



The cost-effectiveness of training US primary care physicians to conduct colorectal cancer screening in family medicine residency programs



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ABSTRACT

Background. Demand for a wide array of colorectal cancer screening strategies continues to outpace supply. One strategy to reduce this deficit is to dramatically increase the number of primary care physicians who are trained and supportive of performing office-based colonoscopies or flexible sigmoidoscopies. This study evaluates the clinical and economic implications of training primary care physicians via family medicine residency programs to offer colorectal cancer screening services as an in-office procedure.

Methods. Using previously established clinical and economic assumptions from existing literature and budget data from a local grant (2013), incremental cost-effectiveness ratios are calculated that incorporate the costs of a proposed national training program and subsequent improvements in patient compliance. Sensitivity analyses are also conducted.

Results. Baseline assumptions suggest that the intervention would produce 2394 newly trained residents who could perform 71,820 additional colonoscopies or 119,700 additional flexible sigmoidoscopies after ten years. Despite high costs associated with the national training program, incremental cost-effectiveness ratios remain well below standard willingness-to-pay thresholds under base case assumptions. Interestingly, the status quo hierarchy of preferred screening strategies is disrupted by the proposed intervention.

Conclusions. A national overhaul of family medicine residency programs offering training for colorectal cancer screening yields satisfactory incremental cost-effectiveness ratios. However, the model places high expectations on primary care physicians to improve current compliance levels in the US.

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1. Introduction

Over 45% of US adults aged 50 to 75 are not up-to-date with screening for colorectal cancer (CRC) (Klabunde et al., 2011). This percentage is even higher among Hispanics and people lower on the socioeconomic scale (Klabunde et al., 2011). The disease continues to be the second leading cause of cancer-related deaths in the US (Klabunde et al., 2011) despite its high survivability when detected early (National Cancer Intelligence Unit (NCIN), 2009). While policy-makers push to increase the demand for CRC screening through awareness campaigns (Lupkin, 2013), increased Medicare reimbursement rates (Gross et al., 2006), and CRC research funding (Centers for Disease Control and Prevention, 2013), less attention has been given to the supply side of CRC screening; that is, the limited availability of well-trained, certified endoscopists.

One strategy to address this deficit is to dramatically increase the number of primary care physicians (PCP) who are trained and supportive of performing office-based colonoscopies or flexible sigmoidoscopies (FSs). A handful of arguments can be made for this strategy. Patients with PCPs who perform FS and colonoscopy were more likely to be in compliance than those whose PCPs did not perform these screening procedures (Levy et al., 2006; Lewis et al., 2000). Other research has determined that trust and frequent reminders—something more likely to be established between patients and their PCP—are two of the most important factors in promoting CRC screening compliance (O'Malley et al., 2004; Stone et al., 2002). Additionally, access issues related to CRC screening, specifically the dearth of gastroenterologists in rural areas (Aboagye et al., 2014) could be reduced more efficiently through the use of existing PCPs, who are more likely to be in rural communities than gastroenterologists (Chan et al., 2006; Newman et al., 2005). Finally, colonoscopies performed by PCPs have been demonstrated to be as safe and effective as those performed by specialists (Wilkins et al., 2009).

With such a strong case then for increasing the number of PCPs who are trained and supportive of performing colonoscopies or FS, one might look to family medicine residency (FMR) programs as an ideal training

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ground. However, Wilkins et al. (2004) discovered that fewer than 50% of US FMR programs offer any colonoscopy training. Furthermore, the survey revealed that fewer than 20% of FMR programs had trained at least one resident to do colonoscopies in the previous year. This dearth of training opportunities for family medicine residents is likely related to the current deficit of certified endoscopists, especially in rural and underserved areas.

In order to address this shortage of FMR endoscopy training programs though, significant funding would need to be directed towards increasing the number of programs that offer colonoscopy and FS training. However, creating and improving these training programs would be costly. FMR programs that do not already offer this training face high initial fixed costs (i.e., scopes, scope washers, endoscopy simulator, etc.). If policy-makers were to pursue this strategy of developing more FMR-based endoscopy training, these high training costs could disrupt the current cost-effectiveness data for various CRC screening strategies. For example, Vijan (2001) demonstrated in his sensitivity analysis how altering the cost of colonoscopy could result in losing its preferred strategy status. We contend that incorporating the costs of such an expansive training overhaul into the existing incremental cost effectiveness ratios (ICERs) for CRC screening strategies is warranted. Such an analysis could provide valuable information to state governments, funding agencies, and family medicine residency programs seeking to improve CRC screening capacity and compliance. In doing so we seek to answer the question: What is the cost-effectiveness of training PCPs to conduct CRC screening?

A Markov Decision model of our proposed CRC screening training regimens is presented in Fig. 1. The bottom half of the model represents the status quo—where ICERs are well defined in the literature (Rogge et al., 1994; Vijan, 2001; Wilkins et al., 2009). The purpose of this analysis is to estimate the ICERs for the top-half of the model which would incorporate the additional costs of a national overhaul of FMR programs and any resulting gains in effectiveness.

2. Methods

2.1. Clinical assumptions

Our model builds upon previously established clinical assumptions from the Vijan (2001) model, which incorporates factors such as age-specific incidence of polyps, dwell time, CRC mortality rates, and direct medical costs (see Table 1 for a complete list of these clinical model assumptions).

2.2. Cost assumptions

Next, to estimate the costs of a national overhaul of FMR programs we incorporated various fixed and variable training costs from both clinical literature (Vijan, 2001) and data from a CRC screening grant at the authors' academic medical training institution. (The institutional review board of the authors' institution approved this study.) We estimated the costs of the training program by using the costs incurred by our single-site FMR program that, as a result of the grant, had just undergone a drastic overhaul of its endoscopy training program. This FMR program had offered endoscopy training prior to the grant, but would have fallen into Wilkins et al.'s (2004) category of programs that officially offer colonoscopy training, but rarely train one or more residents (30% of FMR programs nationally). Purchases related to this training overhaul are reported in Table 1. We contend that because this FMR program's training costs were to improve endoscopy training, versus introduce one, these costs are conservative. The Wilkins et al. (2004) study identified that 52% of all FMR programs offer no colonoscopy training at all. We included variable costs of clinical faculty time using both the grant data and training requirements as set by the American Society for Gastrointestinal Endoscopy (ASGE): 75 and 30 supervised training hours for colonoscopy and FS, respectively (American Society for Gastrointestinal Endoscopy, 1998).

Baseline estimates of the number of residents who participate in a single training program annually (nine), as well as the percentage of residents who go on to practice colonoscopies or FS post-residency (50%), were based on the data at the grant-sponsored FMR program. We estimate that among the 50% of trained residents who go on to perform colonoscopy or FS in their practice, that each would complete 60 colonoscopy or 100 FS procedures annually

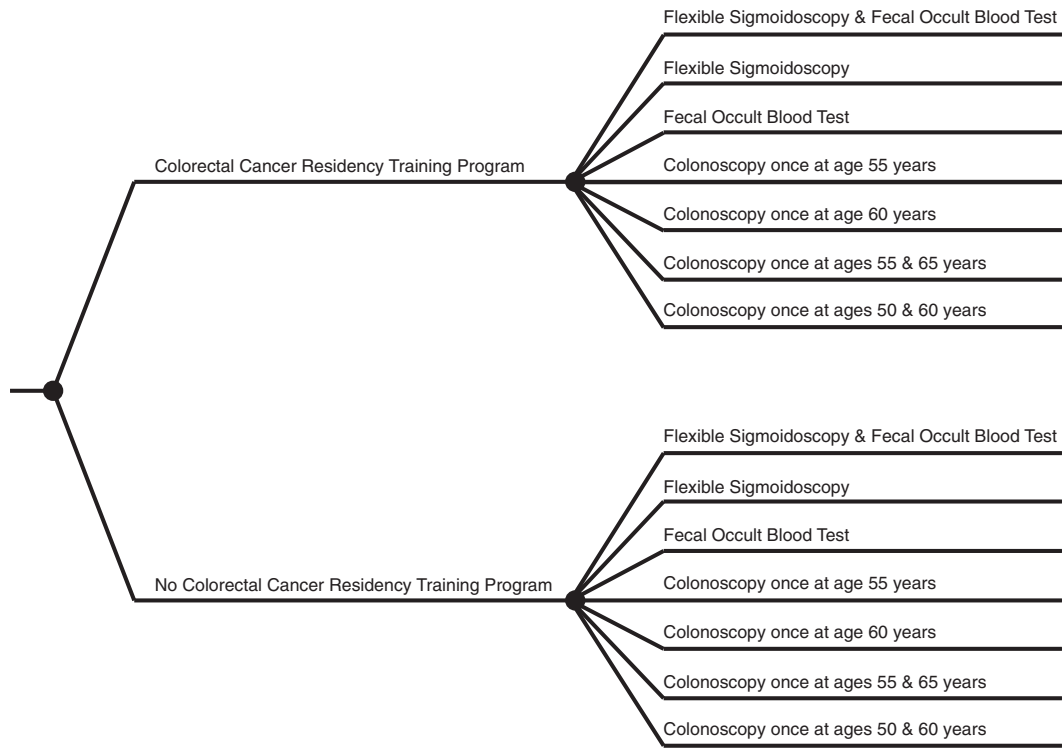


Fig. 1. Markov decision model with seven CRC strategies.

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