


# Impact of the COVID-19 Pandemic on Breast Cancer Screening and Operative Treatment

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Ashley Cairns, MD<sup>1</sup>, V. Morgan Jones, MD<sup>1</sup>, Kelly Cronin, MD<sup>2</sup>, Margaret Yocobozzi, MD<sup>2</sup>, Clifford Howard, MD<sup>2</sup>, Nadja Lesko, MD<sup>2</sup>, Akiko Chiba, MD<sup>1</sup>, and Marissa Howard-McNatt, MD<sup>1</sup>

## Abstract

**Introduction:** The COVID-19 pandemic has impacted many areas of health care and had a significant impact on care delivery, including breast cancer.

**Methods:** To better understand the changes to detection and treatment of breast cancer at our institution, we analyzed mammogram rates (screening and diagnostic) and breast cancer operations in 2019-2020. Mammography rates were calculated using county level census data for eligible women (Z-test). For breast cancer staging, a stage severity score was analyzed with a Mann-Whitney U-test (two-tail,  $P < .05$ ) with proportions derived from WFBH operative volume quarterly reports. Results: Data revealed a relative decline from 2019 to 2020 in breast cancer screening. Screening mammograms decreased by 44% or 1558 fewer screening mammograms ( $Z = 4.75, P < .00001$ ) and by 21% or 771 fewer for diagnostic mammograms ( $Z = 2.16, P = .03$ ). With regards to breast cancer operations, we did not identify a statistically significant difference in number of new breast cancer operations at WFBH with 340 cases in 2020 as compared to 384 cases in 2019 ( $P = .9905$ ). We compared a breast cancer severity score (weighted by stage at time of operation), which did not reveal statistically significant difference in clinical stage of breast cancer at time of operation ( $P = .71, U = 28$ ).

**Conclusion:** Mammography was impacted more than breast surgery cases by the COVID-19 pandemic. More data needs to be collected to evaluate future morbidity and mortality related to breast cancer operations and persistent disparities related to delay in breast cancer care due to COVID-19.

## Introduction

The COVID-19 pandemic has impacted many areas of health care and continues to impact delivery of patient care. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic and the United States declared a state of national emergency. The concern for the prevalence of COVID-19 (coronavirus) as well as the rising incidence of severe COVID-19 cases led to discussions of risk-benefit analysis for screening measures, such as breast cancer. On March 26, 2020, a joint statement by the American Society of Breast Surgeons (ASBrS) and American College of Radiology (ACR) recommended that all medical facilities postpone all breast screening exams immediately due to concerns of mortality of coronavirus outweighing any potential mortality from a delay in screening.<sup>1</sup> With regards to breast cancer management, our institution restricted operative cases and limited operative locations to minimize COVID-19 impact. Several agencies including the Cancer Intervention and Surveillance Modeling Network and

other have attempted to quantify this impact on breast cancer care with models accounting for reduction in mammography screening use and delay in symptomatic cancer diagnosis over the first 6 months with return to pre-pandemic levels.<sup>2</sup> To better understand the short-term COVID-19 impact on detection and treatment of breast cancer at our institution, Wake Forest Baptist Health (WFBH), we analyzed mammogram rates (screening as well as diagnostic) and breast cancer operations from 2019 to 2020.

## Materials and Methods

As the impact of COVID-19 pandemic is evolving and ongoing, we attempted to identify specific and attainable

<sup>1</sup>Department of General Surgery, Wake Forest School of Medicine, Winston-Salem, NC, USA

<sup>2</sup>Department of Radiology, Wake Forest School of Medicine, Winston-Salem, NC, USA

**Table 1.** Breast Cancer Stage at Time of Operation (# of cases) by Year With Weighted Stage Score, 2019-2020.

Stage of Breast Cancer at Operation, 2019-2020			
Stage	Cases by year (n), 2019	Cases by year (n), 2020	Percentage difference (n)
Stage0	72	63	-12.5% (-9)
Stage1a	175	152	-13.3% (-23)
Stage1b	65	63	-3.08% (-2)
Stage2a	28	19	-32.1% (-9)
Stage2b	10	12	20% (2)
Stage3a	4	3	-25% (-1)
Stage3b	10	9	-10% (-1)
Stage4	20	16	-20% (-4)
Overall weighted stage score (+/- std deviation)	1.35+/-158.5	1.34+/-43.5	$P = .71, U = 28$

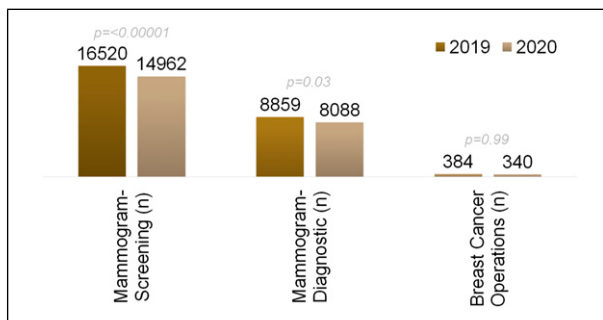
measures to quantify the short-term impact of COVID-19, specifically access to health care. As such, we utilized total number of mammograms performed as well as total number of operations performed. To evaluate the stage at time of operation, we developed a stage severity score, which placed a weighted value for each stage for comparison for 2019 and 2020.

From 2019 to 2020, retrospective data of mammograms from the Radiology Department as well as breast cancer operations at WFBH were analyzed. The specific outcomes investigated were screening mammograms, diagnostic mammograms, breast cancer operations, as well as breast cancer stage at time of operation.

For mammography, comparative analysis with relative and absolute differences was utilized. Proportion comparison with Z-score was utilized based on NC Census data for women eligible for mammogram screening (age 40-74) in Forsyth County, NC. For comparison of breast cancer stage, a breast cancer weighted stage severity score was used for statistical analysis (Table 1). The scores were compared using Mann-Whitney U-test (two-tail,  $P < .05$ ). Proportion analysis was compared to overall WFBH operative volume per public quarterly reports. All statistical measures utilized  $P < .05$ .

## Results

Overall, this analysis identified a short-term decline in screening and diagnostic mammograms from 2019 to 2020, which is likely representative of a relative decline due to ASBrS and ACR recommendations regarding COVID-19. With regards to mammography data, screening mammograms decreased by 44% or 1558 fewer screening mammograms ( $Z = 4.75, P < .00001$ ) and by 21% or 771 fewer for diagnostic mammograms ( $Z = 2.16, P = .03$ ) (Figure 1). This data suggests that screening mammograms had a more significant decrease than diagnostic mammograms. Of note, 771 fewer diagnostic mammograms were performed, which likely indicates that those with a breast complaint were not presenting to the



**Figure 1.** Impact of COVID-19 on screening mammograms, diagnostic mammograms, and breast cancer operations by year, 2019-2020.

hospital to seek care. One proxy that was used to assess any delay to breast cancer diagnosis was stage of breast cancer at time of operation. Utilizing a breast cancer stage weighted severity score, no statistically significant difference in breast cancer stage between 2019 and 2020 was identified at the time of operation, 1.35 +/- 158.5 in 2019 as compared to 1.34 +/- 43.5 in 2020 ( $P = .71, U = 28$ ). The only stage which experienced a relative increase between 2019 and 2020 was Stage 2b; as seen in Table 1.

An additional measure to quantify access to breast cancer care was the overall volume of operations performed between 2019 and 2020. We identified that there was no statistically significant difference in new breast cancer operations at WFBHMC with 340 in 2020 as compared to 384 in 2019 ( $P = .9905$ ), as seen in Figure 1.

## Discussion

We analyzed how the COVID-19 pandemic affected mammogram rates and breast cancer operations and found that during 2020 the mammography rates were more impacted than the number of breast cancer operations. Of note, this analysis focused on the changes that occurred in the "first wave" of the COVID-19 pandemic with changes in delay of care centered on March 2020.

Other authors have analyzed the impact of COVID-19 on breast care. For instance, Alagoz et al attempted to quantify this delay in symptomatic cancer diagnosis. By 2030, the model projects 950 (model range = 860-1297) cumulative excess breast cancer deaths related to reduced screening and 1314 (model range = 266-1325) associated with delayed diagnosis of symptomatic cases.<sup>2</sup> The authors concluded that the initial pandemic-related disruptions in breast cancer care will have a small long-term effect on breast cancer mortality.<sup>2</sup> It is challenging to assess this impact at our health system level. However, our colleagues at the University of North Carolina found that the greatest reductions for screening mammography occurred in March 2020 (−85.1%; 95% CI, −100.0%, −70.0%) and diagnostic mammography (−48.9%; 95% CI, −71.7%, −26.2%) and in May 2020 for biopsies (−40.9%; 95% CI, −57.6%, −24.3%)<sup>3</sup> This deficit decreased with no significant difference between observed and expected numbers by July 2020. More data needs to be collected to evaluate future impact on morbidity and mortality related to breast cancer operations with a larger powered sample and impact over time.

Due to the new challenge of assessing COVID-19 impact, we have learned that other variables might better quantify any change, for cancer detection, future analysis can center on rate of biopsy and assessment of screen-detected cancers vs patients who present with a palpable mass or nipple discharge, that is, symptomatic cancers (as the symptomatic cancer rate is unlikely to change). This is suggestive that the impact of COVID-19 might derive from a delay from screening-based detection of breast cancer, which will emerge over decades.<sup>4-6</sup> As such, it is likely that a difference in breast cancer stage at operation would be challenging to detect as it would not manifest in a year-long study period. However, other analyses suggest that if analyses continue for longer duration and with increased power, a difference in morbidity and mortality might manifest.<sup>2</sup> Alagoz et al<sup>2</sup> predicts that if similar effects on screening and diagnostic mammography persisted for 12 months the breast cancer mortality would double.<sup>2</sup> As the COVID-19 pandemic continues on, additional analyses will need to investigate any ongoing impact on morbidity and mortality.

Additionally, this analysis does not address other factors that impacted breast cancer care during this time. Patients pursuing reconstruction experienced significant delays and required delayed procedures. Prophylactic mastectomies are also delayed as surgical centers tried to minimize elective cases as much as possible. Furthermore, this did not analyze impacts on chemotherapy care or patients access when they tested positive during COVID-19. Other qualitative factors such as transition to virtual delivery of care, restriction of visitors, and expedited discharges also require attention for the patient perception of their care during the COVID-19 pandemic<sup>7-8</sup>

The limitation of the study is that it is from a single institution in a retrospective data set. The effects of the pandemic are still ongoing. Future investigations will need to continue to evaluate ongoing COVID-19 pandemic variants, such as the Omicron variant, short- and long-term impacts.

In conclusion, we found that mammography was impacted more than breast cancer operation rate by the COVID-19 pandemic during 2020. Additional studies are warranted to analyze morbidity and mortality related to breast cancer operations and persistent disparities related to delay in breast cancer care due to COVID-19.

### Declaration of Conflicting Interests

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### 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*, 2021. Available from: <https://www.breastsurgeons.org/news/?id=45>. (accessed on January 14, 2021).
2. 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;113(11):1484-1494. doi:10.1093/jnci/djab097.
3. Nyante SJ, Benefield TS, Kuzmiak CM, Earnhardt K, Pritchard M, Henderson LM. Population-level impact of coronavirus disease 2019 on breast cancer screening and diagnostic procedures. *Cancer*. 2021;127(12):2111-2121.
4. 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.
5. Heller S. *Impact of the Pandemic on Breast Cancer Diagnoses*. Radiology; 2021. Available from: doi:10.1148/radiol.2021212477.
6. 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.
7. Tai DBG, Shah A, Doubeni CA, Sia IG, Wieland ML. The Disproportionate Impact of COVID-19 on Racial and Ethnic Minorities in the United States. *Clin Infect Dis*. 2020;72(14):703-706. doi:10.1093/cid/ciaa815.
8. Soriano EC, Perndorfer C, Otto AK, et al. Psychosocial Impact of Cancer Care Disruptions in Women With Breast Cancer During the Covid-19 Pandemic. *Front Psychol*. 2021. Available from: doi:10.3389/fpsyg.2021.662339.