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BRIEF COMMUNICATIONS

Noninvasive Colorectal Cancer Screening Tests Help Close Screening Gaps During Coronavirus Disease 2019 Pandemic

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See editorial on page 418.

The coronavirus disease 2019 (COVID-19) pandemic has upended routine preventive care across the country. Health systems worldwide have seen a drastic decrease in utilization of preventive care services, including colorectal cancer (CRC) screening.¹ In response to the pandemic, the US Surgeon General advised in March 2020 that all hospitals and ambulatory surgical centers delay nonurgent surgeries and medical procedures, including screening and surveillance colonoscopies. In line with these recommendations, the University of California Los Angeles (UCLA) health system temporarily ceased elective endoscopies and purposefully encouraged the use of stool-based CRC screening modalities among patients and providers through weekly system-wide e-mails to primary care and gastroenterology providers, virtual meetings with primary care leadership, and standardized educational materials for fecal immunochemical testing (FIT). In this study, we sought to quantify the impact of these changes on CRC screening rates and modalities. We hypothesized a decrease in utilization of invasive screening modalities (ie, colonoscopy) and a compensatory rise in stool-based screening (ie, FIT).

Methods

UCLA Health is a large, integrated health system in Southern California with over 371,000 primary care enrollees. Elective endoscopy ceased on March 18, 2020, at which time the health system implemented messaging to primary care and gastroenterology providers (eg, e-mail communication, virtual meetings) and continued mailed FIT² to encourage stool-based CRC screening when clinically appropriate. When elective endoscopy resumed on May 5, 2020 with new safety protocols in place, providers continued to offer noninvasive modalities in addition to screening/surveillance colonoscopy.

We performed a retrospective analysis using electronic health record data to identify all UCLA primary care patients who completed an endoscopy (colonoscopy or flexible sigmoidoscopy), FIT, computed tomography colonography, or stool DNA screening test during the endoscopy cessation period (March 18, 2020 to May 4, 2020), during an equal time interval before the cessation (January 29, 2020 to March 17, 2020), and during the months after resumption of elective

endoscopies (May 5, 2020 to October 27, 2020). Our primary outcome was the average number of screening tests completed per week among primary care enrollees. Secondary outcomes were utilization of each screening modality. We performed pair-wise comparisons of utilization rates before, during, and after endoscopy cessation overall and for each modality using Wilcoxon rank-sum testing (significance level $P < .05$).

Results

In the period before COVID-19, there was an average of 382.4 ± 54.8 screening tests per week, with colonoscopies (222.6 ± 33.0 per week) and FIT (154.0 ± 25.2 per week) comprising most tests. During the endoscopy cessation period, the total average declined to 74.3 ± 47.1 per week ($P < .01$). Colonoscopy saw the steepest decline (11.4 ± 11.1 ; $P < .01$). FIT use also declined significantly to 60.6 ± 52.7 ($P < .02$) but did begin to recover in later weeks of the cessation period (Figure 1 and Supplementary Figure 1). In the months after resumption of elective endoscopy, overall screening test utilization increased dramatically to equal pre-pandemic rates (346.8 ± 93.4 ; $P = .53$). Interestingly, use of colonoscopy approached but did not match pre-pandemic volume (174.2 ± 47.1 ; $P < .02$), whereas utilization of several noninvasive screening modalities either matched or exceeded pre-pandemic utilization, including FIT (154 ± 25.2 to 162 ± 55.2 ; $P = .54$) and stool DNA (0 to 6.0 ± 3.2 per week; $P < .01$). Flexible sigmoidoscopy and computed tomography colonography utilization remained low throughout the study period.

Finally, to determine if providers intended to use FIT as an alternative to colonoscopy while access to colonoscopy was low or in addition to colonoscopy until the procedure was more available, we reviewed rates of subsequent colonoscopy for patients who had a negative FIT during our

Abbreviations used in this paper: COVID-19, coronavirus disease 2019; CRC, colorectal cancer; FIT, fecal immunochemical testing.

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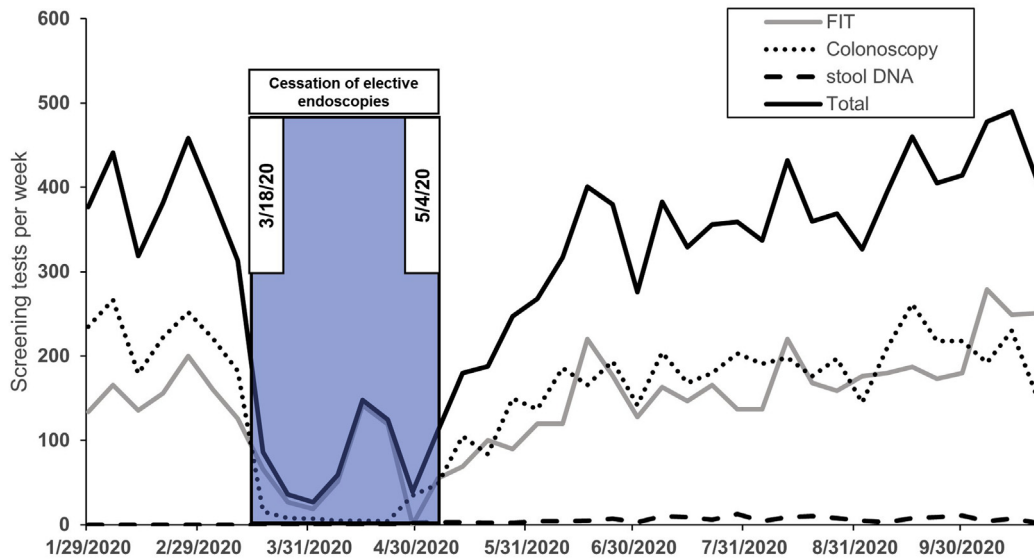


Figure 1. CRC screening test utilization overall and by modality during the study period. Flexible sigmoidoscopy and computed tomography colonography were omitted from the figure because of low baseline utilization rates and lack of significant change during the study period.

study period and during an equivalent period 1 year before the pandemic (January 29, 2019 to October 27, 2019). For patients with a negative FIT result, the rate of subsequent colonoscopy was similar in the 2 time periods (3.6% and 3.8%, respectively), suggesting against co-utilization of FIT and colonoscopy.

Discussion

In the wake of the COVID-19 pandemic, we found that utilization of CRC screening tests declined drastically, largely driven by a decrease in invasive screening modalities. Screening rates recovered to prepandemic rates in subsequent months, largely because of the increased use of stool-based screening modalities to compensate for fewer endoscopic screenings.

The observed decrease in CRC screening in our health system mirrors a pattern observed in health systems worldwide.^{3,4} Reasons for the decrease in CRC screening are likely multifactorial, including public health measures intended to curb spread of the pandemic, diversion of resources from outpatient to acute inpatient services, and patient fears about contracting the virus from healthcare settings. Although these measures were critical to prevent spread of COVID-19, they have also been projected to result in higher rates of preventable cancer diagnoses, later stage at time of diagnosis, and increased cancer-related mortality.^{1,5}

Our findings highlight the need to adapt existing technologies to current conditions to continue the decades-long effort to combat CRC amid the pandemic. Many health systems (including UCLA) have implemented preprocedural COVID-19 testing as a way to mitigate COVID-19 infections while continuing elective endoscopy.^{6,7}

However, preprocedural testing is a resource-intensive protocol that not only requires additional staff, capacity, and reagents but also tremendous logistical coordination of test results and endoscopic completion shortly thereafter. In contrast, our finding of a delayed compensatory rise in stool-based screening modalities suggests that increased utilization of noninvasive screening modalities can also serve as a useful strategy for CRC screening until endoscopic capacity recovers. Although stool-based screening tests are designed as 2-step tests that require timely diagnostic colonoscopy for positive test results, far fewer patients (5%–7% receiving FIT)⁸ will require endoscopy. In addition, identification and prioritization of patients at high risk of CRC (eg, prior advanced adenoma, family history of CRC) for colonoscopic screening will allow for more targeted utilization of precious health system resources.

Study limitations include its quasi-experimental nature and lack of clinical outcomes by screening modality; however, a true experimental approach may not have been ethical, and clinical outcomes can be evaluated in time. A major strength of this study is the generalizability of findings. In contrast to the resource-intensive preprocedural COVID-19 testing protocol mentioned above, FIT screening is inexpensive and widely available. Additionally, given the growing utilization of contactless services, an added benefit of stool-based screening is that it does not require physical patient–provider contact, which is highly desirable for patients and helps reduce risk of COVID-19 in health centers. Overall, this work highlights the potential of stool-based CRC screening modalities as a useful alternative to colonoscopy in the midst of the ongoing COVID-19 pandemic.

Supplementary Material

Note: To access the supplementary material accompanying this article, visit the online version of *Gastroenterology* at www.gastrojournal.org and at <https://doi.org/10.1053/j.gastro.2021.04.026>.

References

1. Kaufman HW, et al. *JAMA Netw Open* 2020;3:e2017267–e2017267.
2. Yu C, et al. *Clin Translat Gastroenterol* 2018;9:177.
3. Del Vecchio Blanco G, et al. *Int J Colorectal Dis* 2020;35:1951–1954.
4. Dinmohamed AG, et al. *J Hematol Oncol* 2020;13:147.
5. Maringe C, et al. *Lancet Oncol* 2020;21:1023–1034.
6. Forde JJ, et al. *Gastroenterology* 2020;159:1538–1540.
7. **Podboy A, Cholankeril G, Banerjee S**, et al. *Gastroenterology* 2020;159:1586–1588.
8. **Robertson DJ, Lee JK**, et al. *Gastroenterology* 2017;152:1217–1237.

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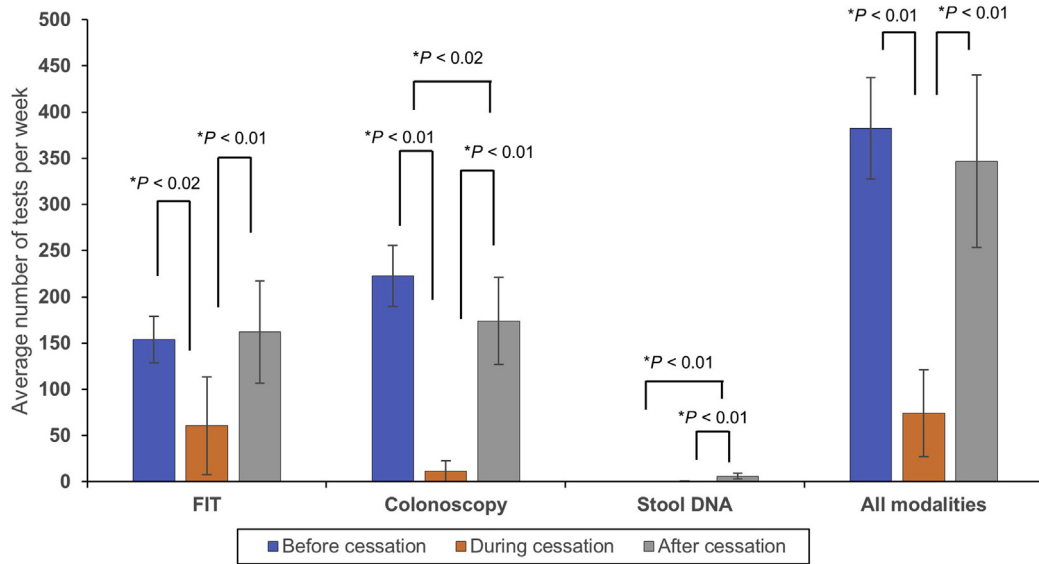
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Conflicts of interest

The authors disclose no conflicts.

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Supplementary Figure 1. Average weekly utilization of each CRC screening modality before, during, and after cessation of nonurgent endoscopies. Flexible sigmoidoscopy and computed tomography colonography were omitted from the figure because of low baseline utilization rates and lack of significant change during the study period.