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Recommendation of colorectal cancer testing among primary care patients younger than 50 with elevated risk

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Abstract

In the era of precision medicine, efforts are needed to identify and tailor screening recommendations among elevated-risk patients. Individuals younger than 50 years are an important target population, as they comprise 15% of colorectal (CRC) cases and often present with more advanced disease than their 50+ counterparts. In this large study, 2,470 patients ages 25–49 used a tablet-based program that assessed risks, matched risks with screening guidelines, and generated tailored printed guideline-concordant recommendations for patients and their providers. The tablet-based program identified 121 (4.9%) patients with risk factors warranting screening before age 50. Likelihood of risk warranting screening was greater for ages 40–49 than <40 years (OR: 2.38), females than males (OR: 1.82), and African Americans (OR: 1.69) and non-Hispanic Whites (OR: 2.89) compared to Hispanics. Most common risk factors were family history of polyps (23.1%), personal history of inflammatory bowel disease (19.8%), and combined family history of CRC + polyps (18.2%). Receipt of guideline-concordant screening within 6 months of identification was low, including only 5.3% of those who needed colonoscopy and 13.3% for whom colonoscopy or FIT was recommended. Although elevated-risk patients younger than 50 years can be readily identified, more than notification is necessary to facilitate screening participation.

Keywords

Tailored interventions; Decision support; Cancer screening

INTRODUCTION

Screening for colorectal cancer (CRC) is not routinely recommended until age 50,¹ but national guidelines recommend earlier screening initiation among individuals with elevated risk.^{2, 3} About 15% of CRC cases occur among people < 50. They are more likely than their 50+ counterparts to present with advanced-stage disease⁴, incidence among them is growing rapidly,⁵ and those at elevated risk are unlikely to be screened.⁶

In the era of precision medicine, multiple groups have called for improved risk assessment and tailored screening for at-risk younger individuals.^{4–7} However, these patients are difficult to identify because relevant risk factors are not routinely collected and documented in medical records.⁸ Also, determining appropriate test modality, age at initiation, and repeat intervals is difficult because guidelines are based on complex algorithms considering multiple personal and family history factors. Based on risk factor combinations, some patients can satisfy guidelines via fecal immunohistochemical test (FIT) whereas colonoscopy is the only recommended test for those at highest risk.^{2, 3}

We developed a touch-screen computer program that assesses individuals' risks, uses algorithms to match them with national screening guidelines, and generates guideline-concordant printed recommendations for patients and their providers. The *Cancer Risk Intake System (CRIS)*^{9, 10} was used by a large, diverse population of patients in two primary-care community-based clinics in Dallas County's safety-net, Parkland Health and Hospital System. For these analyses, we used *CRIS*-collected data to characterize the subset

of patients younger than 50 years who reported risk factors indicating need for CRC screening and to describe proportions who underwent guideline-concordant screening, non-guideline-concordant screening, or no screening.

METHODS

Study procedures

From 8/28/2013 to 1/22/2016, bilingual research assistants and clinic staff invited a convenience sample of 4,583 patients to provide verbal consent and use *CRIS* while waiting for primary care appointments. Eligible patients were 25–75 years –youngest and oldest ages for which there are CRC screening guidelines^{2, 3} – and spoke English or Spanish. *CRIS* collected personal and family history risk factors, including heritable syndromes including Lynch and familial adenomatous polyposis.

CRIS, described in detail elsewhere^{9, 10, 2, 3} *CRIS* algorithms link responses with US Multi-Society Task Force (USMTF) guideline-concordant recommendations and generate tailored printouts for the patient and referring physician.

The study was approved by the UT Southwestern Institutional Review Board.

Analyses

We determined the proportion of patients younger than 50 years reporting risk factors warranting screening. We used multiple logistic regression analysis to examine whether demographic factors were significantly associated with risk warranting screening. We grouped patient-reported risk factors into: personal history of polyps, personal history of inflammatory bowel disease (IBD), family history of polyps, family history of CRC, and personal or family history of CRC or cancers associated with Lynch syndrome. A 3-level outcome identified whether patients received: (a) guideline-concordant screening (FIT or colonoscopy if either were recommended or colonoscopy if it was the only guideline-concordant test), (b) screening not guideline-concordant (FIT if only colonoscopy was recommended), or (c) no screening up to 12 months after *CRIS* completion.

Results

Of 4,583 patients who used *CRIS*, 2,470 (53.9%) were <50 years. As shown in Table 1, they were 70.8% female, 60.4% Hispanic, and 34.1% African American; 50.9% used the Spanish version of *CRIS*. Shown in Figure 1, 4.9% (n=121) reported risk factors warranting CRC screening. Among these 121, 49.6% were 45–49 years, 27.3% were 40–44 and 23.1% were < 40 years. Likelihood of risk warranting screening was greater for ages 40–49 than < 40 years (OR: 2.38; 95% CI: 1.54 – 3.67), females than males (OR: 1.82; 95% CI: 1.15 – 2.81), and African Americans (OR: 1.69; 95% CI: 1.14 – 2.49) and non-Hispanic Whites (OR: 2.89; 95% CI: 1.49 – 5.61) compared to Hispanics.

Among the 121 patients needing screening, 60.3% reported one and 36.4% reported two risk factors (Table 2). Largest groups included 23.1% reporting family history of polyps, 19.8% reporting personal history of IBD, and 18.2% reporting family history of CRC + polyps.

Shown in Figure 1, 76 (62.8%) patients had risk warranting colonoscopy only; 45 (37.2%) could satisfy guidelines via colonoscopy or FIT. Only 5.3% of the 76 who needed colonoscopy and 13.3% of the 45 for whom either test was recommended received guideline-concordant screening within 6 months. Another 6.6% of the 76 who should have had colonoscopy received non-guideline-concordant screening with FIT instead.

Discussion

We employed *CRIS* in two primary-care practices to identify patients whose CRC risks were sufficiently high to warrant screening before age 50. Of ~2,500 patients ages 25–49 who used *CRIS*, just under 5% reported risk factors warranting screening. Because younger patients who develop CRC are more likely to present with advanced disease,⁴ it is important to identify this subgroup and begin precision screening for prevention and/or early detection. Analyses reported here can inform future use of such tools to identify younger screening-eligible patients in routine practice.

About three-quarters of the ~5% in need of screening were in their 40s. Therefore, if non-feasible to routinely assess all patients, largest yield will come from ages 40–49 (although one might argue that patients <40 years may have the most exceptional risks and are especially important to identify). The most common factor elevating risk was family history of polyps – a factor primary-care physicians may not be as likely to assess as family history of cancer. Of those needing screening, most risks were high enough to warrant colonoscopy only.

We learned that identifying screen-eligible patients <50 and reporting guideline-based screening recommendations to them and their providers had negligible impact on screening receipt. Whereas a previous randomized controlled trial demonstrated use of *CRIS* significantly increased guideline-concordant testing (mainly for patients > 50⁹), this effect was not observed among younger patients in our study. Anecdotal discussions with providers suggest a recent system-wide push for FIT completion among *all patients of routine screening age* may have overwhelmed the message for the few exceptions under 50 years, especially when FIT was not the recommended modality. Ordering screening tests for these younger patients, especially colonoscopy, may have “gone against the grain” of common practice in these community safety-net clinics, highlighting need for further provider education.

Study limitations and strengths should be noted. No self-reported data collection system can totally avoid misclassification, either because patients may incorrectly report risk factors or because not every clinical detail (e.g. type of polyp) is queried. Also, because data were collected in community-based clinics from Dallas County’s safety-net system, findings may not generalize to other settings, populations, or methods of CRC risk factor assessment. Conversely, a strength is the large sample of ~2,500 patients younger than routine screening age from a traditionally underserved, racially diverse population. Also, generalizability is enhanced by use of a convenience sample of patients arriving for appointments rather than participants recruited by research assistants in the context of a highly controlled trial.

Conclusion

The fact that ~15% of CRC occur among individuals under routine screening age and these younger patients present with later-stage cancer suggest an urgent need to identify and initiate screening among patients <50 years with elevated risks. We found assessing risk among patients <50 years in routine practice identifies ~5% in need of CRC screening, with the largest yield from assessment of patients in their 40s. However, of those identified who needed screening, < 10% received the recommended test within 6 months. Although *CRIS* may offer a potential solution to identify younger elevated-risk patients, more than notification is necessary to facilitate screening participation.

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Abbreviations

CRIS	<i>Cancer Risk Intake System</i>
CRC	colorectal cancer

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Highlights

- Tablet-based program finds patients <50 years with risks warranting CRC screening.
- Likelihood of risk warranting screening was greater for ages 40–49 than <40 years.
- Receipt of guideline-concordant screening 6 months of identification was low.
- More than notification is necessary to facilitate screening participation.

Figure 1.
Study schematic

Table 1

Demographic factors of patients younger than age 50

	Screening Needed N=121 n (%)	Screening Not Needed N=2,349 n (%)	Overall N=2,470 n (%)	<i>p</i> -value ^a
Sex, Female	97 (80.2)	1,651 (70.3)	1,748 (70.8)	0.0198
Age, Years				
25–39	28 (23.1)	1,015 (43.2)	1,043 (42.2)	<0.0001
40–49	93 (76.9)	1,334 (56.8)	1,427 (57.8)	
Race/Ethnicity				
Hispanic	54 (44.6)	1,437 (61.2)	1,491 (60.4)	0.0007
NH White	12 (9.9)	103 (4.4)	115 (4.7)	
NH Black	54 (44.6)	787 (33.5)	841 (34.1)	
Other/Unknown	1 (0.8)	22 (0.9)	23 (0.9)	

NH = Non-Hispanic.

^a *p*-value based on Chi-Square analysis.

Table 2

Risk factors and screening completion reported by patients younger than age 50 eligible for CRC screening (N=121)

	n	%	Screening completion, n
1 Risk Factor			
Family Hx Polyps	28	23.14	2
Patient IBD	24	19.83	4
Family Hx CRC	9	7.44	1
Patient Hx Polyps	9	7.44	2
Patient/Family Hx CRC/HNPCC-related Cancer	3	2.48	1
2 Risk Factors			
Family Hx CRC			
+ Family Hx Polyps	22	18.18	3
+ Patient Hx Polyps	3	2.48	0
+ Patient IBD	1	0.83	0
Family Hx Polyps			
+ Patient/Family Hx CRC/HNPCC-related Cancer	11	9.09	0
+ Patient Hx Polyps	2	1.65	0
+ Patient IBD	1	0.83	0
Patient Hx Polyps + Patient IBD	4	3.31	1
3+ Risk Factors			
Family Hx Polyps + Patient Hx Polyps			
+ Family Hx CRC	2	1.65	0
+ Patient/Family Hx CRC/HNPCC-related Cancer	1	0.83	1
+ Family Hx CRC + Patient IBD	1	0.83	0

Hx: History; IBD: Inflammatory bowel disease; CRC: Colorectal cancer; HNPCC: Hereditary nonpolyposis colorectal cancer.