

COMPARISON OF FOUR POPULATION HEALTH INTERVENTIONS TO INCREASE COLORECTAL CANCER SCREENING IN YOUNG ADULTS: RESULTS OF A RANDOMIZED TRIAL

Artin Galoosian MD, MA^{1,2}; Daniel Croymans MD, MBA¹; Hengchen Dai PhD³; Silvia Saccardo PhD⁴; Craig R. Fox PhD^{1,3}; Gregory Goshgarian MD¹; Sadie De Silva MD^{1,2}; Maria A. Han MD^{1,2}; Sitaram Vangala MS¹; Folasade P. May MD, PhD, MPhil^{1,2,5,6}

- (1) Department of Medicine, David Geffen School of Medicine, University of California, Los Angeles
- (2) The Vatche and Tamar Manoukian Division of Digestive Diseases, Department of Medicine, David Geffen School of Medicine, University of California, Los Angeles
- (3) Anderson School of Management, University of California, Los Angeles, Los Angeles, CA, USA
- (4) Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh, PA, USA
- (5) Division of Gastroenterology, Greater Los Angeles Veterans Affairs Healthcare System, Los Angeles, California
- (6) UCLA Kaiser Permanente Center for Health Equity, Jonsson Comprehensive Cancer Center, Los Angeles, California

Character count: 2,900/2,900

Introduction: Colorectal cancer (CRC) incidence and mortality have increased in young adults in the United States, prompting several new guidelines that promote screening individuals starting at age 45. Effective population health strategies to screen these individuals have not yet been established. Thus, we aimed to determine effective outreach strategies to maximize screening participation among patients aged 45-49 in a diverse health system.

Methods: The study setting is a large, urban, tertiary academic health system with >3.5 million annual outpatient clinic visits. All health system patients between the ages 45-49, at average risk for CRC, and assigned to a primary care provider were included. Patients were randomized to one of four screening strategies: 1) fecal immunochemical test (FIT) invitation (option to request mailed FIT); 2) colonoscopy invitation (option to request colonoscopy); 3) choice between FIT and colonoscopy; or 4) mailed FIT outreach (standard of care). All invitations were sent to patients via the electronic patient portal (activated for 83% of patients aged 45-75) and via USPS mail. All patients received one initial text message and one reminder text message two weeks later. The primary outcome was completion of any CRC screening at 26 weeks.

Results: There were 20,509 patients randomized; 53.9% were female, 50.8% were non-Hispanic White, and mean age was 47.8 yrs (SD:1.5 yrs) (Table). The overall screening completion rate was 18.6%. Screening completion was significantly higher in the mailed FIT outreach group (26.2%) than in the other three groups in which patients were required to opt into a screening modality (Figure; $p<0.001$). Participation was lowest in the colonoscopy invitation group (14.5%) (Figure). Patients offered a choice between FIT and colonoscopy (group 3) were more likely to complete screening of any kind, compared to patients who were offered only one screening modality (group 1 or group 2) (17.4% v. 15.4%; $p=0.002$). Overall, colonoscopy was more common than FIT (11.1% v. 8.1%; $p<0.001$). In fact, patients given a choice between FIT and colonoscopy (group 3) were more likely to complete colonoscopy than FIT (12.1% v. 5.6%; $p<0.001$). Among patients randomized to FIT invitation (group 1) or mailed FIT outreach (group 4), there was also notable conversion to colonoscopy (10.0% and 10.2%).

Conclusion: We conducted a large, randomized trial to determine the most effective

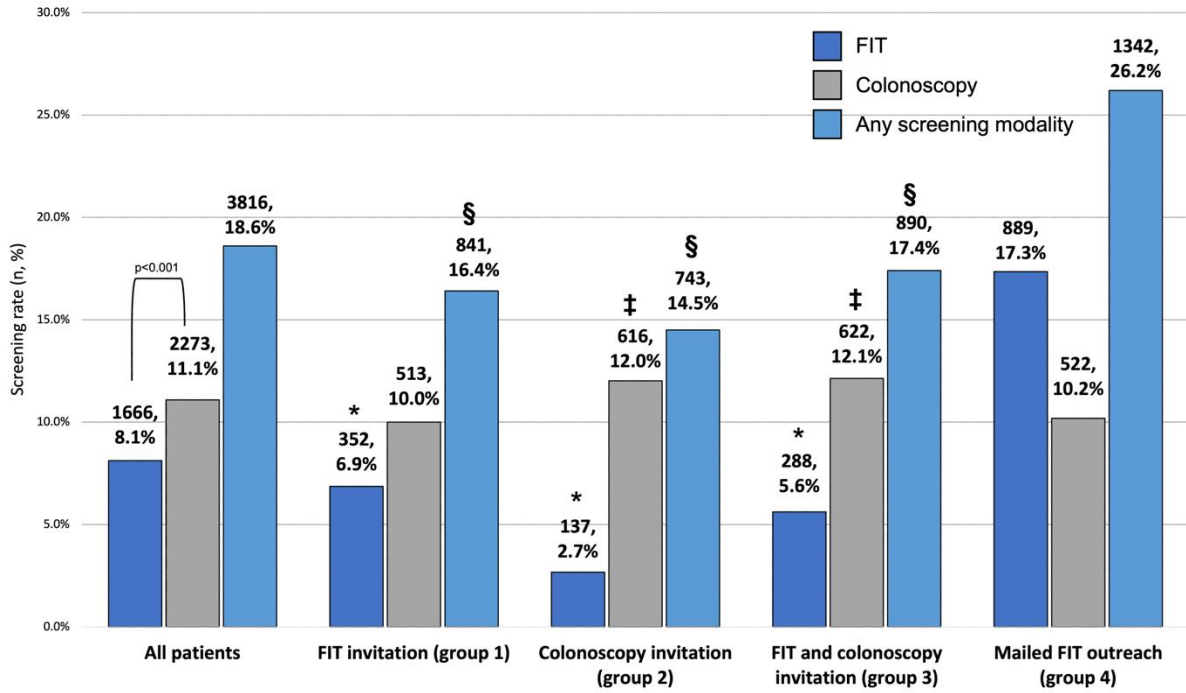
population health approach to screen patients aged 45-49 for CRC. Mailing patients a FIT kit resulted in higher screening participation than offering a choice between FIT and colonoscopy, offering FIT alone, or offering colonoscopy alone. Requiring patients to opt into a screening modality appeared to decrease participation. These findings provide important insight for future population health strategies for young adults at average-risk for CRC.

Tables and Figures

Table: Characteristics of the study population by randomization group, N=20,509

	All patients	FIT invitation (group 1)	Colonoscopy invitation (group 2)	FIT and colonoscopy invitation (group 3)	Mailed FIT outreach (group 4)
Total	20,509	5,131	5,127	5,125	5,126
Age					
Mean (SD)	47.8 (1.5)	47.4 (1.4)	47.4 (1.5)	47.5 (1.5)	47.4 (1.5)
Median (Q1, Q3)	47.4 (46.1, 48.7)	47.4 (46.2, 48.7)	47.4 (46.1, 48.6)	47.4 (46.1, 48.8)	47.4 (46.1, 48.7)
Sex					
Female (%)	11,048 (53.9)	2,854 (55.6%)	2,707 (52.8%)	2,760 (53.9%)	2,727 (53.2%)
Race/ethnicity					
Non-Hispanic Black	865	211	207	231	216
Non-Hispanic White	10,420	2,628	2,574	2,636	2,582
Hispanic	2,757	706	714	658	679
Non-Hispanic Asian	2,814	695	707	700	712
Other	3,653	891	924	900	937
Social vulnerability index (SD)	31.0 (24.8)	31.1 (24.8)	30.9 (24.9)	31.2 (25.1)	30.8 (24.3)
<p>SD: standard deviation Social vulnerability index refers to the potential negative effects on communities caused by external stressors on human health. It is a single measure that includes measures for: <i>socioeconomic status</i> - income, poverty, employment and education; <i>household composition</i> - age, single parenting and disability; <i>minority status and language</i> - race, ethnicity; <i>English language proficiency</i>, <i>housing and transportation</i> - housing structure, crowding and vehicle access.</p>					

Figure: Screening participation overall and by screening modality for each intervention group, N=20,509



* indicates p<0.01 compared to FIT in group 4
 ‡ indicates p<0.01 compared to colonoscopy in group 4
 § indicates p<0.01 compared to any screening modality in group 4