Radiology

Impact of the COVID-19 Pandemic on Breast Cancer Diagnoses

Samantha L. Heller, PhD, MD

Dr Heller is an associate professor in the breast imaging section of the Department of Radiology at the New York University Grossman School of Medicine. Her research interests include improving screening outcomes and screening use. She is a fellow of the Society of Breast Imaging.

At the outset of the COVID-19 pandemic in the spring of 2020, many breast imaging practices purposefully halted mammographic screening to minimize patient and staff exposure to the virus. Multidisciplinary professional societies formally issued guidelines advancing this approach. On March 26, 2020, for example, the American College of Radiology and the American Society of Breast Surgeons issued a joint statement recommending that "medical facilities postpone all breast screening exams (screening mammography, ultrasound, and MRI) effective immediately" (1). The COVID-19 Pandemic Breast Cancer Consortium categorized breast imaging into priority levels, defining mammographic breast cancer screening for patients at average risk as a low-priority examination that could be delayed until the postpandemic period (2). Diagnostic imaging for suspicious symptoms or abnormal mammograms was a higher, albeit nonurgent, priority. In most practices, a return to standard breast cancer imaging recommendations was instituted in the summer of 2020 (3). The effects of the pandemic disruptions remain largely unknown but are of great interest due to their potential longer-term implications for patient prognosis and mortality.

In this issue of *Radiology*, Lowry and colleagues (4) assess the short-term effects of the pandemic on screening and diagnostic breast imaging cancer detection and biopsy recommendations. They analyzed Breast Cancer Surveillance Consortium (BCSC) data from seven breast imaging registries (66 facilities) and compared breast biopsy recommendations and breast cancers diagnosed before and during the pandemic with respect to the method of detection (screen-detected vs symptomatic cancers) and patient-level characteristics. The authors found that recommendation of biopsies decreased precipitously in April 2020 compared with April 2019 (76% decrease, 236 biopsies recommended in 2020 vs 1000 recommended in 2019). Overall, 24% fewer cancers (1650 in 2020 vs 2171 in 2019, $P < .001$) were detected from March to September 2020 as compared with this same period in 2019. These differences were attributable predominantly to a decrease in the number of screen-detected cancers rather than symptomatic cancers. Specifically, there was a significant 38% drop in cumulative screen-detected cancers identified in 2020 (722 cancers) compared with the 1169 screen-detected cancers found in 2019 ($P < .001$). In comparison, there was no significant difference in cumulative symptomatic cancer detection before and during the pandemic, with 965 symptomatic cancers reported in 2019 and 895 reported in 2020 ($P = .27$). In addition, the authors found that the decrease in cancer diagnoses was greatest in Asian women (53% decrease), followed by Hispanic women (43% decrease) and Black women (27% decrease).

To our knowledge, this study is the first observational (nonmodeling) work to directly assess the effects of the pandemic on U.S. imaging-based breast cancer diagnosis. It expands on prior literature, including an earlier BCSC paper, which assessed pandemic effects on mammographic use and suggested the possibility of longer-term screening deficits (5). The findings are also in accord with those of a recent Dutch study by Eijkelboom and colleagues, who reported a decrease in cancer detection during the pandemic, specifically a decrease in the number of screen-detected rather than symptomatic cancers (6). In the Dutch program, screen-detected cancers decreased by 67% compared with 2018 and 2019 averaged volumes, while non–screen-detected tumors decreased by only 7%. Likewise, although the number of symptomatic cancers in the BCSC cohort initially decreased in the spring of 2020, non–screen-detected cancer volumes rebounded quickly and in fact overtook 2019 numbers in June and July 2020 (4).

The key impact of the pandemic in terms of the effects on breast cancer diagnoses may therefore emerge from a delay in screening examinations rather than from a delay in imaging work-up of symptomatic cases. What are the theoretical consequences of screening deficits? Screening mammography works by depicting small invasive node-negative cancers before they metastasize. In multiple observational and randomized controlled trials, mammographic screening has been proven to decrease mortality, and women who are screened have been shown to have better outcomes than those who are not screened (7). In addition, women undergoing annual screening examinations exhibit significantly higher detection rates of smaller cancers with better

From the Department of Radiology, NYU Grossman School of Medicine, Perlmutter Cancer Center, 60 E 34th St, New York, NY 10016. Received September 29, 2021; revision requested October 7; revision received October 7; accepted October 8. **Address correspondence to** the author (e-mail: *Samantha.Heller@nyulangone.org*).

Conflicts of interest are listed at the end of this article.

See also the article by Lowry et al in this issue.

Radiology 2022; 303:295–296 • https://doi.org/10.1148/radiol.2021212477 • Content code: BR

prognoses compared with women who undergo biennial screening; this is perhaps particularly true for premenopausal women (8,9). It follows that the toll of the pandemic on cancer stage at detection and patient prognosis has the potential to be more marked for those women who do not return for their screening examination in the immediate postpandemic period but instead wait until the following year—or even longer—to resume their imaging. This begs the question as to whether the majority of the women at the national level who missed their screening examination will return for their imaging with only a short delay or instead will forgo screening until more time has passed. The fact that the screening shortfall was still not compensated for at the end of the BCSC study period (4) suggests that pandemic-based screening deficits may well be longer-term in nature, although it would be important to review at least a full year of pandemic-era data to fully answer this question.

The authors' finding that the pandemic predominantly affected cancer yields for certain populations, namely Asian women, as well as Hispanic and Black women, is especially troubling. The pandemic has exposed deep fault lines of inequity in our health care system. If the observed screening and cancer diagnosis gaps lead to longer-term prognostic consequences, then this may be yet another way in which the pandemic inequitably affects distinct groups. The findings of this study therefore serve as a call for action to ensure that all women of all races and ethnicities have the opportunity to return to timely screening.

Limitations of this study stem from its short-term analysis of outcomes that may ultimately have only finite relevance. While modeling studies have predicted long-term pandemic effects on cancer stage at diagnosis and even on mortality—for example, one study calculated a 0.52% cumulative increase over expected breast cancer deaths by 2030 (10)—it is not possible to truly assess the continued impact of the COVID-era screening moratorium until we can observe its later consequences. Eijkelboom and colleagues, for example, found a decrease in the number of screen-detected cancers and specifically a decrease predominantly in lower-stage tumors, as would be expected. However, as of August 2020 and the restart of screening in the Netherlands, there were no shifts toward higher tumor stage at diagnosis. The organization of the Dutch national screening program likely allows for a more controlled and efficient recapture of women who missed their screening than may be possible in many practices in the United States. In fact, women in the Netherlands who had missed their screening were methodically invited to come in for screening first (6). It is therefore conceivable that the consequences and duration of the impact of the pandemic on breast cancer outcomes will vary by setting.

In summary, the COVID-19 pandemic has led to a natural experiment, allowing evaluation of the effects of a temporary cessation of screening on breast cancer outcomes. Lowry and colleagues offer a first step to assessing the effects of COVID-19 disruption on cancer detection. Ultimately, the effects of the pandemic on cancer stage at diagnosis, patient prognosis, and breast cancer mortality are what are most clinically meaningful, and for this we will need longer-term national data. It is to be hoped that the authors will continue to report their follow-up observations for this cohort, enabling a more complete understanding of the downstream effects of the pandemic.

Disclosures of conflicts of interest: S.L.H. No relevant relationships.

References

1. The American Society of Breast Surgeons and The American College of Radiology. Joint Statement on Breast Screening Exams During the Covid-19 Pandemic. https://www.breastsurgeons.org/news/?id=45. Published 2021. Accessed September 24, 2021.
2. Dietz JR, Moran MS, Isakoff SJ, et al. Recommendations for prioritization, treatment, and triage of breast cancer patients during the COVID-19 pandemic. the COVID-19 pandemic breast cancer consortium. Breast Cancer Res Treat 2020;181(3):487–497.
3. Sprague BL, O'Meara ES, Lee CI, et al. Prioritizing breast imaging services during the COVID pandemic: A survey of breast imaging facilities within the Breast Cancer Surveillance Consortium. Prev Med 2021;151:106540.
4. Lowry KP, Bissell M, Miglioretti DL, et al. Breast biopsy recommendations and breast cancers diagnosed during the COVID-19 pandemic. Radiology 2022;303(2):287–294.
5. Sprague BL, Lowry KP, Miglioretti DL, et al. Changes in Mammography Use by Women's Characteristics During the First 5 Months of the COVID-19 Pandemic. J Natl Cancer Inst 2021;113(9):1161–1167.
6. Eijkelboom AH, de Munck L, Lobbes MBI, et al. Impact of the suspension and restart of the Dutch breast cancer screening program on breast cancer incidence and stage during the COVID-19 pandemic. Prev Med 2021;151:106602.
7. Webb ML, Cady B, Michaelson JS, et al. A failure analysis of invasive breast cancer: most deaths from disease occur in women not regularly screened. Cancer 2014;120(18):2839–2846.
8. Hunt KA, Rosen EL, Sickles EA. Outcome analysis for women undergoing annual versus biennial screening mammography: a review of 24,211 examinations. AJR Am J Roentgenol 1999;173(2):285–289.
9. Miglioretti DL, Zhu W, Kerlikowske K, et al. Breast Tumor Prognostic Characteristics and Biennial vs Annual Mammography, Age, and Menopausal Status. JAMA Oncol 2015;1(8):1069–1077.
10. Alagoz O, Lowry KP, Kurian AW, et al. Impact of the COVID-19 Pandemic on Breast Cancer Mortality in the US: Estimates From Collaborative Simulation Modeling. J Natl Cancer Inst 2021. 10.1093/jnci/djab097. Published online July 14, 2021.