Evaluation and Program Planning 34 (2011) 147–153

Contents lists available at ScienceDirect

Evaluation and Program Planning

journal homepage: www.elsevier.com/locate/evalprogplan

Clinical and programmatic costs of implementing colorectal cancer screening: Evaluation of five programs☆

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ARTICLE INFO

Article history:
Received 6 April 2010
Received in revised form 2 August 2010
Accepted 27 September 2010
Available online 30 October 2010

Keywords:
Program cost
Activity-based costing
Economic evaluation
Colorectal cancer screening

ABSTRACT

Background: The Centers for Disease Control and Prevention (CDC) initiated the Colorectal Cancer Screening Demonstration Program (CRCSDP) in 2005 to explore the feasibility of establishing a colorectal cancer screening program for underserved US populations. We provide a detailed overview of the evaluation and an assessment of the costs incurred during the service delivery (screening) phase of the program.
Methods: Tailored cost questionnaires were completed by staff at the five CRCSDP sites for the first 2 years of the program. We collected cost data for clinical and programmatic activities (program management, data collection and tracking, etc.). We also measured in-kind contributions and assigned values to them.
Results: During the first 2 years of the demonstration excluding the start-up cost, the average cost per person was $2569. Per person cost of clinical services alone ranged from $264 to $1385, while per person programmatic costs ranged from $545 to $3017.
Conclusion: Colorectal cancer screening programs can incur substantial costs for some non-clinical activities, such as data collection/tracking, and these support activities should be managed carefully to control costs and ensure successful program implementation. Our findings highlight the importance of performing economic evaluation to guide the design of future colorectal cancer screening programs.

1. Introduction

Colorectal cancer (CRC) is the third most common cancer in the United States and is the second leading cause of cancer-related death. (USCS, 2009) In addition, there are significant racial disparities in CRC mortality and survival (Alexander et al., 2007; Rim, Seeff, Ahmed, King, & Coughlin, 2009). Although there is strong scientific evidence that regular screening decreases the incidence and mortality of colorectal cancer, only about half of the eligible population in the United States has been screened as recommended by national guidelines (ACS-CCAG, 2008; Shapiro et al., 2008; Subramanian, Amonkar, & Hunt, 2005; Whitlock, Lin, Liles, Beil, & Fu, 2008). Screening programs that specifically target the underserved population might help reduce disparities in CRC screening, incidence, and mortality (Seeff et al., 2004).

There are few organized colorectal cancer screening programs designed for underserved populations, and only limited evaluations have been performed of these existing programs (MDCCSP, 2009; NYCCSP, 2009). The Centers for Disease Control and Prevention (CDC) established the 4-year Colorectal Cancer Screening Demonstration Program (CRCSDP) in 2005 to explore the feasibility of establishing a national colorectal cancer screening program for underserved US populations (Seeff et al., 2008).

The five organizations selected by CDC to receive funding included the Maryland Department of Health and Mental Hygiene, the Missouri Department of Health and Senior Services, the Nebraska Department of Health and Human Services, Stony Brook University Medical Center (New York), and Public Health—Seattle & King County (Washington).

☆ This research was funded by Contract No. 200-2002-00575 TO 09 from the Centers for Disease Control and Prevention (CDC). The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
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doi:10.1016/j.evalprogplan.2010.09.005

CDC is undertaking a detailed evaluation of CRCSDP to describe the implementation processes, assess patient outcomes, estimate the cost of implementation, and determine the relative cost-effectiveness of screening modalities. We have previously reported on the process and cost of initiating the five colorectal cancer screening programs (DeGroff et al., 2008; Tangka et al., 2008). The start-up costs of establishing colorectal cancer screening programs included all the expenditures incurred before starting service. During the start-up period, the programmatic categories requiring the most resources were program management, database development, and quality assurance.

No studies have been reported that include an evaluation of the costs during the service delivery phase (when screening services are provided) of organized colorectal cancer screening programs in the United States. This information is critical to understand the costs involved in offering colorectal cancer screening in the real world setting. We provide a detailed assessment of the costs incurred during the initial service delivery phase of the program. Overall, these costs include clinical costs (costs of screening and diagnostic testing) and programmatic costs such as program management, data collection and tracking, service delivery contract management, administrative costs, patient support, public education and outreach, professional education, partnership development and maintenance, quality assurance and professional development, and program evaluation. Our findings provide practical guidance for estimating the cost of future screening programs at both the state and the national levels.

2. Materials and methods

We developed a questionnaire to collect activity-based costs from the programs to facilitate analysis using a programmatic perspective. These cost estimates were derived by allocating parts of the total expenditure to specific activities performed by the programs (Drummond, Sculpher, Torrance, O'Brien, & Stoddart, 2005). The derivation of activity-based costs is important, because they allow for a more in-depth comparison of the programs and their distribution of costs across key activities, something not available through assessment of total cost. The questionnaire was based on well-established methods for collecting cost data for program evaluation (Anderson, Bowland, Cartwright, & Bassin, 1998; French, Dunlap, Zarkin, McGeary, & McLellan, 1997; Salomé, French, Miller, & McLellan, 2003). We also incorporated lessons we learned from pilot testing a similar instrument designed to collect cost data from breast and cervical cancer screening programs to ensure high-quality data collection (Subramanian, Ekwueme, Gardner, Bapat, & Kramer, 2008).

We developed our questionnaire to collect expenditure data related to personnel, consultants, cancer screening and diagnosis, contracts, and administrative or overhead activities, such as telephone and rent. To appropriately allocate the expenditures, the questionnaire captured details on the distribution of both labor and nonlabor costs for all activities performed. Program staff was asked to allocate costs to the following CRCSDP activities: program management, clinical service delivery (cost of screening and diagnostic testing), service delivery contract management (activities to facilitate screening including identifying and establishing provider contracts), data collection and tracking (collecting information for various data systems, for example, clinical data elements, cost assessment tools, program-specific systems), patient support, public education and outreach, professional education, partnership development and maintenance, quality assurance and professional development, and program evaluation. The description of the program activities is provided in Table 1. The programs were also requested to include data on in-kind contributions and their estimated monetary value. To ensure data collection methods were standardized across all five programs, the questionnaire also collected details of the methods used to assign monetary value to in-kind contributions (for example, source and hourly wages used to derive cost of in-kind labor contributions). The cost of complications resulting from the colonoscopy procedure and the cost of treatment for cancer were not included, because those were rare and the information was not collected in a standard way across the programs.

Staff at all five CRCSDP-funded programs completed the cost questionnaire to provide information during the first 2 years of the program (September 2005 to August 2007). Each program has been described in detail in previous journal articles (DeGroff et al., 2008; Seeff et al., 2008). An overview of the programs is presented in Table 2.

Start-up time for the programs ranged from 9 to 11 months, and the costs ranged from $60,602 to $337,715. The focus of this study is on the costs incurred during implementation and therefore costs related to the start-up period were excluded. The implementation phase therefore ranged from 13 to 15. Program evaluators received a user's guide that contained definitions and a description of the required cost data elements to ensure consistent reporting across all programs. Routine conference calls were conducted with each site to provide additional guidance for data collection. All data received from the programs were stored in password protected electronic folders.

In estimating labor costs, we asked for the following information: (1) the number of hours worked by staff per month on various activities, (2) the proportion of staff salaries paid through CRCSDP funds, (3) data on the percentage of time that staff members worked, and (4) staff salaries. We requested the staff salary information be provided as a range or an actual base salary with the fringe benefit rate. We used the average of the lower and upper bounds of the salary range when necessary. In a few instances when salary information was not provided, we used national average compensation for a specific job category from the US Bureau of Labor Statistics or the average salary from a similar job category provided by the CRCSDP programs. We computed the hourly rate for each staff member and used the hours spent on each program activity to allocate parts of the total salary to the activities performed. We then aggregated the labor costs for each activity, and assigned in-kind labor contributions to each program activity. In-kind contributions reported by the programs include donated time by physicians participating in the Medical Advisory Committee and senior health department staff who supervise the program.

Similarly, we aggregated the costs of consultants, materials, equipment, and supplies for each activity, and derived the total overhead costs related to the service delivery period using detailed information provided by the programs on rent, utility payments, and other indirect costs. Although the general approach in economic assessments is to use an appropriate allocation methodology to assign indirect costs to program activities (Drummond et al., 2005; Gold, Siegel, Russell, & Weinstein, 1996), we chose to present administrative or overhead costs as a separate cost center to allow for greater accuracy when comparing the programs with each other. Since overhead costs can differ greatly, reporting these costs separately allowed us to assess the magnitude of the administrative costs in relation to other costs, and to understand the effect of these costs on overall program costs.

To ensure valid comparisons, we adjusted the costs to reflect differences in the cost of living in the geographic location of the programs. We adjusted the clinical costs using the regional medical care component of the Consumer Price Index (CPI), and all other costs using the overall CPI (US BLS, 2008). As appropriate, we reported the costs for each program either separately or pooled together. For cost estimates that are pooled across all programs, we reported the mean and the range. We also reported the cost of each