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The effects of teamwork and system support on colorectal cancer screening in primary care practices

Shawna V. Hudson, PhD^{a,b}, Pamela Ohman-Strickland, PhD^{b,c}, Regina Cunningham, PhD^{a,b}, Jeanne M. Ferrante, MD^d, Karissa Hahn, MPH^b, and Benjamin F. Crabtree, PhD^{a,b,e}

^a The Cancer Institute of New Jersey, UMDNJ-Robert Wood Johnson Medical School, New Brunswick, NJ

^b Department of Family Medicine, UMDNJ-Robert Wood Johnson Medical School, New Brunswick, NJ

^c Department of Biostatistics, UMDNJ-School of Public Health, Piscataway, NJ

^d Department of Family Medicine, UMDNJ-New Jersey Medical School, Newark, NJ

^e Department of Epidemiology, UMDNJ-School of Public Health, Piscataway, NJ

Abstract

BACKGROUND—While cancer screening is generally increasing in the U.S., colorectal cancer (CRC) screening remains low. Most CRC screening interventions focus either on patients or individual clinicians without examining the office context in which CRC screening is implemented. This study examines whether primary care practices that involve staff in general forms of health education have higher CRC screening rates than practices that do not.

METHODS—Cross-sectional data from 22 New Jersey and Pennsylvania family medicine practices were analyzed. Data include chart audits for 795 men and women eligible for CRC screening (age 50–70) and practice information surveys for each practice. Generalized estimating equations were used to determine CRC screening correlates.

RESULTS—Overall, 31.3% (n=249) of patients received CRC screening. Practices that reported using nursing or health educator staff to provide behavioral counseling to patients on topics such as diet, exercise or tobacco use were significantly more likely to also have higher CRC screening rates ($z=7.30$, $p<0.0001$). Their patients had 2.96 times increased odds of CRC screening than those in other practices (95% C.I., 2.21–3.96). Reminder system use was also associated with higher CRC screening ($z=4.96$, $p<0.0001$). In practices that used reminder systems, patients had 2.57 times increased odds of CRC screening than others (95% C.I., 1.77–3.74).

CONCLUSIONS—These findings suggest that interventions to achieve better CRC screening rates do not need to focus solely on CRC. Higher CRC rates may be achieved by capitalizing on the enhancing contributions of non-physician practice members providing more general health behavior change patient education.

Keywords

colorectal neoplasms; cancer prevention; cancer control; primary care; family practice; patient care team; medical records; medical record audit; colonoscopy; reminder system

Corresponding author: Shawna V. Hudson, PhD, The Cancer Institute of New Jersey, 195 Little Albany Street, New Brunswick, NJ 08903–2681, hudsonsh@umdnj.edu, phone: 732–235–9591, fax: 732–235–8808.

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Introduction

Colorectal cancer (CRC) is the third leading cause of new cancer cases and cancer death for men and women in the United States.[1] In 2006, there were an estimated 148,610 new cases and 55,170 deaths from colorectal cancer.[1] Providing evidence based preventive screening for colon cancer has been identified as a priority area for national action by the Institute of Medicine (IOM).[2] Preventive screening for CRC in the forms of colonoscopy, sigmoidoscopy and fecal occult blood testing (FOBT) have been shown to reduce mortality in randomized control trials and case controlled studies.[3,4] Appropriate testing could have saved more than half of the 55,170 people expected to die in 2006 from CRC.[1]

A number of recent studies [5-7] aimed at improving CRC screening in primary care practices directly target physicians for CRC clinical interventions examining their attitudes [6,7] and whether physicians discuss CRC screening with their patients.[5] Although, primary care physician counseling of patients has been positively associated with CRC screening,[6,8] this approach is inadequate due to multiple competing demands and priorities.[9-11] Increasingly traditional models of primary care practice are being criticized as too physician centric and resulting in care that is mostly reactive and often fragmented.[12] Several reports including the IOM's *Crossing the Quality Chasm* [13] and the *Future of Family Medicine* [12] describe optimum health care settings as being "responsive and prospective" practices that include a teamwork approach where multidisciplinary teams and not individual clinicians are the sources of care. Nevertheless, few studies examine the impact of involving other health care team members on CRC screening.[14]

There is a growing literature that suggests that office characteristics such as office practice structure [15,16] and competing demands [17] are associated with cancer screening, [15,16] and several new models of primary care advocate the use of teams in the delivery of health care.[12,13] The purpose of this paper is to determine if the inclusion of office staff in general behavioral counseling activities has the added benefit of enhancing rates of colorectal cancer screening.

Methods

We used cross-sectional data collected at baseline, from April 2003 through December 2004, from a quality improvement intervention study, Using Learning Teams for Reflective Adaptation (ULTRA). The ULTRA study used a multi-method assessment process [18] to inform a facilitated team-building intervention [19] aimed at improving guideline adherence for multiple chronic diseases among 60 practices in New Jersey and Pennsylvania. For this analysis, 22 suburban practices were selected that had medical records with at least 10 years of data, thus allowing the calculation of rates of colonoscopy screening as a primary outcome measure. The University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School Institutional Review Board approved this study. Written informed consent to participate in the study was received from the medical directors and/or lead physicians of each practice before study data were collected.

Data Collection

Clinical outcome data were collected from medical records. Each practice participating in the study generated lists of patients seen in their office during the previous twelve months based on billing codes for the following conditions: asthma, coronary artery disease, diabetes, hypertension, and any reason. Patient records were excluded if patients were deceased at the time of the audit, below age 18 or no longer a patient of the practice. Within each practice, twenty patients were randomly selected from each list of patients. In cases where there were fewer than 20 patients in the practice with a particular diagnosis code, all patients with the

diagnosis code were used. For all patients, nurse chart auditors from the research team noted the dates of relevant cancer screenings (i.e., breast, cervical, colorectal and prostate) as well as age and other patient information. Only patients aged 50 and above are eligible for CRC screening. Furthermore, due to co-morbid conditions, screening for patients above 70 may be of decreasing value. Thus we limited this analysis to include only patients aged 50 to 70, an average of 36.1 patients per practice (total n=795). A single nurse chart auditor audited the charts in the 22 practices.

In addition to the medical record review, practice managers and lead physicians completed a 46-item practice information survey that solicited information on topics such as patient population (e.g., payer mix, race/ethnicity), staff turnover, use of clinical reminder and prevention systems, and implementation of electronic medical records.

Measures

Outcome score—We examined CRC screening as the primary outcome and used the US Preventive Services Task Force (USPSTF) clinical considerations[20,21] and the American Cancer Society (ACS) screening recommendations[22] regarding age and appropriate time interval to evaluate whether patients had been screened. Dates for all CRC screening modalities (i.e., home administered FOBT, double contrast barium enema, sigmoidoscopy and colonoscopy) and dates of patients' last visits to the practice were obtained through the medical record review. Patients were considered to be up to date on their CRC screening if one of the following conditions were met: (1) colonoscopy within 10 years; (2) sigmoidoscopy or double contrast barium enema within 5 years; or (3) at home FOBT within the past year. Patients were considered to have been screened according to guidelines if they had received one of the screening tests in the recommended time period before their most recent office visit or within 90 days after their most recent office visit. We used a 90-day window following the office visit to account for scheduling of tests after the most recent visit and any delays in the reporting of test results from consultants to the practice. This grace period has been used in other studies. [23,24] For each eligible patient in the practice, a binary variable was created to indicate whether screening had occurred according to USPSTF/ACS recommendations (0 = no, 1 = yes).

Office context indicators—Indicators of practice teamwork were taken from the practice information survey. A binary indicator of behavioral counseling was created from the question “Do you use nurses or health educators within your practice to provide individual counseling to your patients with any of the following?” and applied to each of three topics: diet/eating habits, exercise/physical activity or tobacco use. If the practice indicated “yes” for all three, then they were assigned a score of 1; otherwise a score of 0. Physicians and office managers were also asked, “Does your practice use a health risk assessment (HRA) protocol or questionnaire to identify patients who may benefit from counseling or other interventions for the following?” for the same three categories. If they responded yes, then a binary indicator for health risk assessment was assigned a score of 1 and 0 otherwise. Finally, for reminder systems, the practice information survey asked “Do you regularly use any of the following reminder systems?” Responses of yes for patient reminder cards, computerized patient recall system or telephone recall by nurse/office staff were used to construct a binary reminder system measure (1 = yes practice uses any type of reminder system).

Socio-demographic correlates—We captured general demographics for the practices such as practice type, average number of years the practices had been in existence and practice estimates of payer mix and race/ethnicity of the patient population. In addition, we examined patient level covariates such as age, gender, presence of co-morbid conditions (i.e., asthma,

diabetes, heart disease and hypertension) and number of patient visits in the past 2 years (see Table 1).

Analyses

Descriptive statistics were used to summarize rates of screening and teamwork indicators as well as other patient and practice-level socio-demographic information. Means with ranges and standard deviations summarized both continuous patient-level covariates (age, gender, number of visits in past 2 years) and practice-level covariates (practice size, % patient race/ethnicity, % payer mix, number of years in practice), while frequencies summarized binary variables (for patients, presence of co-morbid conditions; for practices, CRC screening, teamwork indicators).

Generalized estimating equations were used to examine the effects of the practice indicators of teamwork, while controlling for additional practice-level covariates and patient-level covariates. Proc Genmod in the SAS programming language Version 8.1 was used for this estimating procedure. Through use of the generalized estimating equations, simultaneous evaluation of both practice and patient level covariates was possible while accounting for correlation between subjects within practices. A logit link function was used to model the binary response variable (CRC screening completed according to guidelines). Patient level covariates included in the model included patient age, gender, # of visits in the past 2 years and presence of co-morbid conditions (see Table 1).

Results

In the 22 practices charts were audited for 795 patients eligible for CRC screening. Over half (55%) were men. The average patient age was 59.30 (S.D.= 5.84). Of the patients eligible for screening, 249 (31.3%) had received appropriate screening, with practice screening rates ranging from 10.3% to 64.9% (median of 31.9%). Twenty out of 22 practices were group practices (91%) with a heavy Caucasian patient panel (average 86%). Most practices reported the majority of their patients had commercial insurance, with an average of 25% having Medicare, 4% having Medicaid, and 7% having no insurance. On average, practices had been under the current ownership for 14.55 years (range 0–30 years).

A summary of the statistical results can be found in Table 1. Four of the 22 practices indicated that they used Health Risk Assessments (HRA's) for diet, physical activity and tobacco; however, the use of HRA's was not significantly associated with CRC screening ($z=-0.44$, $p=0.6625$).

On the other hand, three of the practices indicated that they used nursing staff for diet, physical activity and tobacco counseling activities and these had significantly higher CRC screening rates than those not using nursing or health educator staff for such counseling ($z=7.30$, $p<0.0001$). Over half of the patients (54%) in these practices with behavioral counseling received CRC screening in contrast with 27% of patients in practices without. In particular, in practices that used behavioral counseling by nursing or health educators, a patient's odds of appropriate screening were 2.96 times a patient's odds of screening in practices that did not use nursing or health educators for behavioral counseling.

Twelve of the 22 practices used some sort of patient reminder system, whether patient reminder cards, a computer recall system or telephone recall by the nursing or office staff. Practices using patient reminder systems had significantly higher CRC screening rates despite the fact that these systems were not specifically targeting CRC screening ($z=4.96$, $p<0.0001$). In practices that used reminder systems, a patient's odds of appropriate screening were 2.57 times

a patient's odds of screening in practices that did not use nursing or health educators for behavioral counseling.

Practices that did and did not offer counseling by non-physician staff differed significantly ($p=0.0217$) with respect to % of patients on Medicaid. However, this difference was due to one practice that provided non-physician counseling reporting 24% of their patients were on Medicaid. All other practices reported 10% or fewer patients with Medicaid insurance. No other significant associations existed for counseling. Practices that used reminder systems or health risk assessment did not differ significantly from those that did not.

Additional analyses examined the effect of the three different types of counseling (physical activity, eating and tobacco) independently to examine whether one or two of them contributed to the observed effect of counseling more strongly than others. Of seven practices that provided any type of counseling by non-physician staff, two practices used non-physician staff for counseling in one area; two practices in two areas; and three practices in all areas. Results examining the association with colorectal screening are included in Table 2. Physical activity counseling had the largest effect with an odds ratio of 2.40; however, this effect was smaller than the effect of using non-physician staff for all three types of counseling, which had an odds ratio of 2.96.

Discussion

Reports such as IOM's *Crossing the Quality Chasm* [13] and the *Future of Family Medicine* [12] identify team approaches and more functional offices as important variables for improving outcomes in the primary care setting. In this study, we examined three generic organizational features to determine if they would also translate into higher rates for a non-targeted recommendation, that of CRC screening. Two of these features; the use of nurse or health educator for health behavior counseling and the use generic reminder systems, were found to be associated with higher rates of CRC screening.

Most studies that examine preventive CRC screening do so aiming to find the problem – e.g., patient barriers, [25-30] physician barriers, [5-7,31,32] system barriers [14,23,24,33,34] – and implement targeted interventions that solely impact CRC screening. These approaches, while successful to varying degrees, may be limited in their usefulness in applied practice settings for a number of reasons.

First, the focus on targeting physician barriers, while necessary, is not sufficient alone. Klabunde et al 2003 report that 98% of primary care physicians agree with recommendations for CRC screening, [31] yet the low rates of screening reported in this study and other chart audit studies [35,36] suggest that knowledge of recommendations does not translate into action without additional practice organizational features in place to support them. With the large number of preventive recommendations now in place, effective screening requires a “system” within the practice that facilitates the translation of recommendations into everyday care delivery; however, few practices have mechanisms in place to ensure that this happens. Indeed, evidence from quality improvement studies that focus on providing system enhancements have demonstrated efficacy for increasing CRC screening [24] while others without this focus have demonstrated either no improvement [37] or unsustainable improvements.[35] Findings from this study support the use of multidisciplinary teams and support systems as being efficacious for increasing CRC screening.

Second, there has been a tendency for practice improvement studies to focus on segments of care (e.g., preventive screening, chronic care, acute care) and disease silos (i.e., cancer, diabetes, cardiovascular disease). Yet, primary care physicians are tasked to care for individuals with multiple, competing risk factors and conditions. Therefore, developing

complicated procedures and interventions that are disease specific rather than focusing on increasing system capacity may be shortsighted. Our study shows that practices that had support systems in place, though not specifically targeted towards colorectal cancer screening, did in fact lead to higher rates of colorectal cancer screening. There have been several reviews of cancer prevention intervention effectiveness that have noted that multifaceted interventions with multiple targets are necessary to have large effects on screening.[38,39] However, such interventions are scarce. This is an area of study in need of further development.

Our study findings should be interpreted while considering several potential limitations. First, there are a number of factors that limit generalization of these results. Our sample was drawn mainly from a pool of patients with known chronic diseases (i.e., asthma, coronary artery disease, diabetes, hypertension). Though reflective of common diseases that affect many patients eligible for preventive colorectal cancer screening, this sample may over represent patients with chronic disease and under represent others in the general patient population. In addition, the study was conducted in suburban primary care practices in New Jersey and Pennsylvania and consisted of a relatively homogeneous group of practices with predominantly white patients who had commercial insurance; therefore it may not be generalized to practices in other settings. However, many would see this as a best-case scenario as the homogeneity of the patient population accentuates differences in practice screening patterns that might be masked were the practice populations fairly diverse.

Second, this was a chart review study, which may be limited by lack of documentation of some CRC screening. Some patients may have gone directly to gastroenterologists for their CRC screening, or there could have been inadequate documentation of referral for CRC screening so the screening rates we found may be artificially low. Additionally, chart audit measures of CRC screening cannot readily distinguish between diagnostic and preventive testing. Therefore, our CRC measure highlights documentation of FOBT, sigmoidoscopy, colonoscopy and barium enema usage and may overestimate the amount of preventive CRC screening occurring in these practices.

These limitations notwithstanding, the fairly low screening rates in our study, as well as the significant variability in rates, suggest that having generic system support in place in primary care practices is associated with increased CRC screening. We hypothesize that the efficacy of applying generic system support strategies such as the ones examined in this study will result in an additive effect, which applied across several targets, may increase numerous preventive screening efforts. However, there are a number of factors that might influence the relative success or failure of such interventions (e.g., the level of active support provided by clinicians and non-physician staff to patients in setting up and attending to screening appointments, health communication strategies used by clinicians and non-physician staff members to introduce and discuss the topics of cancer prevention and CRC screening before, during and after patient encounters). This is an area of research that is underdeveloped and merits further study.

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Table 1

The effect of patient and practice based correlates on colorectal screening

Unadjusted analyses			Multivariate analysis [†]	
CRC Screening using USPSTF/ACS guidelines			Z-score, p-value	Odds Ratio (95% CI)
	Number of patients	Number Screened (%)		
Gender				
Male	435	151 (34.7)	2.67, .0077	1.57 (1.13, 2.19)
Female	360	98 (27.2)		
Patient age				
Less than 60	420	122 (29.1)	-2.02, .0431	0.73 (0.54, 0.99)
60 or older	375	127 (33.9)		
Number of patient visits in past 2 years				
Less than 7	421	121 (28.7)	-1.27, .2049	0.80 (0.56, 1.13)
7 or more	373	127 (34.1)		
Patients with the following conditions:				
Asthma				
With	116	36 (31.0)	-0.28, .7806	0.94 (0.54, 1.49)
Without	679	213 (31.4)		
Diabetes				
With	299	88 (29.4)	-1.69, .0908	0.74 (0.53, 1.05)
Without	496	161 (32.5)		
Heart disease				
With	192	53 (27.6)	-2.22, .0263	0.61 (0.40, 0.94)
Without	603	196 (32.5)		
Hypertension				
With	528	166 (31.4)	-0.72, .4697	0.89 (0.64, 1.23)
Without	267	83 (31.1)		
Practice type				
Solo	48	10 (20.8)	-1.32, .1884	0.80 (0.58, 1.11)
Group	747	239 (32.0)		
Practice use of:				
Reminder systems				
With	458	183 (39.9)	4.96, <.0001	2.57 (1.77, 3.74)
Without	337	66 (19.6)		
Non-physician staff for behavioral counseling				
With	122	66 (54.1)	7.30, <.0001	2.96 (2.21, 3.96)
Without	673	183 (27.2)		
Health risk assessments				
With	150	60 (40.0)	-0.44, .6625	0.92 (0.64, 1.33)
Without	645	189 (29.3)		

/ Analysis performed eliminating one observation with missing data for # visits in past 2 years

Table 2

The effect of counseling on colorectal screening

Practice use of counseling for:	Unadjusted analyses		Multivariate analysis ^{1,2}	
	CRC Screening using USPSTF/ACS guidelines		Z-score, p-value	Odds Ratio (95% CI)
	Number of patients	Number Screened (%)		
Physical Activity				
	With	157		
	Without	638	3.77, .0002	2.40 (1.52, 3.80)
Eating	With	275		
	Without	520	1.78, .1383	1.51 (0.88, 2.59)
Tobacco	With	161		
	Without	634	3.02, .0025	2.19 (1.32, 3.66)

¹ Analysis performed eliminating one observation with missing data for # visits in past 2 years.

² Multivariate analyses were conducted separately for each category of counseling, with each reported association adjusted for all patient level covariates listed in Table 1 as well as practice use of reminder systems.