Promoting Cancer Screening: Lessons Learned and Future Directions for Research and Practice

Supplement to ***Cancer***

Examining the Cost-Effectiveness of Cancer Screening Promotion

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Cost-effectiveness analyses (CEAs) can help to quantify the contribution of the promotion of a screening program to increased participation in screening. The cost-effectiveness (C/E) of screening promotion depends in large part on the endpoints of interest. At the most fundamental level, the C/E of a strategy for promoting screening would focus on the attendance rate, or cost per person screened, and the C/E would be influenced by the costs of promotion, as well as by the size and responsiveness of the target population. In addition, the costs of screening promotion (measured as the cost per additional participant in screening) can be included in a CEA estimate of the screening technology. In this case, depending on the efficacy of the screening test and the costs and influence of the promotion, the C/E of screening may improve or become poorer. In the current study, the authors reviewed the literature on the C/E of cancer screening promotion. The following lessons were learned regarding the C/E of screening and its promotion: 1) high-quality information on the C/E of screening is increasingly available; 2) cost-effective promotion of screening is dependent on cost-effective screening strategies; 3) quality-of-life effects may be important in assessing the overall C/E of screening programs; 4) research efforts aimed at identifying cost-effective approaches to screening promotion are useful but sparse; 5) C/E studies should be better incorporated into well designed effectiveness research efforts; 6) variations in C/E according to intervention characteristics, population characteristics, and context should be evaluated in greater depth; 7) the long-term effects of screening promotion are critical to assessing C/E; 8) the effects of promotion on costs of screening must be better understood; and 9) CEA must be interpreted in light of other information. The authors showed that CEA can be a valuable tool for understanding the merits of health promotion interventions and that CEA is particularly valuable in identifying screening strategies that might be promoted most cost-effectively. ***Cancer* 2004;101(5 Suppl):1229–38.**
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Cost-effectiveness analysis (CEA) is used to compare resource expenditures, other costs, and health benefits associated with myriad, often competing, public health and health care interventions.[1] CEA can be a useful adjunct to efficacy and effectiveness studies that quantify screening program outcomes or that assess the impact of promotional efforts aimed at increasing participation in screening by members of a target population. Unlike most efficacy or effectiveness studies, CEA takes costs into account and gauges benefits in terms of life years gained or quality-adjusted life years (QALYs) gained.

The current article describes lessons learned regarding the cost-

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effectiveness (C/E) of interventions aimed at promoting cancer screening. Because the C/E of promotion programs includes the C/E of the cancer screening strategy being promoted, the article also discusses the C/E of screening.

CEA

CEA examines the relative efficiency of various strategies for achieving health benefits and thus guides resource allocation, allowing decision-makers to choose strategies that maximize health improvements achieved for a given level of resource use. Strategies for reducing disease incidence, morbidity, and mortality can be compared when analyses use the same measure of C/E and comparable methods. The measure most frequently recommended is the cost per year of life saved adjusted for quality of life (QOL).[1] Occasionally, an intervention produces sufficient savings (e.g., in terms of treatment costs) to offset the costs of the intervention. In such cases, the intervention is said to be *cost saving*,[1,2] i.e., it both saves money and improves health relative to some alternative. More commonly, a C/E ratio is calculated that measures the cost per quality-adjusted life year saved (QALYS). A new strategy is said to be cost effective if it yields an additional benefit that is worth the additional cost, relative to a defined baseline, over a defined period. An intervention need not be cost saving to be cost effective. Many excellent references exist for conducting and interpreting CEA.[1–9]

CEA is most useful to policymakers when results are reported in terms of cost per QALYS,[10] because this measure can be compared among widely varying health interventions. The perspective of the primary analysis should be that of society rather than that of an interested party, such as a payer who does not bear all the costs and benefits. The goal is to compare the C/E of a screening program and its promotion with the C/E of other approaches aimed at improving health. In other words, an intervention such as cancer screening or its promotion should be pursued if that intervention provides more QALYs for a given investment than would another medical procedure or public health intervention that people generally agree should be available.

Economic analyses that have a narrower perspective (including only some of the relevant costs and benefits) can also be useful. They can provide useful estimates of program costs, such as the costs of achieving certain outcomes (e.g., cost per additional screening participant) or marginal or incremental costs associated with the comparison of two or more programs without regard to effectiveness. Economic analyses that have a payer's perspective also may be useful to decision-makers in particular organizations, such as health maintenance organizations (HMOs), insurance companies, or health departments, by providing specific information regarding the influence of particular choices on the costs and benefits affecting those organizations. Economic analyses performed from the payer's perspective, however, are not sufficient for guiding resource allocation, because they ignore important societal costs and benefits.

C/E of Cancer Screening and its Promotion

C/E of screening

The C/E of screening is expressed as a ratio that measures the cost per QALYS attributable to screening. The numerator (*net money cost*) is the cost of the screening plus the cost of other activities triggered by screening (such as diagnostic workup and treatment) less any applicable savings (such as lower treatment costs attributable to earlier diagnosis). Workup and treatment costs are not limited to those who have cancer. For example, workup of false-positive test results can generate appreciable costs. The denominator in this ratio (*effectiveness*) comprises the QALYS attributable to earlier diagnosis and treatment in the same population as well as any net loss in survival or QOL that is attributable to the risks associated with screening, diagnosis, or treatment. This factor should include the applicable negative consequences of screening, diagnosis, and follow-up for the numerous individuals who will be screened but be found not to have cancer.

C/E of screening promotion

Even with aggressive promotion of screening, both to physicians and to the general public, most screening technologies are not used fully by the individuals most likely to benefit from them.[11–14] In many cases, screening promotion is essential to ensure that those who could benefit from the screening program become aware of and participate in screening. To quantify the true C/E of any screening program, promotion costs should therefore be included. The cost analysis of a promotion program—in terms of cost per additional individual screened—is also valuable for comparing different ways of promoting a specific screening intervention. Such analyses identify more and less cost-effective methods for promoting a particular form of screening and provide detailed insights regarding ways to enhance the C/E of cancer screening promotion.

Assessment of the C/E of screening promotion requires an additional step beyond assessing the C/E of the screening technology itself. This additional step involves the evaluation of the effect of the promotion

TABLE 1
Lessons Learned Regarding the Cost-Effectiveness of Cancer Screening Promotion

Lesson 1: High-quality information regarding the C/E of screening is increasingly available, permitting identification of cancer screening strategies suitable for promotion.
Lesson 2: Cost-effective promotion of screening requires that one choose cost-effective screening strategies to promote.
Lesson 3: Quality-of-life effects are important in assessing the overall C/E of cancer screening and screening promotion programs.
Lesson 4: Research efforts that identify cost-effective approaches to screening promotion are useful, but to date, little work has been performed in this area.
Lesson 5: Studies evaluating the effectiveness of cancer screening promotion programs should include C/E in their design.
Lesson 6: The C/E of promotional efforts must be considered in the context of the populations that have been studied.
Lesson 7: One must consider long-term effects to determine the true C/E of screening promotion programs.

C/E: cost-effectiveness.

effort on participation in screening relative to the cost of the promotion, thus yielding an estimate of the cost per additional screening participant. These costs must be added to the numerator of the C/E equation for screening. The increased population of individuals participating in screening becomes the basis for calculating benefits in determining the C/E of the screening program. The baseline for the comparative analysis reflects participation in screening in the absence of the promotion program. Table 1 presents a list of seven lessons learned concerning the C/E of cancer screening promotion.

LESSONS LEARNED

Lesson 1: High-Quality Information Regarding the C/E of Screening is Increasingly Available, Permitting Identification of Cancer Screening Strategies Suitable for Promotion

Not all effective screening technologies are cost-effective, and not all interventions shown to be cost-effective in specific populations and used at specific frequencies will be cost-effective when applied in other situations or contexts. Several authors and organizations[6–8] have conducted independent reviews of the C/E of screening as well as other clinical and public health interventions. Information is available regarding the C/E of screening tests for breast,[15–17] cervical,[18,19] and colon[20–22] cancers. Although most CEAs of screening for a particular cancer reach similar conclusions when evaluating the same technologies on similar schedules in comparable populations, CEAs can differ considerably due to model inputs (e.g., estimates of costs, screening performance, benefits, and adjustments) and population characteristics (e.g., age and risk factors). For example, estimates of the C/E of a screening test per year of life saved will vary based on the underlying prevalence of disease, screening performance in different age or risk groups, and the potential number of years of life gained. Therefore, although screening may be cost-effective over a broad age range, the C/E of screening may vary considerably across age and risk groups within a population for which screening is recommended.[1,6–8]

Screening for cervical cancer by Papanicolaou (Pap) smear is generally considered both effective and cost-effective for women across a wide range of risk groups. However, the C/E of Pap smears is determined, in part, by the frequency with which women receive the test; i.e., more frequent screening is less cost-effective.[19]

Colon cancer screening is cost-effective in average-risk populations (i.e, individuals age $\geq$ 50 years). Moreover, all of the screening technologies currently available appear to have similar C/E ratios when compared with no screening, even though the tests differ in cost, efficacy, and frequency of application. There is less agreement regarding the C/E of various types of screening when populations that vary in terms of risk and age characteristics are compared and when different screening schedules are considered.[20]

As screening technologies improve and their delivery methods evolve, estimates will evolve regarding the effectiveness and C/E of screening for various types of cancers in specific subpopulations. The C/E of using new technologies for cervical cancer screening currently is being evaluated.[18,23,24] Similarly, strategies for using multimodal screening—in which a relatively simple yet sensitive test, such as the fecal occult blood test, is used to identify persons requiring a second, more costly test using a different screening modality (such as colonoscopy)—could improve specificity and C/E. Additional multimodal strategies for screening are also being evaluated.[25–27]

Lesson 2: Cost-Effective Promotion of Screening Requires That One Choose Cost-Effective Screening Strategies To Promote

Screening promotion generally adds to costs per screen and cannot increase the effectiveness of a screening technology on a per screen basis. Therefore, an intervention promoting a screening technology with marginal C/E would not be considered particularly cost effective no matter how cost effective that intervention was per additional person recruited to participate in the screening program. Promotion of more cost-effective forms of screening is more likely to be considered cost effective, even if the promotion program itself is more costly per additional person

screened. Similarly, initial and infrequent screens, although not optimally effective, can be especially cost-effective and may save more years of life at lower cost than frequent repeat tests for a single individual.[2,19,28–30] Therefore, promotions aimed at increasing the percentage of individuals screened, even if they are screened infrequently and not according to recommendations, can be more cost effective than promotions aimed at increasing the frequency of use among patients already being screened at regular but suboptimal intervals.[31] Initial and infrequent screens, although not optimally effective, can be especially cost effective and may save more years of life at lower cost compared with frequent repeat tests for a given individual.[2,19,28–30]

Lesson 3: QOL Effects Are Important in Assessing the Overall C/E of Cancer Screening and Screening Promotion Programs

Health promotion, disease prevention, and medical treatment are effective not only when they reduce mortality but also when they improve health-related QOL. Health-related QOL is a broad concept that encompasses very different health states and the health outcomes of widely varying interventions aimed at improving health.[32] It is an important outcome measure by which to assess the effectiveness of medical interventions, including screening. QOL is incorporated into CEA by adjusting the effects of an intervention in terms of years of life gained to account for QOL effects. Measures of QOL that are suitable for making such adjustments are called *utility measures.* C/E assessments that include this adjustment are referred to as cost-utility analyses.[1]

QOL adjustment incorporates benefits of cancer screening that accrue when early detection reduces the negative consequences of cancer (e.g., by reducing pain) or permits less toxic or debilitating cancer treatments, even in the absence of a survival benefit. Including these benefits in the analysis therefore improves the C/E of screening. Conversely, QOL adjustment reduces the C/E of screening when screening, early diagnosis, or treatment has adverse effects. This could occur if the screen-detected cancer would not have progressed within the patient's lifetime or could not be treated effectively.[33–38] Any form of cancer screening will lead to false-positive results. In a population with a low pretest probability of cancer, even very specific and sensitive cancer screening tests will produce false-positive test results more often than they will yield true-positive results.[19,39] False-positive test results may increase individuals' concerns regarding cancer and therefore reduce QOL at least temporarily.[40–45]

Comprehensive QOL adjustment would also include the effects of screening and its promotion on people who are screened but do not develop cancer. People are generally enthusiastic about the opportunity to be screened.[46] This suggests that they find screening to have some intrinsic benefits. Among individuals in whom true-negative findings are noted, the screening experience may be predominantly reassuring, reducing the level of concern regarding cancer risk and allowing individuals to feel that they are taking actions to protect their health. However, screening may have negative effects on QOL if it is inconvenient, awkward, painful, or anxiety provoking. Although these reassurance- and anxiety-related effects are presumably small, they occur in a large number of individuals. The promotion of screening may exacerbate these psychologic effects, which therefore are potentially relevant to the cost-utility of screening promotion programs. Promotion strategies could increase confidence in the effectiveness of screening and thus enhance patients' feelings of reassurance, whereas strategies that rely on a fear-based message may be particularly likely to create feelings of anxiety, affecting even those who fail to seek screening after being exposed to a promotional campaign. Again, such effects are presumably small, but because of the number of individuals affected by them, even small QOL effects related to screening participation and screening promotion may have a considerable influence on the overall QOL effects exerted by a particular program.[19,47]

We do not know whether the potential psychologic effects of screening and promotion are large enough to affect the overall cost-utility of a screening program. Nonetheless, we can estimate the magnitude of the effect that screening and promotion would have to exert on QOL for that effect to influence the overall C/E of the screening and promotion programs. For example, approximately one in nine women will have breast cancer in her lifetime. Therefore, when women are screened, most receive no medical benefit from screening, because they will never develop breast cancer. The number of life years saved per case by annual mammographic screening in women ages 50–85 years has been estimated to be approximately 0.81 years (unpublished data) (range, 1.69–0.46 years).[48] Based on this estimate, a screening program might be estimated to save 0.09 years per screening program participant or 0.003 years per year of participation, assuming 30 years of participation in screening (i.e., participation from age 50 years to age 80 years). Even a small reassurance effect might be sufficient to increase these benefits substantially. In the general population, screening-induced reductions in levels of can-

cer-related concern or other improvements in health-related QOL would represent a substantial proportion of the effect of a mammographic screening program on QALYs (equal to 0.3% if this effect was continuous over 30 years of screening participation). Studies aimed at examining the effects of cancer-related concern on an individual's health-related QOL would be of considerable value in determining the importance of a screening program's design and promotion and the effects of these features on cancer-related concern.

Currently, research is relatively sparse on the effects of screening and of the cascade of diagnosis and treatment triggered by screening, especially among individuals who are ultimately found not to have cancer. Even less is known concerning the QOL effects of promotion interventions on the total target population. Such information is necessary to conduct a truly comprehensive assessment of the QOL effects of a program of cancer screening and screening promotion. Because the effects of screening on QOL could have important effects on the overall C/E of a screening program, these effects warrant further research aimed at more accurate assessment of the total public health effects of both cancer screening and screening promotion.

Lesson 4: Research Efforts That Identify Cost-Effective Approaches to Screening Promotion Are Useful, but to Date, Little Work Has Been Performed in This Area

Approaches to promote participation in screening have been discussed elsewhere in the current supplement.[49–51]

Interventions directed toward patients

Studies have evaluated the effectiveness of various forms of reminder systems in various settings. Some such studies have reported the costs of screening promotion–related reminders.[52,53] Reports on the costs of other types of interventions aimed at promoting screening to individuals are rare.

Interventions aimed at changing physicians' behavior

Physician endorsement, recommendation, or prescription of screening for a specific patient and the physician's willingness and/or ability to provide screening during an office visit are strong predictors of screening use.[54,55] Provider support or endorsement is usually necessary for the creation or promotion of a screening program. Many interventions have been made to encourage physicians to promote screening. The C/E of these interventions has not been reported.

Health care system interventions

A limited number of studies have evaluated the C/E of system strategies used by clinics, hospitals, or HMOs to promote screening. (See also Zapka and Lemon[51] in the current supplement.) For instance, in an Australian study, the incremental C/E of 'flagging charts', which were designed to remind physicians to perform cervical cancer screening, was reported to be $15.40 per additional screen received.[56] In that particular study, however, the intervention was less effective and less cost-effective than reminders aimed directly at patients.[56,57]

Policy approaches, including strategies to improve access

These approaches, with or without interventions, are conceptually important areas for research and practice,[49,58] but empiric data regarding C/E are limited at present.

Community-oriented approaches

Community-based efforts to promote screening have different strengths and weaknesses compared with health care system–based approaches. Untargeted approaches, such as media campaigns, may show modest effects compared with interventions in self-selected individuals or organizational improvements that target the delivery of patient care.[59] The costs associated with individually targeted intervention activities conducted in communities tend to be higher per person targeted compared with similar health care system–based interventions. This difference is due in part to the availability and use of preexisting systems in health care system–based approaches that facilitate the identification of eligible individuals in need of intervention. Nonetheless, the aggregate size of the effects of community interventions can be large, depending on the number of persons reached. Moreover, community interventions can reach individuals who do not have routine contact with the health care system.

Despite the importance of examining the C/E of cancer screening promotion, only a modest number of studies have collected and reported pertinent data.[57,60–67] One study involving a CEA with cost per year of life saved as its endpoint is the Community Trial of Mammography Promotion (CTMP).[68] That study illustrates some of the methodologic aspects of CEA and several issues regarding the C/E of community-based screening promotion interventions and their assessment. Its purpose was to evaluate the effectiveness and C/E of 3 strategies for the promotion of mammography among women ages 50–80 years in rural communities; these strategies were individual

counseling, community activities, and a combination of the two.[68–70] In the individual counseling intervention, volunteer peer counselors telephoned women in their community and used barrier-specific telephone counseling to promote mammography use.[63] In the community activities intervention, volunteers distributed a community newsletter, presented information at community gatherings, and distributed various items (e.g., pencils) imprinted with messages regarding the benefits of mammography.

Overall, mammography use increased by 2.5%, 1.6%, and 2.0% in the community activities, individual counseling, and combined arms, respectively. Including all societal costs, the average cost of promotion was $49 per eligible woman living in a community in which community activity interventions were performed, yielding an estimated cost of $1953 for each additional mammography user associated with the program. Of the promotional approaches that were investigated, the community activities strategy was the most cost-effective approach for the population as a whole. Although improvements were not as great in the individual counseling arm, the individual counseling intervention was more effective for women who were not using mammography at baseline, and the costs of individual counseling were lower.[69]

The cost per additional woman screened must be interpreted in the context of a screening program. After calculating the C/E of the study interventions in terms of cost per additional user of mammography, each intervention's cost and effectiveness were included in a microsimulation model of the C/E of breast cancer screening for women age > 50 years, an age range that is consistent with the population investigated in the CTMP. The community activities intervention for promotion of mammography to women age > 50 years was associated with a cost per additional year of life saved of approximately $56,000—a cost that is within the range of what many consider to be cost-effective.[60]

In terms of the percentage increase in mammography use per person in the population, the effects of the community intervention were modest, and the costs per additional mammography participant were high. However, the screening that was promoted—mammograms every 2 years for women age > 50 years—is itself cost effective. If a less cost-effective screening strategy (e.g., annual screening) had been promoted, the estimated C/E of the screening promotion program would be much lower, even if the cost per additional woman screened were the same.

Taplin et al.[52] and Davis et al.[62] have also reported the effectiveness and C/E of postal and telephone reminders and of an HMO's efforts to provide tailored counseling to promote mammography use among its members. Using data from an effectiveness trial in which telephone reminders were more effective than either tailored counseling or mailed reminders,[52] Taplin and colleagues found that a simple reminder postcard was the most cost-effective way to increase mammography screening.[53] A motivational counseling phone call was of intermediate effectiveness and was more costly than a simple reminder phone call. Therefore, it was not recommended as being cost effective. The simple reminder phone call was more effective than a mailed reminder in motivating enrollees in a health plan to schedule mammography appointments, but the phone calls were more costly than reminder postcards. The estimated cost to a health plan per additional woman scheduled was $22 for a reminder postcard and $92 for a reminder telephone call to women who had received previous mammograms but who did not schedule a screening mammogram within 2 months after receiving a reminder letter.

Another study[61] found that in-person and telephone counseling accompanied by a reminder letter were similarly effective and cost-effective ways to increase mammography use by patients in a health care system. Given the similar effectiveness of in-person and telephone counseling accompanied by reminder letters, the authors noted that the most cost-effective method for a particular organization may well depend on what specific resources are available and/or underused.

Lesson 5: Studies Evaluating the Effectiveness of Cancer Screening Promotion Programs Should Include C/E in Their Design

The CTMP[68,69] and Taplin et al.[52] illustrate the importance of conducting C/E studies in tandem with research designed to test the effectiveness of alternative promotion strategies. Such information can influence study findings and provide important information beyond what is yielded by analyses of effectiveness. It is, for example, possible that the most effective intervention is not the most cost-effective if another effective intervention is sufficiently less costly. Such information is particularly vital to some decision-makers, because promotional activities are often considered to represent an 'overhead' cost that cannot be recouped through billing for screening services.

Lesson 6: The C/E of Promotional Efforts Must Be Considered in the Context of the Populations That Have Been Studied

Cancer screening rates and the effectiveness of particular screening promotion programs are likely to differ

from population to population according to race and ethnicity, income and education, insurance status, and rural or urban residency, among other characteristics.[11,12] Furthermore, the costs of intervention will also vary according to these characteristics. Some populations are likely to require more intensive and costly interventions than others. Therefore, no particular method of screening promotion is likely to be equally effective or cost-effective for all populations. Unfortunately, few studies have examined whether the C/E of promotion interventions varies according to contextual factors. These issues should be investigated more thoroughly and reported in CEAs whenever possible.

The development and use of screening promotion interventions designed specifically to reach individuals in groups that face a common barrier to screening may lead to identification of interventions that are also more effective and cost-effective for specific populations.

Some individuals may remain noncompliant with cancer screening recommendations despite having routine contact with the health care system. CEA can be used to identify the most efficient means of recruiting these individuals into screening programs. For example, in the previously discussed study conducted by Taplin et al.,[52] the reminder call was notably more effective than a postcard among women who had not received previous mammograms. This finding inspired the authors to estimate the marginal C/E of the same interventions for women who had not received a previous mammogram (specifically, $70 for the postcard and $100 for the reminder call); per woman scheduled although these costs are higher than those estimated for women who had received a previous mammogram, they represent the costs of promoting mammography to a group of special importance if the goal of screening is to reduce breast cancer mortality.

Efforts to provide intensive screening and to promote screening use among high-risk populations may be cost effective even if these efforts are more costly than similar efforts targeting persons at average risk, because the rates of cancer incidence in such groups are higher. This is true, however, only if both promotion and screening are effective in these high-risk groups and if the increased C/E of screening in a high-risk population (or the improved effectiveness of efforts to promote screening to such groups based on their high-risk status) outweighs the additional costs associated with identifying and targeting high-risk individuals. Such costs can be substantial.

Lesson 7: One Must Consider Long-Term Effects To Determine the True C/E of Screening Promotion Programs

To interpret the results of the CTMP study described in Lesson 4,[68] assumptions were made regarding the frequency with which the promotion effort had to be repeated over a woman's lifetime to maintain the observed gain in screening use. In CEAs, the uncertainty surrounding such assumptions is accounted for using sensitivity analyses that quantify the effects of changes in assumptions. Sensitivity analyses can highlight the importance of specific parameters in understanding the C/E of screening and of screening promotion programs. In this case, the CEA model was very sensitive to changes in assumptions regarding the need to repeat the program. If the intervention worked as designed, women recruited to undergo mammography would be expected to continue to use mammography regularly without further intervention. Therefore, the promotion costs would be incurred only once in a woman's life. The effects of most screening promotion interventions, however, tend to be short lived. If the promotion program had to be repeated every few years to maintain the observed effects, the cost per year of life saved associated with the program would be much higher, easily exceeding the upper limit of what is commonly considered to be cost effective.

Long-term follow-up studies that examine the effects of community-based screening promotion efforts are likely to be large, difficult, and expensive. However, such studies may be necessary to understand potentially important effects of screening promotion, particularly when sensitivity analyses suggest that they substantially affect results and conclusions.

OTHER ISSUES

Does Promotion Always Add to the Cost of Screening?

Both screening and the promotion of screening programs can be costly.[52] Although the interpretation of how much expense is worthwhile varies, promotion of a screening program adds to the costs of the program. In theory, however, promotion programs might actually lower the marginal cost (i.e., the cost per individual) of screening if promotion increases demand to the level at which economies of scale can be realized in the production of screening services. To our knowledge, the effect of screening promotion programs on the marginal cost of screening has not been documented in the literature.

How Should Equity and Fairness be Considered in Screening Promotion?

The ultimate users of C/E studies are policymakers. Efficiency of resource allocation, however, is not nec-

essarily their only, or even their primary, concern. Decision-makers must also take other issues into account, including issues of equity, distributional justice, individual preferences for specific procedures and policies, feasibility of implementation, and emotional reactions and responses associated with specific diseases. Distributional justice (i.e., equitable distribution of costs and benefits) is a particularly important issue. Decision-makers will frequently have to consider whether it is appropriate to invest more in the promotion of screening for certain populations, given that 1) promotion is essential to ensure the use of screening by members of those groups and 2) screening is essential to ensure equitable health outcomes.

Private individuals also make daily decisions regarding their personal resources and their interest in health care interventions, including cancer screening and related procedures. The many concerns of decision-makers suggest that cost per year of life saved and cost per QALYS are unlikely to ever be the primary measures used to determine appropriate health care resource use and expenditure. Policymakers for various federal and private organizations, in conjunction with the public, ultimately decide how society allocates resources for health care and health promotion. Researchers examining the C/E of screening and interventions aimed at screening promotion can only hope that the data they provide will prove useful to decision-makers in developing rational policies that maximize public health in ways that are consistent with public values.

CONCLUSIONS

CEA can be a valuable tool for understanding the relative merits of various interventions, such as cancer screening, aimed at promoting health and preventing disease. In the context of cancer screening, CEA is particularly useful for helping to identify screening strategies that may be worthy of promotional efforts. In addition, CEA can highlight the various costs of screening and promotion programs, including not only financial costs but also opportunity costs and potentially important QOL effects. Furthermore, costs included in CEA calculations may correspond to barriers to potential program implementation; thus, interventions may be easier to execute if they are designed to be cost effective.

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Ⅲ. 研究成果に関する刊行物等

研究成果の刊行に関する一覧表

書籍

著者	タイトル	編集者	書籍名	発行	発行年	ページ
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