Costs of Establishing a Colorectal Cancer Screening Program in Safety Net Clinics

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INTRODUCTION

Colorectal cancer (CRC) is the third most common cancer and the second most common cause of cancer death in the U.S., with over 135,000 new cases and over 50,000 deaths expected in 2017. Identifying and removing pre-cancerous polyps can greatly reduce invasive disease, emphasizing the need for effective CRC screening. Yet, in 2015 only 63% of adults aged 50+ were up-to-date on CRC screening. This rate falls short of targets set by the National Colorectal Cancer Roundtable (80% by 2018) and Healthy People 2020 (70.5%). Although improving, adult CRC screening rates in federally qualified health centers (FQHCs) remain well below those of non-FQHC populations, at 38.3% in 2015. Low screening utilization delays CRC detection and leads to higher CRC-related morbidity and mortality.

Fecal immunochemical testing (FIT) may be a low-cost alternative, especially well-suited to FQHC patients, and an effective population-based CRC screening approach when combined with colonoscopy following positive tests. Strategies and Opportunities to STOP Colon Cancer In Priority Populations (STOP CRC) is a cluster-randomized pragmatic study of an intervention designed to increase CRC screening rates within FQHCs by promoting use of low-cost FIT. We present development, implementation, and maintenance costs of the STOP CRC intervention as adopted by participating FQHCs.

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INTERVENTION

Eight FQHC organizations, seven in Oregon and one in California, and comprising 26 individual clinics, participated in STOP CRC (Table 1). Eligible patients were 50-74 years old with at least one office visit in the last year, and were not current for CRC screening (colonoscopy within nine years, no flexible sigmoidoscopy within four years, no FIT or fecal occult blood test (FOBT) within 11 months, no referral for colonoscopy, flexible sigmoidoscopy, or gastroenterology within one year or FIT order within six months), and were not living in a nursing home or assisted living facility within 12 months. Permanent exclusions were prior CRC diagnosis, prior colectomy, ulcerative or inflammatory colitis, history of end stage renal disease or evidence of hospice care.

STOP CRC was an automated electronic health record (EHR) data-driven program for mailing FIT kits to patients due for CRC screening. Eligible patients received an introductory letter with a number to call to decline participation, address clinical concerns, etc. Remaining eligible patients were mailed FIT kits, including illustrated instructions and return postage. Non-completers received reminder letters. EHR mailing status data were updated nightly. Four to six months after staff training, a plan-do-study-act (PDSA) improvement cycle was facilitated with participating clinics to identify strategies to improve reach or effectiveness.

Organizations implemented STOP CRC as appropriate for their individual systems **(Table 2)**. The greatest variety across organizations involved handling of the FITs themselves, which were variously mailed to participants, sometimes monthly, in single large batches, or as staff time permitted. Most organizations mailed the FIT and introductory letter together. Processing of completed FITs was perhaps even more varied. FITs were returned to the clinic for lab processing either in-house (four organizations) or at an outside lab (one); at three organizations, FITs were sent directly to the outside lab. Usual care was existing clinic activities that supported CRC screening.

Table 1. STOP CRC Federally Qualified Health Centers (FQHCs)

FQHC	Number of Clinics	Patients Ages 50-74
A	2	3,747
B	2	1,215
C	6	7,334
D	2	2,498
E	4	6,675
F	3	3,267
G	3	3,810
H	3	2,085

Table 3. Intervention Activities

DEVELOPMENT	IMPLEMENTATION	MAINTENANCE
Data management	**Data management**	**Data management**
• Updating claims data • Initial EHR training • Testing EHR tools	• Lab orders tracking • Results pool tracking	• EHR scrubbing • Report generation • Lab orders tracking • Results pool tracking
Staff training	**Staff training**	
• Staff (e.g., medical assistant) training	• On-going training, new staff on-boarding	
	Dissemination process	**Dissemination process**
	• Adapting mailings • Mailing intro letters Mailing FIT kits • Mailing reminders • In-clinic FIT kit distribution	• Mailing intro letters • Mailing FIT kits • Mailing reminders
Program management	**Program management**	**Program management**
• Execution of lab interface agreements • Research team meetings	• Billing adjustments • Conducting PDSAs • Provider engagement meetings	• Billing adjustments • Conducting PDSAs • Working with sponsor on issues • Staff check-ins

*EHR: electronic medical record; FIT: fecal immunochemical test; PDSA: plan-do-study-act

Table 2. Implementation Activities by Organization

	ORGANIZATION							
Clinic Activity	A	B	C	D	E	F	G	H
Chart Scrubbing	YES	YES	YES	YES	YES	YES	YES	YES
Mailed Intro Letters	Single batch	YES at start/ with kits later	YES at start/ with kits later	YES at start/ with kits later	With kits from start	YES at start/ with kits later	YES	NO
Mailed FIT Kits	Single batch	Monthly	Monthly	Monthly	Monthly on birthdays	Randomly when time allowed	Single large batch	Randomly when time allowed
FIT Return	Direct to lab at start Patient hand delivered to clinic later	Return to clinic for in-house processing	Return to clinic prior to lab	Direct to lab at start Return to clinic first later	Patient hand delivered to clinic	Direct to lab	Return to clinic for in-house processing	Direct to lab
Mailed Reminder Letters	NO	YES	YES	NO	YES	NO	NO	NO
Phone Calls	NO	YES	NO	YES at control clinic	NO	NO	NO	NO

METHODS

Clinics at each organization were split between intervention and usual care for 18 months (February 2014–August 2015). From August 2015 to February 2016, intervention clinic staff were trained in implementation. Three organizations did not participate in the maintenance phase, so maintenance costs are limited to the five remaining organizations. Organization staff completed spreadsheets using an activity-based costing format **(Table 3)**, assigning labor hours by intervention activity and wage rates by job position. Non-labor costs were obtained from study data. Data were from 2014–2015, and analyses were performed in 2016–2017.

RESULTS

Estimated average development costs were nearly $6K **(Figure 1)** with 54% allocated to data management and 37% to program management. Overall implementation costs averaged $14K, allocated mostly to mailing tests (54%) and staff training (28%). Development costs per clinic averaged nearly $3.8K **(Figure 2)**. Implementation costs per clinic averaged almost $9.7K; one organization (C)'s costs were $24.1K, primarily due to extensive training and processing of returned FITs. Per-clinic implementation costs for the seven other organizations averaged $7.6K.

Figure 1. Development and Implementation Costs by Activity Category

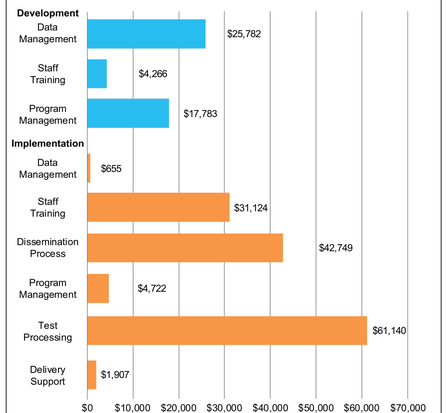


Figure 2. Development and Implementation Costs Per Clinic, by Organization*

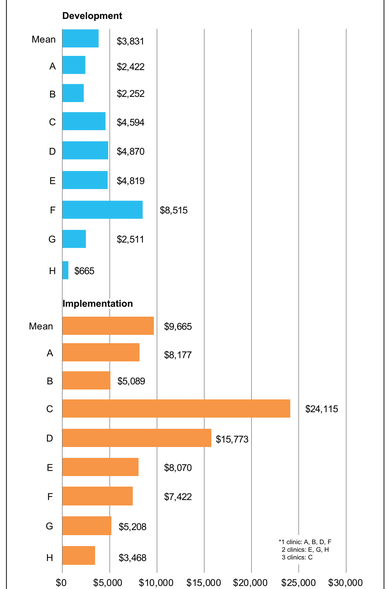


Figure 3 illustrates per-clinic activity categories across implementation and maintenance phases. The largest reported cost category for each organization was preparing mailings, including printing letters, affixing labels, and placing lab orders.

Six-month maintenance costs, averaging nearly $20K across five reporting organizations, were much more heterogeneous than implementation costs. One organization reported program management as its most resource-intensive category, while two others reported data management and test distribution, respectively, as their most resource-intensive. No organization reported staff training during the maintenance phase. **Figure 4** presents crude evidence of economies of scale, i.e., cost per person screened appears to decline with the number of individuals screened.

Figure 3. Cost of Activity Categories by Clinic, by Organization*

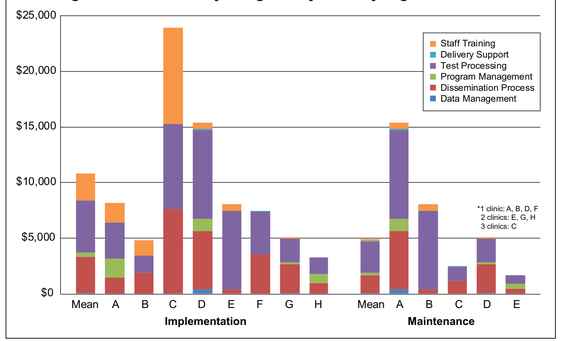
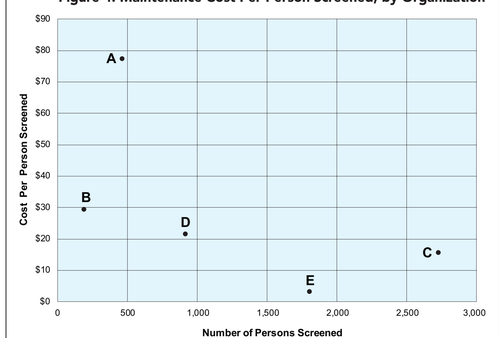


Figure 4. Maintenance Cost Per Person Screened, by Organization



CONCLUSIONS

Our results highlight the cost implications of implementing a standard CRC screening intervention within a pragmatic trial setting involving multiple FQHCs with varied patient populations, clinical structures, and resource availability. We plan to integrate these findings into a more comprehensive economic evaluation that contributes to our knowledge of how to introduce such programs to underscreened populations most effectively and efficiently.

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