


The Future of Cancer Screening After COVID-19 May Be at Home

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LAY SUMMARY:

- During the coronavirus disease 2019 (COVID-19) pandemic, cancer screening decreased precipitously; home screening for colorectal cancer diminished less than that for colonoscopy and breast and cervical cancer screening.
- The authors have highlighted approaches for home cancer screening in addition to telemedicine.

KEYWORDS: breast, COVID-19, cancer, cervical, colorectal, home, screening.

INTRODUCTION

The coronavirus disease 2019 (COVID-19; severe acute respiratory syndrome coronavirus 2; SARS-CoV-2) pandemic has triggered dramatic and rapid actions. With shelter-in-place policies implemented throughout the United States, and patients fearful of exposure to COVID-19 in health care facilities and physicians' offices, in-office visits were no longer possible, and instead were replaced by video and telephone visits, as institutional support would allow. Professional societies such as the American Cancer Society issued recommendations that no one should go to a health care facility for routine (nondiagnostic) cancer screening until further notification.¹ Other national professional societies issued similar recommendations (the American Society of Clinical Oncology, American Society of Breast Surgeons, American College of Radiology, and American Society for Colposcopy and Cervical Pathology) to postpone regular cancer screening until health care facilities resumed preventive visits.²⁻⁴ Prior to the pandemic, population screening rates for breast, cervical, and colorectal cancers among age-eligible adults at average risk were rising, reaching parity among diverse population subgroups, although still not meeting the Healthy People 2020 goals.⁵⁻⁷ During the pandemic, analyses of national cancer screening patterns⁸ as of April 25, 2020, revealed a precipitous drop in cervical cytology and breast cancer screening of 94% each and of 86% for colorectal cancer screening.

Other analyses of national claims data have suggested that, at current positivity rates, there could be 36,000 missed or delayed diagnoses of breast cancer during the 3-month period from early March through early June. Missed diagnoses of cervical cancer are estimated at 2500 cases and at 18,800 cases for colorectal cancer.⁹ The dramatic reductions in cancer screening have created considerable challenges for cancer detection, with later stages of disease at the time of diagnosis, increased cancer incidence (particularly for cervical and colorectal cancer), and greater morbidity and mortality.¹⁰⁻¹⁴

The US Preventive Services Task Force (USPSTF) recommends regular screening for breast, cervical, and colorectal cancers. In the United States, cancer screening has become predominantly an office-based and physician-directed activity, with colonoscopy performed under sedation, even though effective colorectal cancer screening can be done at home.¹⁰ In 2016, the USPSTF added the multitarget stool DNA (mt-sDNA) Cologuard test to the other recommended home screening options, including the guaiac fecal occult blood test (gFOBT) and fecal immunochemical test (FIT). In-office speculum examinations for specimen retrieval currently are the standard of care for cervical cancer screening; however, home sampling kits for cervical cancer screening currently are under evaluation for approval by the US Food and Drug Administration. Specialist-led bilateral mammography is normative for breast cancer screening. The USPSTF recommends low-dose computed tomography for lung cancer screening, but

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only for those individuals aged 55 to 80 years with a smoking history of at least 30 pack-years who currently smoke or have quit within the past 15 years. Their new draft deadlines propose to drop the pack-year exposure to 20 years, and the age at which to initiate screening to 50 years, but these recommendations likely will not be finalized until next year. Because the current commentary discussed USPSTF-recommended cancer screening tests among those at average risk, lung cancer will not be discussed further.

Although commercial analytic and electronic medical records (EMR) firms have shared national data, to our knowledge to date there have been no systematic studies of the variations in the use of the individual in-office or home screening tests, nor the implications of these changes in cancer screening within a local health care system. The objective of the current study was to describe the patterns of cancer screening in response to a statewide shelter-in-place executive order within a large, midwestern private medical center.

MATERIALS AND METHODS

Under a state executive order, Michigan Medicine (an affiliate of the University of Michigan) closed all of its clinics to nonessential care from March 19, 2020, to May 9, 2020, and initiated vigorous programs in telemedicine. We evaluated the EMR of 42,974 unique adult outpatients receiving routine cancer screening across 3 cancer types over the past 3 years between the periods March 19 to May 9 and May 10 to June 7 in 2017, 2018, 2019, and 2020. We selected the most common cancer screenings conducted for average-risk individuals at the health care center. We chose these time periods to compare patient visits during the shelter-in-place orders with similar time periods in the previous years to account for secular variations. We added an additional time period to show recovery rates as restrictions were being lifted. In accordance with USPSTF age-specific screening guidelines,^{11,13,14} we evaluated men and women aged 50 to 75 years for colorectal cancer screening via colonoscopy, the mt-sDNA test (Cologuard), and FIT; we assessed women aged 50 to 74 years for breast cancer screening via bilateral mammography; and reviewed women aged 21 to 65 years for cervical cancer screening via ThinPrep and/or the human papillomavirus DNA high-risk profile. We used both laboratory reports for cervical cancer screening and procedure codes for colorectal and breast cancer screening within the time periods under study. We excluded any patients who had been diagnosed with cervical, colorectal, or breast neoplasms between 2017 and 2020 to eliminate patients who

were undergoing surveillance. We used Slicer Dicer, a self-service analytics engine, to collect and select the EMR data regarding cancer screening in EPIC software. For the outpatient visits, we used regular reports from the EMR and billing claims.

RESULTS

We compared cancer screening for breast, cervical, and colorectal cancers year to year for the periods between March 19 and May 9 in 2017, 2018, 2019, and 2020 and during the clinic reopening between May 10 and June 7, 2020, by comparison with a similar period in 2017, 2018, and 2019 (Fig. 1). Patterns within these time periods were relatively similar prior to March 19 through May 9, 2020. By comparison with the same time period of March 19 through May 9, 2019, prior to the shelter-in-place orders, unique patient visits for cancer screening decreased markedly with mammograms for breast cancer (3339 to 6) and colonoscopy for colorectal cancer (1291 to 8) (Fig. 1). Cervical cancer screening also decreased considerably during the shelter-in-place orders (4990 to 444 overall). By comparison with comparable monthly time periods in 2019 prior to the shelter-in-place orders, all family medicine outpatient in-person visits decreased by approximately 91% (Table 1).

By contrast, although home mt-sDNA testing was less common than colonoscopy prior to the shelter-in-place orders, testing only decreased by approximately 65% during the pandemic (109 to 38 unique patients) (Fig. 1), while the home-based FIT decreased from 101 to 13 unique patients (87%). Similar to other recommended stool-based tests for colorectal cancer (eg, gFOBT), however, both the FIT and the mt-sDNA tests were performed at home by the patient, and therefore were feasible whereas in-office visits were limited.

After the clinic reopenings took place between May 10 to June 7, 2020, cervical cancer screenings increased slightly. Colonoscopy screenings only increased slightly after the clinics reopened, despite their high economic value to medical centers.¹⁵ Neither mt-sDNA screening using Cologuard nor FIT increased. Screening mammograms were not resumed until June 29, 2020, which was a later stage in the reopening of the medical center, and therefore these data reflected as-needed diagnostic mammograms. After reopening of the clinics in 2020, family medicine outpatient visits increased to approximately 80% of the total between May 10 and June 7, 2019, but in-person visits dropped by approximately 88%. Concurrently, video, telephone, and portal visits have continued to follow a steep upward trajectory, far above the use of these approaches in a comparable period in 2019.

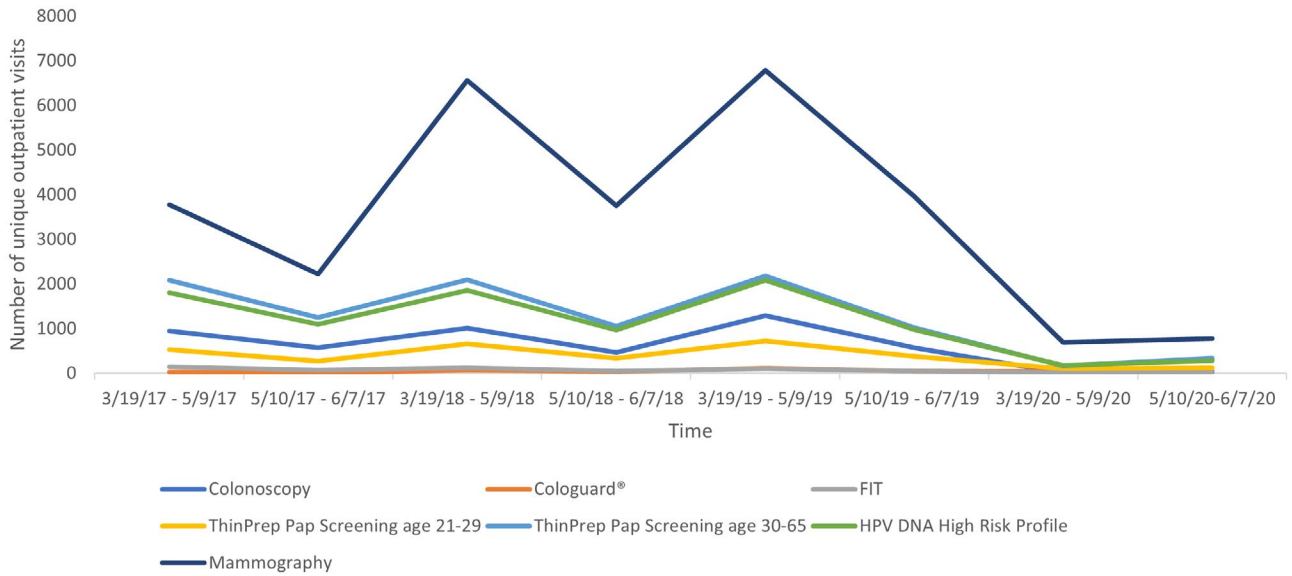


Figure 1. Colorectal, cervical, and breast cancer screening before, during, and after coronavirus disease 2019 (COVID-19) shelter-in-place orders in Michigan.

TABLE 1. Number of Family Medicine Outpatient Visits in Comparable Months Before, During, and After the COVID-19 Pandemic-related clinic closures^{a,b}

Type of Visit	3/19/17 to 5/9/17 No. (%)	5/10/17 to 6/7/17 No. %	3/19/18 to 5/9/18 No. %	5/10/18 to 6/7/18 No. %	3/19/19 to 5/9/19 No. %	5/10/19 to 6/7/19 No. %	3/19/20 to 5/9/20 No. %	5/10/20 to 6/7/20 No. %
In person	21,123 (99.7)	11,723 (99.9)	21,891 (99.9)	11,844 (99.9)	22,667 (99.9)	12,514 (99.9)	2120 (15)	1492 (15)
Video	2 (<0.1)	1 (<0.1)	6 (<0.1)	8 (<0.1)	11 (<0.1)	5 (<0.1)	4462 (31)	3519 (35)
Telephone	46 (0.2)	6 (<0.1)	5 (<0.1)	0 (0)	1 (<0.1)	3 (<0.1)	6997 (48)	4551 (45)
Patient portal ^c	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	833 (6)	459 (5)
Total no. of visits	21,171 (100)	11,730 (100)	21,902 (100)	11,852 (100)	22,679 (100)	12,522 (100)	14,412 (100)	10,021 (100)

^aOnly completed visits that could be assigned to a specific provider were reported. Over time, visit types changed (eg, with the addition of a nurse practitioner care navigator).

^bSource: The electronic medical record using EPIC software.

^cSource: Michigan Medicine billing reports.

DISCUSSION

We observed an abrupt decrease with in-office breast, cervical, and colorectal cancer screening via colonoscopy between March 19 and June 9, 2020, in accordance with national claims data.¹⁶ However, we observed a more modest decrease in home screening for colorectal cancer via the mt-sDNA test and FIT. Because we captured both the ordering and the performance of these tests within the time periods under study, the at-home tests likely occurred during the suspension of nonessential services. Data from Kaiser Permanente Washington have found that the median time from ordering to the return of FIT among those who adhere is 2 weeks.¹⁷ This suggests the generalizability of the current study findings regarding at-home testing during the pandemic.

With the reopenings taking place after the COVID-19 restrictions, all cancer screenings, both those performed in the office and at home, are beginning to trend upward. However, the number of cancer screening visits remains vastly below those occurring in previous years during the same period of time.

Nonetheless, these data have indicated a potential path forward for home-based cancer screening after the pandemic in addition to telemedicine. Perhaps at-home testing is more immune to the impacts of a pandemic, and its after effects, on the use of and access to primary health care.

Based on the evidence for mt-sDNA testing and FIT, and the emerging findings regarding cervical self-screening, home-based patient screening is both accessible and acceptable to patients¹⁸⁻²² across diverse

populations, reducing the embarrassment that often accompanies these tests in a medical office.²³⁻²⁷ There are cost differences, however. Cologuard has a lower cost per screening than colonoscopy, but the screening intervals are more frequent, and therefore the overall cost per patient is higher.^{28,29} However, Cologuard is reported to be approximately 99% effective for the general asymptomatic population, and compares favorably with other, similar tests.^{30,31} Furthermore, although not yet approved by the US Food and Drug Administration, several studies have found primary human papillomavirus testing using self-sampling to be nearly as effective as speculum-based specimen retrieval.^{32,33}

Home self-screening can be taught to and performed by patients.^{34,35} Home screening can be integrated into the primary care provider workflow^{36,37} for effective screening follow-up that is critical to the earlier detection of cancer, hence to reducing morbidity and mortality. Over time, as clinically relevant biomarkers emerge for the early detection of breast cancer,³⁸ these tests too may be conducted at home. Home screening for more than one cancer (eg, colorectal and cervical) may significantly boost detection, particularly among populations that have limited access to medical care such as rural-dwelling Native Americans and individuals residing in frontier areas, as well as many minority communities who experienced increased morbidity and mortality after the COVID-19 pandemic. We currently are conducting studies to test this hypothesis.

Michigan Medicine at the University of Michigan treated only approximately 500 patients who were diagnosed with COVID-19. Nonetheless, the health care system quickly increased the use of remote visits and developed centralized management structures and specialized clinical sites. Some of this structural flexibility remains in the organization after COVID-19. However, similar to many other medical centers nationwide, the institution continues to struggle to regain the patient visits that are key to health care settings.³⁹ In addition, in rural areas, fewer primary care offices are reopening after COVID-19 restrictions.^{40,41} The rapid transformation that the health care institution underwent during the pandemic demonstrates that changes can be made in workflow, provider training, and patient engagement to facilitate growth in self-screening for cervical and colorectal cancers, however.

There are several limitations to the current descriptive study. Most important, the cancer screening tests are age-specific counts, but are not necessarily

up-to-date screening. To reduce this limitation, we excluded patients from the analyses who were diagnosed with neoplasms. Although year-to-year screening was relatively stable, we limited our analyses to within-screening test comparisons. We evaluated a limited set of tests for colorectal cancer screening within 1 institution, although colonoscopy is the most common test for colorectal cancer nationwide, and the study institution is a major medical center with a diverse and large patient population.⁵ Cologuard, which demonstrated the lowest decrease in adherence during the clinic closings, has demonstrated an adherence rate of 71% in a Medicare population.⁴² Nonetheless, the baseline testing rates for both mt-sDNA testing and FIT were low compared with colonoscopy, and continued to decline after the clinics reopened. This likely reflects both the high value of colonoscopy to the medical center¹⁵ and physician preference for colonoscopy when all choices are available.⁴³⁻⁴⁵ Although no formal statistical tests were conducted, the changes in screening that were depicted were clinically relevant.

Cancer screening in the United States is opportunistic and therefore, to enhance its effectiveness across populations, it is optimally supported by multilevel intervention approaches, from policy communities, health care organization, physicians, provider teams, and patients.⁴⁶ At a time when resources (staff, equipment, and supplies) are devoted to fighting the COVID-19 pandemic and preparing for potential further rebounds, coordinated public health policy and multilevel approaches to implementation are warranted to support continued cancer screening in health care settings. As examples, organized national screening programs for breast, colorectal, and cervical cancers across Europe and the United Kingdom have generally yielded reductions in cancer-related mortality as in the US; nevertheless, implementation still is incomplete, and participation rates vary.⁴⁷⁻⁴⁹ Nonetheless, during a pandemic, these organized, nationally supported programs still can systematically offer cancer screening.

A positive outcome from the devastation of COVID-19 could be a growth in home screening for 2 cancers: colorectal and cervical. Longer-term study of these changes in cancer screening on patient health after COVID-19 is our future.

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CONFLICT OF INTEREST DISCLOSURES

The authors made no disclosures.

AUTHOR CONTRIBUTIONS

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