

# Overcoming Barriers to Cancer Screening: A Case Study in Colorectal Cancer

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Colorectal cancer is the third most common and deadly cancer in the US, exceeded only by lung and prostate cancer in men and lung and breast cancer in women.<sup>1</sup> The disease accounts for about 60,000 deaths annually in the US alone. Hence, the US Preventive Services Task Force (USPSTF) has placed a high priority on colorectal cancer screening giving it an “A” recommendation for screening persons aged 50 and older.<sup>2,3</sup> Programs promoting efficient and effective screening can improve screening rates, which in turn helps meet public health goals, improve health and save money. The importance of screening for cancer as a component of evidence-based medicine is well documented, and the economic rationale has been proven by Andersen et al.<sup>4</sup> Breast,<sup>5,6</sup> cervical,<sup>7</sup> colorectal<sup>8,9</sup> and prostate<sup>10</sup> are among the cancers that benefit from population-based screening and early detection. However, screening for colorectal cancer is

generally perceived by patients to be more unpleasant than most other types of cancer screening. As a result, colorectal cancer has performed particularly poorly in terms of cancer screening rates.

Americans are generally able to access some type of affordable colorectal cancer screening. In 1998, Medicare began to provide reimbursement for annual fecal occult blood tests (FOBT) and for flexible sigmoidoscopies every four years, and it further extended coverage for average-risk beneficiaries in 2001. Most private payers and other government programs also cover the screening. There is evidence that the medical community has moved toward colonoscopy as the preferred strategy due to its proven cost effectiveness<sup>12</sup> in reducing the incidence of disease through the removal of abnormal growths of tissue that may be cancerous (adenomatous polyps).<sup>13</sup> The cancer detection rate is also significant, as colonoscopies can detect between

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76% and 90% of colorectal cancers.<sup>14</sup>

There are three other key approaches that must be taken to advance colorectal cancer screening. First, public awareness of colorectal screening must be increased, as people may not get screened because they have personal aversions to some types of cancer screening or do not understand the importance of screening for their own health. Second, strategies for improving screening compliance among reticent groups of patients must be devised. Third, cost-effective screening promotion must be grounded in rational cost-effective screening strategies, and screening for colorectal cancer is considered relatively cost-effective.<sup>2</sup> To date, efforts aimed at identifying cost-effective approaches to screening promotion have been few and far between.<sup>15</sup> Standardization of outcomes metrics and development of league tables are essential to meaningful comparisons across available cancer screening promotion programs.

## Colorectal Cancer Screening – A Case Study

This section presents a case study using studies by Dolan,<sup>19</sup> Ferreira<sup>20</sup> and Wolf<sup>21</sup> that are particularly relevant to an understanding of the barriers, efficacy, costs and benefits relating to colorectal cancer prevention and detection in the Veterans Administration (VA) health system. The VA provides an ideal setting in which to assess screening promotion because it is the largest integrated delivery system in the US, offers national data on screening and has adopted an electronic medical record. Its predominately male patient population is

characterized by low health-related literacy and low socioeconomic status. Moreover, these patients have guaranteed access to health care and no cost barriers.

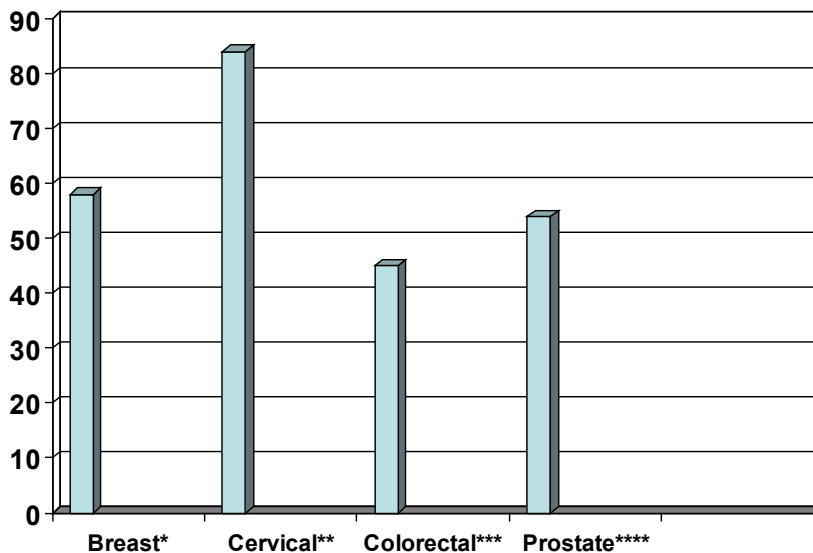
Colorectal cancer screening rates are particularly low among certain subgroups of the population. Nationally, low utilization rates of colorectal cancer screening have been associated with patient-related factors such as poor socioeconomic status, racial/ethnic minority status and low levels of education, as well as physician-related factors that include failure to remember to offer colorectal cancer screening or lack of time to discuss screening during office visits for general medical problems. Among lower socioeconomic status populations, screening rates are estimated to range from 10% using the standard FOBT<sup>22</sup> to 5% with flexible sigmoidoscopy.<sup>23,24</sup> This is considerably lower than the estimated 40% to 50% rate for the population as a whole, suggesting lack of patient understanding, interest and aversion to screening.

The VA population's screening options are based on the 1996 USPSTF findings that FOBT, flexible sigmoidoscopy, contrast barium enema and colonoscopy are effective. But there is insufficient evidence to determine the best single screening approach. Colorectal cancer screening is underused in the VA, just as it underused is among the entire US population (Figure 1). Screening uptake rates are well behind those of other types of cancer.

## Aversion to the Screening Test

The preparation and invasiveness of endoscopic screening tests for colorectal cancer are considerably more off-putting than simple blood tests such as the pros-

Figure 1. Cancer Screening Rates.



\*Centers for Disease Control and Prevention (CDC). 2000 BRFSS Summary Prevalence Report. Atlanta, Georgia: US Department of Health and Human Services, Centers for Disease Control and Prevention, 2000.

\*\* Ibid.

\*\*\*Centers for Disease Control and Prevention. Colorectal Cancer Test Use Among Persons Aged 50 Years – United States, 2001. *Morb. Mortal Wkly Rep* 2—3;52(10):193-196.

\*\*\*\*Sirovich BE, Schwartz LM, Woloshin S. Screening Men for Prostate and Colorectal Cancer in the United States: Does Practice Reflect the Evidence? *JAMA*. 2003;289:1414-1420.

tate-specific antigen test (PSA). As seen in Table 1, colorectal screening requires a significantly larger time investment by the patient in comparison to breast, cervical, and prostate cancer screenings. Lost productivity, discomfort associated with preparation for the more invasive techniques (colonoscopy and sigmoidoscopy) and the procedure itself all impose very real direct and indirect costs, which are likely to be borne by the patient.

Preparation for a colonoscopy requires clearing the bowels in order to provide a clear view of the bowel walls, a process which can be unpleasant and limits the activities of the patient for the day prior to the colonoscopy, during which patients must drink large quantities of fluids such as polyethylene glycol-electrolyte solution. On the day of the procedure, patients must follow a strict diet of low fiber and non-

carbonated clear liquids and must travel to the hospital with a responsible relative or caregiver. During the colonoscopy, the patient is given intravenous sedatives such as pethidine or midazolam. The colonoscope is passed through the rectum up to the colon, and air may be used to inflate the colon for a clearer view. This allows for biopsies to be taken when lesions are found, as well as for the removal of polyps, because, although polyps are not malignant, they can transform into malignant tumors. A rare but serious risk of colonoscopies is the perforation of the colon, which requires immediate surgery. If polyps are removed from the colon, there may also be excessive bleeding from the colon. Lastly, because air is used to inflate the colon in some cases, patients might feel bloating and discomfort after the procedure.

Table 1. Cancer Screening Test Types, Recommendations, and Attri-

Cancer Type	Screening Test(s)	USPSTF Screening Recommendation <sup>A</sup>	Setting	Time Invested by Patient	Perceived Discomfort of Test	Detection Rate	Additional Cost / Year / Life Saved
Breast	Breast Self-Examination	"I" The USPSTF believes there is not sufficient evidence to promote or argue against the BSE	Patient's Home	<5 min.	None		
	Mammogram	"B" Women age 40 and over, mammogram every 1 to 2 years	Radiology Unit	<2 hr.	Slight discomfort lasting 5 – 10 minutes	80% <sup>B</sup>	\$34,000 to \$88,000 <sup>C</sup>
Cervical	Pap Smear	"A" Women age 18 and over, screening at least every 3 years	Physician's Office	<30 min.	Momentary discomfort	80 to 95% <sup>D</sup>	\$151,434 <sup>E</sup>
Colorectal*	FOBT	"B"	Patient's Home	5 min.	None	N/A	N/A
	Flexible sigmoidoscopy (or barium enema)	"B"	Hospital	½ day	Bowel cleansing prep with enema; moderate discomfort for procedure	70.3% <sup>F</sup>	N/A
	Colonoscopy Rectal exam	"A" For all persons 50 and over, an annual fecal occult blood test (FOBT), flexible sigmoidoscopy or contrast barium enema every five years and a colonoscopy every 10 years	Hospital	24 hours	Uncomfortable bowel cleansing prep requires ingesting 1 gal. prescribed drink; general anesthesia with 4-8 hrs of noted discomfort afterward (0.002% risk of perforated bowel [death])	76 to 90% <sup>G</sup>	\$10,000 to \$25,000 <sup>H</sup>
Prostate	PSA	"I" The USPSTF believes there is not enough evidence to recommend or argue against the PSA test, so frequency recommendation cannot be determined	Physician's Office  Lab or Doctor's Office	<30 min.  <30 min.	Minimally invasive with slight discomfort lasting for approx 15 minutes  Slight discomfort with blood draw	20% (estimated)	\$12,000 to \$15,000 <sup>I</sup>

NOTE: In 1996, the U.S. Preventive Services Task Force (USPSTF) placed a high priority on colorectal cancer screening giving it an "A" recommendation for screening for persons aged 50 and older. The USPSTF grades its recommendations according to one of five classifications (A, B, C, D, or I), with A being the highest, reflecting the strength of evidence and magnitude of net benefit (benefits minus harms). (Source: US Preventive Task Force Recommendation Statement, Table 1, USPSTF Recommendations and Ratings. <http://www.aafp.org/afp/20040515/us.html> (Accessed 7/24/06))

<sup>A</sup> US Preventive Task Force Recommendation Statement, Table 1, USPSTF Recommendations and Ratings <http://www.aafp.org/afp/20040515/us.html> (Accessed 7/24/06)

<sup>B</sup> Centers for Disease Control and Prevention. The National Breast and Cervical Cancer Early Detection Program 1991–2002 National Report. Atlanta (GA): Department of Health and Human Services; 2005.

<sup>C</sup> Mandelblatt J, Saha S, Teutsch S, et al. The Cost-Effectiveness of Screening Mammography Beyond Age 65. *Ann Intern Med.* 2003;139(10):835-842.

<sup>D</sup> U.S. Preventive Services Task Force. Screening for Cervical Cancer: Recommendations and Rationale. AHRQ Publication No. 03-515A. January 2003. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.ahrq.gov/clinic/3rduspstf/cervcan/cervcanr.htm>.

<sup>E</sup> Cancer Screening and Treatment in Women. Program Brief. Agency for Healthcare Research and Quality, Rockville, MD. AHRQ Publication No. 06-P015, June 2006. <http://www.ahrq.gov/research/cancerwom.htm>

<sup>F</sup> Colorectal Cancer Screening. July 21, 2006; <http://www.cancer.gov/cancertopics/pdq/screening/colorectal/healthprofessional/allpages/print>. Accessed August 24, 2006, 2006.

<sup>G</sup> Leng JCC, Thorpe LE, Feldman GE, Thomas PA, Frieden TR. The volume and capacity of colonoscopy procedures performed at New York City hospitals in 2002. *Preventing Chronic Disease: Public Health Research, Practice, and Policy.* 2005;2(1):1-7.

<sup>H</sup> Pignone M, Saha S, Hoerger T, Mandelblatt J. Cost-effectiveness Analyses of Colorectal Cancer Screening. *Ann Intern Med* 2002;137(2):96-104.

<sup>I</sup> Harris R, Lohr KN. Screening for Prostate Cancer: An Update of the Evidence for the U.S. Preventive Services Task Force. *Ann Intern Med* 2002;137:917-29.

## Low Health Literacy is a Barrier

Low health literacy, or the inability to understand health-related material, is a concern among the VA population<sup>25</sup> because it is positively associated with both low income and poor health and is a key factor in patient decision-making for cancer screening. Dolan's 2004 study of colorectal cancer screening knowledge, attitudes and beliefs among veterans confirmed that socio-economic, racial and educational disparities affect compliance with screening recommendations in the VA population.<sup>17</sup> Individuals with lower health literacy levels tend to be diagnosed with cancers at a later stage in the disease progression and, as a result, have increased mortality risk. Health literacy involves understanding the relationship between how a disease could alter one's life and why a recommendation will make one better off, as well as understanding the meaning and importance of words like "sigmoidoscopy." Low literacy and cultural and socio-economic status amplify patient reluctance to comply with screening recommendations. Solving the problem of low health literacy requires a blend of education, advocacy and empowerment directed at the patient. In one hopeful case, a televised colon cancer awareness campaign in 2000 in which celebrity Katie Couric promoted colonoscopy use had a positive impact on public participation and acceptance of this screening strategy.<sup>28</sup> Additionally, physicians must be provided with tools to educate and motivate their patients through timely and efficient communication.

In addition to literacy issues, racial and ethnic disparities remain impediments to colorectal cancer screening in and out of

the VA. The cultural divide is evident when comparing screening rates across cultural groups nationally. A 2006 study by Shih, Ahao and Etling examining the effect of the Medicare coverage policy on the rate of colorectal cancer screening found that Medicare reimbursement has reduced the disparity of colorectal cancer screening among black and white elderly individuals in the US, while the gap between colorectal cancer screening rates among elderly Hispanics and non-Hispanic whites has widened.<sup>29</sup>

## A Physician-Directed Intervention to Promote Colorectal Cancer Screening to Patients Attending a Veterans Administration Clinic

As noted above, patients with a limited health vocabulary may not understand cancer control concepts such as screening and early detection.<sup>31</sup> Health belief factors, such as the patient's perceptions of severity of and susceptibility to cancer and the benefits of cancer screening, play a role in the uptake of screening. Physician communication to VA patients about the importance of colorectal cancer screening is not well understood.<sup>32,33</sup> To determine how to overcome physician-patient communication issues that hinder early detection and prevention efforts for colorectal cancer, Ferreria et al. established and examined an innovative VA-based physician-directed colorectal cancer screening promotion program.<sup>17</sup>

A randomized control study was done with an experimental group of practitioners who were engaged in the protocol and

a control group. Every four to six months, providers were invited to attend feedback lunch sessions, during which they received information on colorectal cancer screening guidelines, colorectal cancer screening recommendation rates and patient adherence to recommended tests. The practitioners also received confidential information on their individual recommendation and adherence rates in a sealed envelope. Small group discussions and role-playing sessions focused on empowering providers to effectively recommend screening by crafting short powerful and personal messages that fit individual providers and patients. This simple yet innovative physician-directed intervention significantly improved screening rates among the VA population, resulting in a 9% difference between the intervention and control groups. The authors also recognize that since a large proportion of patients remains unscreened, additional efforts may be needed to fully achieve screening optimal targets and increase overall cost-effectiveness.

### Cost-Effectiveness Assessment of the Physician-Directed Screening Promotion Program

Wolf<sup>18</sup> quantified the effects of the colorectal cancer screening promotion program to calculate a cost to effectiveness ratio following the systematic method provided by Segal.<sup>34</sup> The cost-effectiveness of any program depends largely on the outcomes or endpoints of interest; the focus should be on the cost per person screened.<sup>35</sup> This can be thought of as the incremental contribution of the screening promotion program to increased rates of screening. In economic terms, it is the Incremental

Cost Effectiveness Ratio (ICER). In Wolf's study, the outcome metrics of interest were the number of patients screened, cost per patient screened, and the ICER. The cost-effectiveness analysis (CEA) took the payer perspective. Costs were derived for the entire 25-month study period, and specific resources included personnel, overhead (amount assigned by institution for normal operating expenses; e.g. electricity, which is assumed to be 26% based on VA cost accounting estimates), and costs related to conducting the feedback sessions. Personnel cost estimates were derived from actual salary and benefit data. A base salary of approximately \$30,000 per year for a research assistant was assumed, with a fringe benefit rate of 23.5%.

The study found that by using manual review of electronic medical records for feedback reports, the ICER was \$978 per additional veteran screened. For Wolf's parallel analysis, data included in the feedback reports for the intervention arm were assumed to be generated with VA information technology support rather than by manual review of electronic medical records (EMR). In this instance, the cost-effectiveness estimate decreases to \$196 per additional veteran screened. The later ICER is most relevant due to the widespread use of the EMR in the VA today. Because the ICER is significantly affected by compliance rates, greater increases in the number of patients screened would have made the intervention even more economically attractive.

Together these studies provide necessary information on the value of a cancer screening promotion program. But this promising and innovative program cannot be considered in isolation, and, rather,

**Table 2. Studies on the Cost-Effectiveness of Cancer Screening Promotion.**

Study* and Year	Type of Cancer Screening Promoted	Target Population	Costs Included in Analysis	Baseline (control) Screening Rates	Δ Effectiveness (Intervention Increase over control)	Cost Effectiveness (cost per additional person screened)
Andersen et al <sup>12</sup> ; 2002	Mammography	Women living in rural communities (n = 2,000)	Materials, personnel, indirect costs	Community activities = 51%; individual counseling = 50%; both = 48%	Community activities = 3% increase; individual counseling = 2% increase; both = 2%	Community activities = \$1953; individual counseling = \$1984; both = \$2451
Stockdale et al <sup>13</sup> ; 2000	Mammography	Low-income urban women (n = 1,443)	Materials, postage, meetings	Adherent = 77%; nonadherent = 63% (Duan et al <sup>14</sup> )	Adherent = 7% increase; nonadherent = 2% increase	\$900 (salaried personnel), \$487 (personnel valued at minimum wage), \$188 (personnel not included)
Lynch et al <sup>15</sup> ; 2004	Mammography and pap test	Women in a large HMO (n = 254)	Identification of population and barriers, letters, phone calls	19%	20% increase	\$818
Thompson et al <sup>16</sup> ; 2002	Mammography	Low-income urban women at a public hospital (n = 231)	Equipment, personnel, training, postage, overhead, miscellaneous (office supplies)	22%	27% increase	\$559
Weber and Reilly <sup>17</sup> ; 1997	Mammography	Low income women 52 to 77 years old in inner-city primary care clinics (n = 337)	Community health educators' salaries (+20% fringe benefits), mailings, home visits, transportation, nonmonetary incentives	10% control group received personalized letter from PCP but no case management	15.2% increase	\$375
Wolfe et al 2005	Colorectal	Patients attending a Veterans Administration Clinic	Personnel, overhead (benefits included), materials and costs related to conducting the intervention	69.4% control group; 76% intervention group	9 percentage point increase; intervention versus control arms were 41.3% and 32.4%, respectively	ICER = \$196 for electronically generated feedback reports [\$978 if generated from manual review of records]
Fishman et al <sup>18</sup> ; 2000	Mammography	Women 50 to 79 years old in an HMO	Overhead, materials, personnel	Telephone reminder and motivational call; adherent = 45%; nonadherent = 11% (Taplin et al <sup>19</sup> )	Telephone reminder: adherent = 16% increase; nonadherent = 15% increase; motivational call: adherent = 15% increase; nonadherent = 13% increase	Telephone reminder: adherent = \$92; nonadherent = \$100; motivational call: adherent = \$132; nonadherent = \$161; Postcard: adherent = \$22; nonadherent = \$70
Mohler <sup>20</sup> ; 1995	Mammography	Female patients 50 to 59 years old, mainly middle class and white, in a primary care office (n = 151)	Physician time and medical assistant calling and recording data (benefits not included); \$2.50 per letter; telephone costs not included	11%	Physician counseling = 19% increase; medical assistant counseling = 32% increase; physician letter = 7% increase	Physician counseling = \$52; medical assistant counseling = \$3; physician letter = \$14
Lantz et al <sup>21</sup> ; 1996	Mammography and pap test	Low-income women 40 to 79 years old in a federally funded community health center (n = 659)	Labor based on wages of personnel, materials (letterhead, envelopes, postage, telephone costs, etc)	16%	41% increase in intervention over control for at least one screening test	\$30
Saywell et al <sup>22</sup> ; 1999	Mammography	Nonadherent women 50 to 85 years old at a large HMO and/or a general medicine clinic	Personnel, materials, postage, telephone charges, fixed costs not included	18%	Telephone counseling = 5% increase; individual counseling = 16% increase; physician letter = 3% decrease; telephone counseling and physician letter = 17% increase; individual counseling and physician letter = 12% increase	Telephone counseling = \$12; individual counseling = \$14; physician letter = dominated; telephone counseling and physician letter = \$14; individual counseling and physician letter = \$18

Adapted from Wolf MS, Fitzner KA, Powell EE, et al. Costs and cost effectiveness of a health care provider-directed intervention to promote colorectal cancer screening among veterans. *Journal of Clinical Oncology* 23(34): 8877-83

should be compared to alternative interventions that are either more or less cost-effective. Public health officials, policymakers for Medicare and Medicaid, medical directors of integrated health systems, decision-makers for private insurers, and experts sitting on medical advisory boards are often faced with limited resources, forcing them to discriminate among competing programs to make choices that maximize health care resources. So the question then is, "Of the available population-based prevention promotion programs for cancer, which ones should be implemented?"

To compare and contrast Wolf's ICER with that of other cancer screening promotion programs, we constructed Table 2\* to present characteristics and findings of ten studies on the cost-effectiveness of cancer screening promotion. At first glance, it appears that six of the programs considered are more cost-effective than that studied by Wolf. But, unfortunately, it is not possible to make meaningful comparisons because the metrics (e.g. cost inputs and endpoints) used in the studies are not equivalent and their outcome measures vary. In Wolf's study, for example, the ICER was derived from the difference in the costs assigned to the intervention and control groups divided by the difference in colorectal cancer screening rates between the intervention and control groups. In Table 2, the mammography intervention assessed by Lanz that costs \$30 per extra person screened would be preferable to the intervention assessed by Thompson that costs \$559 per extra person screened, assuming the metrics used in both studies were equivalent. Without systematic comparisons, little can be determined about the relative cost-effectiveness of the programs.

## Ranking Economic Results Would Facilitate Decision-Making

Choosing among competing programs becomes clearer when economic tools are applied. Recognizing the differences in the cost and benefit metrics and how studies are conducted and the nature of the information and assumptions employed and outcome metrics used leads to one conclusion. Greater uniformity of analytic practice is necessary to better integrate CEA so that it can be a more influential tool in debates about resource allocation.<sup>36</sup> Meaningful comparisons demand uniformity across study perspective, outcome measure, what is included as cost, and treatment of uncertainty (e.g. sensitivity analyses).

Healthy People 2010,<sup>37</sup> the US's national public health promotion and disease prevention initiative, has set cancer screening targets (Table 1). Screening promotion programs designed to increase screening rates among underserved populations are an integral part of this effort. With this emphasis on targets and rates, the crucial metric on which the ICER is calculated would be the cost per change in screening rate. The ICER of interest is the ratio comparing the cost per additional outcome (e.g. screened individual) for two competing interventions. This metric should become the standard for screening promotion program evaluations. To have this happen, the research community must achieve greater uniformity in analytic practice so as to inform policy-makers who strive for efficient allocation of limited health resources. A convenient league table of ICERs for cancer screening pro-

motion programs can be established once this standardized metric has been adopted and consistent definitions and methods are employed in economic analyses. Of course, CEA must be interpreted in light of other information such as patient resistance to invasive cancer screening. Policy-makers also need to include notions of equity, choice and political feasibility.

Cost-effectiveness league tables that rank alternative health care interventions based on their ICERs provide easy to understand information to policy-makers about the value of competing health care interventions. A league table presents a numeric score based on a clearly defined scoring algorithm. Competing strategies (e.g. screening promotion programs) are then ranked by this score with the program with the lowest ICER (lowest cost/additional person screened) being “best” and the program with the highest ratio being “worst.” League tables have been used to rank interventions to prevent cardiovascular disease and infection from HIV. Optimal budget allocation is simplified when alternative programs are ranked in the league table and those with the lowest ICERs are funded. When compared to a benchmark, ICERs under the benchmark are recommended for funding because they are considered to provide good value for money.<sup>38</sup>

Economic tools can help to indicate which prevention programs are worthwhile to implement and CEA, when done rigorously, affords a high degree of transparency that can be of considerable interest to policy-makers. Ideally, economic analyses add a systematic way to evaluate clinical and public health measures to allocate scarce resources efficiently. Moreover,

CEA allows us to judge a program’s impact from a particular perspective – societal, individual or payer.


## **Conclusion**

Cancer screening promotion programs have been implemented to increase screening rates among medically underserved populations who historically have low compliance with preventive recommendations. Targeted screening promotion programs have been applied with some modicum of success among medically underserved populations for breast, cervical, colorectal and prostate cancers.

While some assume that from the patient’s perspective cost is the primary reason for avoiding colorectal screenings, the VA studies disprove this point because patients in the VA do not pay for their health care. Rather, an aversion to the screening procedure itself or inability to understand the importance of screening turn patients away. This aversion was overcome in a VA population by a promising design for physician-directed screening promotion that is likely to be applicable to other populations. Because unique barriers exist for colorectal cancer screening uptake, its advancement depends on a partnership involving patients, physicians, researchers and policy makers. Together they can address personal aversions to screening, implement effective physician-driven screening promotion programs, and standardize outcomes metrics.

Resource allocation is an important consideration in making funding decisions about such a program. Economic evaluation in the health sector can assist

policy-makers in achieving more health promotion at less cost within certain resource constraints. CEA can contribute the most to resource allocation decisions when alternative interventions are explicitly and rigorously analyzed and compared or ranked according to their ICERs so that limited funds can be allocated by transferring “marginal” dollars from one intervention to another. At present we lack uniform metrics with which to assess whether one program is more worthwhile than a program that is designed differently or for another type of cancer.

League tables of cost-effectiveness ratios for diverse interventions can be used to allocate resources most efficiently. To be meaningful, uniform effectiveness measures must be used to create all the ratios in a league table. The usefulness of league tables is constrained if the studies included use differing methodologies, definitions and ICER calculations. Currently, CEA for screening promotion program outcomes involves a variety of metrics, only one of which measures their stated intent—changes in number of persons screened. We propose metric standardization and development of meaningful league tables as a simple solution to improving comparability across cancer screening promotion programs. 

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