Improving Colorectal Cancer Screening by Targeting Office Systems in Primary Care Practices

Disseminating Research Results Into Clinical Practice

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Background: Randomized trials have shown the efficacy of an office systems approach in improving colorectal cancer (CRC) screening behaviors; its feasibility in real-world primary care practices has not been well studied.

Methods: Between August 1, 2000, and December 1, 2001, we enrolled 185 primary care clinicians identified through purchased database lists. At the end of follow-up (December 31, 2002), 127 clinicians had completed preintervention and postintervention questionnaires. Trained staff from the American Cancer Society visited practices and identified areas for improvement in CRC screening. They provided clinicians with resources, tools, and support to facilitate positive change.

We defined 5 clinician behavior areas related to successful CRC screening, including educating patients, identifying patients due for screening, enabling patient compliance, monitoring patient compliance, and notifying patients of their test results. We measured these areas before and after the intervention using questionnaires and data extracted from medical records.

Results: We demonstrated improvements in the passive use of posters and brochures about CRC screening (baseline, 20.5% and follow-up, 69.3%; P<.001) and in the monitoring of fecal occult blood tests using manual tracking systems (baseline, 20.6% and follow-up, 37.3%; P<.05). Based on medical records data among 551 patients, we found a statistically significant increase in the number of patients who became up-to-date with CRC screening recommendations and tests (P<.001 for both).

Conclusion: Methods shown to improve CRC screening processes in protocol-driven randomized trials may be effective in community practice, and wider dissemination of these strategies shows promise to increase CRC screening.

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Clinician recommendations regarding CRC screening can be a major impetus for a patient to seek a screening test. However, clinicians cite confusion regarding screening modalities, limited time, low patient compliance, and the lack of a systematic, organized approach to preventive services as barriers to giving CRC screening recommendations. Several community-based randomized controlled trials have addressed providers’ barriers using trained facilitators, a term and role described by Fullard et al., to incorporate a unified system of preventive services into office routines. Promoting teamwork among clinicians, staff, and patients; creating routines; and tailoring materials to each clinician’s situation have been shown to increase the proportion of patients receiving FOBT.

Office systems are effective in a range of preventive services, including cardiovascular disease prevention, well-child care, and immunizations. However, unlike more straightforward preventive health services, clinicians face a complex set of recommended testing strategies and intervals for CRC screening. It remains to be seen in the area of CRC screening whether the office systems shown to be effective in the randomized controlled trial setting can be implemented and their efficacy demonstrated in more representative settings.
Therefore, this project aimed to test the feasibility and effect of having facilitators help primary care practices implement office systems to improve CRC screening behavior.

METHODS

PARTICIPANTS AND RECRUITMENT

A facilitator in each of 3 states recruited clinicians and provided ongoing support toward integrating changes in existing office routines during the intervention. Between August 1, 2000, and December 1, 2001, the facilitators mailed invitation letters and response postcards to internal medicine and family practice clinicians in New Hampshire, Massachusetts, and Connecticut (names and addresses were purchased through a retail database publisher, Folio Associates, Hyannis, Mass). They invited additional clinicians not on the lists whose names had been suggested by clinicians who had already agreed to participate (including nurse practitioners and physician assistants). Clinicians who completed the baseline questionnaire were considered enrolled in the study.

INTERVENTION

Before the intervention, we identified 5 areas of the CRC screening process to target, including educating patients, identifying patients due for screening, enabling patient compliance, monitoring patient compliance, and notifying patients of their test results. We developed a tool kit (an appendix listing the tool kit items is available from the corresponding author) similar to that used in the Put Prevention Into Practice project to help clinicians in each of these 5 areas. Facilitators also developed new items and tailored existing materials (eg, reminder postcards and letters).

Between August 1, 2000, and December 31, 2002, facilitators had at least 4 in-person visits or telephone calls with each participating clinician. These included an assessment contact (during which the facilitator introduced the intervention and asked each clinician to complete the baseline questionnaire), a planning visit (during which the facilitators met with enrolled clinicians and staff to discuss their current screening process, offer suggestions, introduce the tool kit, and reflect on ways to improve their screening process), and 1 or more reinforcement follow-ups (during which the facilitators provided an opportunity for clinicians to order more materials, reinforced any changes already made, and addressed any barriers that the providers had encountered). Approximately 6 months after the planning visit, the facilitators made a final evaluation visit, when the follow-up questionnaire was administered or left for self-administration. Clinicians were invited to voluntarily participate in a medical record review. Three incentives were offered, including (1) feedback on CRC screening rates, (2) feedback on cholesterol screening rates, and (3) $100 to compensate for staff time and inconvenience. On average, facilitators spent 13½ hours with each practice; however, of this, only 3½ hours were direct contact via telephone or in-person visit, with the remainder spent as travel time between practices.

DATA COLLECTION

We collected clinician self-reported data using a questionnaire that was based on a survey developed by the Massachusetts Colorectal Cancer Working Group. To limit loss to follow-up, clinicians were sent 2 mailings requesting the return of the questionnaire, followed by telephone reminders. Clinicians who completed the follow-up questionnaire received a thank-you letter, a token of appreciation, an electronic version of their tailored tools, and a form to use for ordering more tools.

An independent medical record review company (Medical Review Associates, Milton, Mass) performed the medical record audits. Before the data extraction, the staff of each participating practice were asked to randomly pull 50 medical records that met the following criteria: the patient had to be age 50 to 80 years, have no family history of CRC or adenomatous polyps, have been seen in the practice in the 4 months before the medical record review, and have had his or her first visit to the practice before 1999 (to select patients who had the opportunity for screening before our intervention). Patients were excluded if they had a personal history of CRC, adenomas, or inflammatory bowel disease or if they were referred for endoscopy because of symptoms or signs of CRC (ie, loose stools, blood, or pain).

We excluded anyone who did not meet the eligibility criteria and recorded whether the patient received appropriate screening recommendations, tests, and follow-up before enrollment in our study and in the period before the medical record review. Medical record reviews were conducted, on average, 12 months after the provider enrolled in the study. We considered a patient up-to-date with screening recommendations and tests if he or she had received a recommendation for and completed any of the following: a home FOBT within the past 18 months, flexible sigmoidoscopy within the past 5 years, barium enema within the past 5 years, or colonoscopy within the past 10 years. We recorded each patient's up-to-date status before and after the intervention.

Sixty-three providers agreed to the medical record review. Of these, 2 moved before their review, 22 changed their minds after initially agreeing (most often because the staff did not agree to or believe that they could identify and pull eligible medical records), and 4 were excluded because of invalid data (eg, no eligible medical records). This left 351 patient medical records from 35 providers.

STATISTICAL ANALYSIS

For all analyses other than the medical record review, we used the individual clinician as the unit of observation. Demographic characteristics were summarized as percentages, means, or medians. We used nonparametric tests to compare self-reported information at baseline and follow-up. To compare the number of clinicians reporting each CRC screening behavior at baseline with the number reporting it at follow-up, we used a 2-sample test for binomial proportions for matched-pair data (McNemar test). Each clinician's behavior at baseline and follow-up was compared and treated as one matched pair.

For each category of behavior change, there were several options the clinicians could use to attain the overall goal. For example, to improve patient education, clinicians could hang educational posters or actively distribute brochures. To assess the improvements made in a given category, we created a score variable by summing the individual options for the category. Maximum scores ranged from 3 to 7. To evaluate changes in scores between baseline and follow-up, we used a Wilcoxon signed rank test.

To evaluate the changes in patients' up-to-date status before and after the intervention as determined by medical record review, we used a 1-sample test for binomial proportions, accounting for the clustering of patients within providers. In particular, we were interested in the proportion of patients who became up-to-date during the intervention.

RESULTS

Initially, 1972 physicians were invited to participate in the study. Of these, 276 (14.0%) returned a postcard in-
indicating that they were interested. One hundred eighty-five clinicians (New Hampshire, 79; Massachusetts, 69; and Connecticut, 37) enrolled in the study.

Of the 185 enrolled clinicians, 29 dropped out because of lack of continued interest and 11 left their practice. This left 145 enrolled clinicians eligible to complete the follow-up questionnaire. Of those, 127 (87.6%) completed their questionnaires.

Nearly 80% of the 185 clinicians who enrolled were physicians, and 93.5% specialized in internal medicine or family practice (Table 1). Slightly more than half (53.5%) were in private practice, and more than half (53.0%) reported that at least 1 physician in their practice was trained in colonoscopy. The number reporting practice colleagues trained in flexible sigmoidoscopy was much lower (18.4%).

On average, at baseline clinicians gave CRC screening recommendations to 34.5% of their patients during periodic health examination or waiting or examination rooms (18.4%) but increased to 69.3% at follow-up (43.3%) at baseline and follow-up. The most common method of patient education at baseline (15.0%) but increased to 43.3% at follow-up (P < .001). The active distribution of posters and brochures in the waiting or examination rooms (baseline, 20.5% and follow-up, 69.3%; P < .001) and an increase in staff discussing screening with patients (baseline, 20.5% and follow-up, 36.2%; P < .05). The active distribution of brochures was one of the least common methods of patient education at baseline (15.0%) but increased to 43.3% at follow-up (P < .001).

Health maintenance flow sheets and notations in the progress note were the most common methods used for identifying patients due for screening (67.7% and 64.6%, respectively, at baseline) (Table 2). Although both methods decreased slightly at follow-up (62.2% and 60.6%, respectively), their use remained high.
For enabling and monitoring patient compliance, we evaluated each screening modality separately. At baseline, 108 clinicians (85.0%) reported that they recommend home FOBT for their asymptomatic patients 50 years or older. At follow-up, this increased slightly to 113 (89.0%). Among 102 clinicians who recommended FOBT at baseline and follow-up, 80% to 90% provided tools (such as written instructions and return envelopes) to enable patients’ compliance (Table 2). The number of providers who recorded when their patients received the FOBT kit increased from 76.5% to 85.3%. Furthermore, the percentage of providers who monitored compliance with FOBT recommendations increased from 26.5% at baseline to 52.0% at follow-up (P<.05).

At baseline, 45.6% of providers who recommended colonoscopy and 51.0% of those who recommended sigmoidoscopy reported that they did not monitor compliance with their recommendations. Few changes between baseline and follow-up were observed in the monitoring of compliance with tests other than FOBT (data not shown). Also, no appreciable changes occurred during the study in the methods clinicians used to notify their patients of test results.

At baseline, 78.7% of clinicians reported that they refer the patient to a gastroenterologist after an abnormal FOBT result, but only 29.6% reported monitoring whether patients followed through with the referral (data not shown). Similarly at follow-up, the percentage of clinicians referring patients with a positive FOBT result but not monitoring whether the patient complied was 35.4% (data not shown). Four clinicians reported that they would repeat the test after a positive FOBT result and 8 said that they would recommend sigmoidoscopy; neither practice complies with established guidelines.¹

Table 3 gives the changes that were implemented by broad behavior categories. Each 1-point increase or decrease in the score translates into 1 additional or less behavior that was adopted or discontinued in that category. We observed significant improvements in the category of patient education (P<.001) and in the combined category of enabling and monitoring FOBT (P=.008).

Of 551 patient medical records reviewed, the percentage of patients up-to-date with their screening recommendations increased from 38.7% at baseline to 56.1% at follow-up. Similarly, the percentage of patients up-to-date with their screening tests increased from 34.4% at baseline to 43.2% at follow-up (data not shown). One hundred forty-two patients who were not up-to-date with their CRC screening recommendations at baseline were up-to-date at follow-up (Table 4). Ninety-two patients who were not up-to-date with their CRC screening tests at baseline were up-to-date at follow-up. A statistically significant proportion of individuals became up-to-date with screening recommendations and tests (P<.001 for both) during the intervention.

Although our intervention did not promote any particular screening test or aim to change the modality that clinicians recommended for CRC screening, we observed a shift away from sigmoidoscopy (78.7% to 49.6%) and a shift toward colonoscopy (53.5% to 81.1%) (P<.001 for both) (Figure). We observed a decrease in the percentage of clinicians recommending barium enema (17.3% to 10.2%, P<.05) but no significant change in the rate of recommendation for FOBT (85.0% to 89.0%, P=.32).

**COMMENT**

Among 127 primary care clinicians in New Hampshire, Massachusetts, and Connecticut, we demonstrated im-

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**Table 3. Behavior Changes of the 127 Participating Clinicians in 3 Areas Targeted by the Intervention**

<table>
<thead>
<tr>
<th>Area</th>
<th>No. of Clinicians With a Change in Score From Baseline to Follow-up*</th>
<th>P Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educating patients about colorectal cancer screening</td>
<td>Score Decreased</td>
<td>2</td>
</tr>
<tr>
<td>Identifying patients who are due for screening</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>Subset of those who recommended fecal occult blood test at baseline and follow-up (n = 102)</td>
<td></td>
<td>19</td>
</tr>
</tbody>
</table>

*Points were assigned to behaviors reported in the questionnaire, and a score was calculated for each provider by taking the sum of those points within each category.†Two-sided Wilcoxon signed rank test for change in score before and after the intervention.

**Table 4. Patients’ Up-to-date Status With Screening Recommendations and With Screening Tests at Baseline and Follow-up Based on 551 Patient Medical Records From 35 Clinicians**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Up-to-date at Baseline but Not at Follow-up</th>
<th>Up-to-date at Follow-up but Not at Baseline</th>
<th>P Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening recommendations</td>
<td>42</td>
<td>142</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Screening tests</td>
<td>42</td>
<td>92</td>
<td>.001</td>
</tr>
</tbody>
</table>

*Data are given as number of patients unless otherwise indicated.†Statistical significance from 1-sample test for binomial proportions accounting for clustering within provider.
provenments in 2 areas for CRC screening, educating patients and monitoring patient compliance with FOBT. A review of a subset of medical records showed a statistically significant improvement in the number of patients who became up-to-date with CRC screening recommendations and tests. The improvement we observed in patient education was primarily a result of increased passive use of posters and brochures, active distribution of these materials, and the frequency of clinicians’ reporting that staff discussed CRC screening with patients.

At baseline, most clinicians in our population did not have any tracking system to monitor compliance with FOBT recommendations. We observed a statistically significant increase in the number of clinicians who reported having a monitoring system at follow-up, which can be largely attributed to our facilitators’ setting up simple and effective manual tracking systems.

Computer systems have been shown to improve preventive health services within primary care practices. However, our results suggest that, while ubiquitous (data not shown), computer systems are vastly underused for tracking preventive health care services. Appropriate follow-up of an abnormal FOBT result is a critical step in appropriate CRC screening. We observed a decrease in the number of clinicians who referred their patients to a specialist without further primary care follow-up or tracking. However, we also found that some clinicians were doing inappropriate follow-up for an abnormal FOBT result, such as repeating the test. This suggests a continued need to increase clinician awareness and knowledge regarding correct follow-up procedures for FOBT.

The coverage of colonoscopy in leading medical journals that reach a substantial audience of primary care clinicians is a likely cause of the shift we observed from recommending sigmoidoscopy to recommending colonoscopy. Furthermore, the general public is increasingly informed about colonoscopy through media events such as news anchor Katie Couric’s colonoscopy in 2000. These types of secular trends affect the evaluation of non-controlled trial interventions on CRC screening.

As in previous studies, clinicians overestimated the number of patients to whom they give CRC screening recommendations. Our medical record review suggests that clinicians give CRC screening recommendations to approximately 40% of their asymptomatic average-risk patients 50 years or older. Clinicians potentially miss opportunities to provide screening recommendations because of their perception of efficacy. Verifying self-reported information with an objective data source in these types of evaluations is critical.

We demonstrated a significant increase in the proportion of patients up-to-date with their screening recommendations and tests. The objective measures of change in the medical record data corroborate the self-reported behavior changes and, taken together, are an indication of the effect of our intervention. The voluntary nature of the medical record review raises the possibility that medical records reviewed may not be representative of all participating clinicians. However, the overall low rates of screening, even after our intervention, suggest that this is less likely to have strongly affected our overall findings. Although we focused our attention on those who had a change in their up-to-date status, we also saw an increase in the absolute percentage of patients up-to-date.

Dissemination and implementation projects are the foundation for translating research into practice. The efficacy of these types of projects has been reviewed, and the barriers and incentives to overall evidence-based practice have been evaluated. However, evaluating the effect of these types of projects, particularly with respect to CRC screening, is challenging, and formal methods require further development. Although randomized trials are still the gold standard of investigating the effect of interventions, we believe that our “pragmatic trials” provide useful information on whether office systems interventions are effective in the real world.

This project encountered limitations inherent in evaluating CRC screening. First, CRC has multiple screening modalities with long intervals between several of the screening tests. Evaluating changes to these tests requires prohibitively long follow-up. Furthermore, tracking patient compliance requires looking retrospectively at each patient’s history to establish up-to-date status, rather than comparing cross-sectional proportions before and after the intervention. Second, although the gold standard measure of CRC screening is CRC mortality, tracking mortality does not normally fit within the financial and time constraints of an evaluation project, given the long latency of this disease. The next best outcome for increased CRC screening would be polyp removal data. However, reliable and comprehensive polyp removal data are not usually readily available.

Studies that have evaluated the dissemination and implementation of a similar intervention (Put Prevention Into Practice) concluded that simple tool availability was not sufficient to affect change; technical assistance is a key factor toward improving implementation. Therefore, although our recruitment methods may have led to participation by motivated physicians, we believe that the clinicians would not have implemented changes as effectively without the facilitators’ providing attention, support, and technical assistance. Overall, our re-
sults suggest that use of an office systems approach toward improving CRC screening behavior in real-world primary care practices is feasible and effective enough to warrant considering wider dissemination.

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REFERENCES


