Supplementary Online Content

Gupta S, Skinner CS, Ahn C, et al. Effect of colonoscopy outreach vs fecal immunochemical test outreach on colorectal cancer screening completion: a randomized clinical trial. *JAMA*. doi:10.1001/jama.2017.11389

This supplementary material has been provided by the authors to give readers additional information about their work.

eAppendix.

Description of Usual Care: Usual care consisted of clinic-based CRC screening by clinicians. During the study period, Parkland clinics had a visited-based CRC screening reminder in the EMR (via an Epic Best Practice Alert [BPA]) that flagged patients who were not up-to-date. These were passive alerts and did not have a forcing function. The clinics had similar visit-based EMR reminders for other preventive care and chronic disease management testing recommendations when patient were not up-to-date, and primary care providers were used to interacting with such outpatient-oriented BPAs. There was also provider-level audit and feedback for CRC screening performance, which was included in clinicians' annual performance appraisal. Besides these measures, Parkland did not have any other standardized CRC screening promotion tools as part of usual care. The study protocol did not include any specific clinician education, patient education, or decision aids for patients in the usual care group. All information and recommendations about CRC screening was at the discretion of the clinician as part of their usual work flow and decision making. While the degree of information and discussions about CRC screening likely varied by patient and visit dynamics, we did not measure this. This natural variation in usual care underlies the pragmatic nature of the clinical trial and was assumed to be the same in all study arms (as the outreach arms were really outreach plus usual care).

Study period: The trial was terminated in July 2016 when Parkland Health & Hospital System moved to a new facility and FITs from the FIT outreach group could no longer be processed. Follow-up and outcome ascertainment was equal for all three groups; however, some patients had less than 12 months of follow-up during Year 3 given patients were randomized every quarter over Year 1. Of note, screening process completion rates did not differ by randomization periods.

	Randomization Period 1 No (%)	Randomization Period 2 No (%)	Randomization Period 3 No (%)	Randomization Period 4 No (%)
FIT Outreach	170 (28.3)	150 (25.0)	172 (28.7)	179 (29.8)
Colonoscopy Outreach	244 (40.7)	228 (38.0)	241 (40.2)	209 (34.8)
Usual Care	28 (9.4)	39 (13.0)	35 (11.7)	26 (8.7)

Sample Size Calculation: In order to conduct sample size estimates, we estimated the strategy-specific proportion of patients expected to complete the screening process. Assumptions for proportions completing each step of the screening process were based on available medical literature and our prior work.[1-12] Under these assumptions, the predicted screening process completion proportions were 8.6% for usual care, 13.5% for colonoscopy outreach, and 16.6% for FIT outreach. We *a priori* assigned FIT vs. colonoscopy outreach as our primary comparison of interest. Assuming alpha of 0.05, a sample size of 2,152 patients per group would be required to have 80% power to detect a statistically significant difference. To account for potential loss-to-follow up of 10%, we increased sample size for each group to 2,400 patients. Sample size for the usual care group was based on formal power analysis, as well as practical considerations. In a formal power analysis, assuming 2400 patients would be assigned to the FIT and to the colonoscopy outreach groups, we estimated that having $\geq$170 patients assigned to the usual care group would provide at least 80% power to detect the projected differences for colonoscopy outreach vs. usual care, as well as FIT outreach vs. usual care, assuming two sided alpha=0.05 for each comparison. From a practical standpoint, because only passive follow up utilizing electronic health record data was required for the usual care group, and because we expected some potential variation in usual care opportunistic offers for screening across clinics within the health system, we assigned 1200 patients to the usual care arm.

We conducted a post-hoc power calculation using Bonferroni correction to allay potential concerns about Type 1 error. With sample sizes of 2,400 patients in FIT outreach and 2,400 patients colonoscopy outreach and a potential loss-to-follow up of 10%, we had 67% power to detect a difference in the screening process completion proportions of 13.5% and 16.6% between the two intervention groups using a chi-square test at a two-sided significance level of 0.017 with Bonferroni correction. If we assumed no loss-to-follow up, we would have 72% power to detect this difference at a significance level of 0.017. With a sample size of 2100 patients assigned to usual care, assumed screening process completion rate of 8.6%, and 10% potential loss to follow-up, we had >95% power to detect differences of between both outreach intervention groups and usual care using a chi-square test at a two-sided significance level of 0.017. Thus overall, given that power to detect the target differences was substantial, even requiring Bonferroni correction for the key comparisons, chances of a type 1 error are low. Further, examination of the 95% confidence intervals for differences in screening process

completion for FIT vs. colonoscopy outreach, and each outreach arm versus usual care, suggest that repetition of the trial would be predicted to result in clinically meaningful, and qualitatively similar differences. Notably, the range of differences between the lower and upper confidence interval bounds around estimates of intervention group differences for the outcome of screening process completion is narrow (under 6%) for all comparisons.

eTable. Ascertainment of Colonoscopy Procedures

Transactions data within the EHR were queried for completed colonoscopy procedures. We used a combination of screening CPT and HCPCS codes as well as keyword searches of the procedure description, as listed below:

Code Type	Code	Description
CPT	45378	Colonoscopy, flexible, proximal to splenic flexure; diagnostic, with or without collection of specimen(s) by brushing or washing , with or without colon decompression (separate procedure)
CPT	45380	Colonoscopy, flexible, proximal to splenic flexure, with biopsy, single or multiple
CPT	45385	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s) or other lesion(s) by snare technique
CPT	45381	Colonoscopy, flexible, proximal to splenic flexure; with directed submucosal injection(s), any substance
CPT	45384	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s) or other lesion(s) by hot biopsy forceps or bipolar cautery
HCPCS	G0121	Colorectal cancer screening; colonoscopy on individual not meeting criteria for high risk
HCPCS	G0105	Colorectal cancer screening; colonoscopy on individual at high risk
Internal	-	COLONOSCOPY/BIOPSY
Internal	-	COLONOSCOPY/DIAGNOSTIC
Internal	-	COLONOSCOPY/POLYP REM/SNARE
Internal	-	COLONOSCOPY W/BIOPSY
Internal	-	COLONOSCOPY/SUBMUC INJECT
Internal	-	COLONOSCOPY W/RMVL POLYPS
Internal	-	CHG COLONOSCOPY
Internal	-	COLONOSCOPY/SUBMUCOSAL INJECTION
Internal	-	CHG COLONOSCOPY/REM.POLYP/LES OTH METHOD
Internal	-	COLONOSCOPY/CONTROL BLEEDING
Internal	-	CHG COLONOSCOPY W / BIOPSY
Internal	-	COLON/STOMA/BIOPSY
Internal	-	COLON/STOMA/POLYP REM/SNARE
Internal	-	COLONOSCOPY
Internal	-	COLONOSCOPY/FBR

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