist them to assess their own risks of CRC using questions on family history and health, and also the program made a recommendation for the sort of CRC screening. Studies in the UK are employing a combination of, life-course, genetic and family-risk data to provide risk-stratified screening for breast (29) and ovarian cancer (PROMISE) (30). These initiatives raise problems that psychology is well placed to analyze, including the social and psychological consequences and public understanding of risk information, of being diagnosed as having higher versus lower risk, and the implications for preventive behaviors (31). Psychological expertise might also facilitate to spot strategies of framing and presenting risk information to enhance understanding, promote healthy behavior modification, and minimize distress.

Combining cancer prevention education with screening is another likely development. Screening makes cancer notably salient and will thus provide a chance for alternative prevention or early detection advice (32; 33). The term teachable moment is widely utilized in this regard (34; 35), though research has yet to define its parameters and verify whether or not data is best transmitted before or after the screening result, whether or not it should be specific to the cancer under consideration or general, and whether or not it should focus solely on early detection or include primary prevention through life-style modification. There are some small-scale studies demonstrating the utility of preventive advice given along screening (36; 37), however there's significant scope to take benefit of screening as an opportunity to engage with face-to-face education briefly on primary and secondary prevention.

CONCLUSIONS

Screening for certain types of cancer can decrease disease-related mortality. Although cancer is common in older persons, most studies of cancer screening have been done in younger populations. While awaiting the results of prospective trials of cancer screening in an older population, we can carefully extrapolate the results of cancer screening in younger populations. Available data suggest that screening for breast cancer and cervical cancer can substantially reduce disease-related mortality. Although conclusive data are lacking about the efficacy of screening for prostate cancer, because of its high incidence, it is probably reasonable to do an annual rectal examination, especially in high-risk persons. Screening for lung cancer has been shown not to alter outcomes, and hence the routine screening of asymptomatic persons is not recom-

mended. The early detection of colorectal cancer can improve the outcome, but the available screening tests have several limitations, including high false-positive rates, costs, and patient discomfort. Hence, decisions about colorectal cancer screening should be made on an individual basis. For ovarian cancer, there is no evidence that the detection of early disease by screening is associated with better results. When making any decision about cancer screening, physicians must weigh the risks and benefits for each patient. These risks and benefits include factors such as co-morbid diseases and associated life expectancy, the feasibility of surgical intervention, the acceptability of cancer treatments, and, most important for the elderly, the effects of screening and the resulting diagnostic evaluations and therapies on the quality of life. ■

ARTICLE INFORMATION

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