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The American Journal of Surgery

journal homepage: www.elsevier.com/locate/amjsurg

Original Research Article

Utilization of a rapid diagnostic centre during the COVID-19 pandemic reduced diagnostic delays in breast cancer

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A B S T R A C T

Background: Access to breast imaging was restricted during the first wave of the COVID-19 pandemic. We assessed the impact of healthcare restrictions on the Gattuso Rapid Diagnostic Centre (GRDC) at the Princess Margaret Cancer Centre.

Methods: A retrospective review of patients seen at the GRDC between March 12 - August 31, 2020 and the corresponding period from 2019 was performed.

Results: There was an 18.6% decrease in patients seen at the GRDC (n = 429 in 2020 vs. 527 in 2019). Time from the first abnormal breast image to diagnosis was significantly shorter (17.4 days [IQR 13.0–21.8] in 2020 vs. 25.9 days [21.0–30.8] in 2019; p = 0.020) with no appreciable difference in time from diagnosis to consult or from consult to surgery.

Conclusion: The GRDC enabled patients with concerning breast symptoms to access breast imaging, which helped to ensure timely treatment during the first wave of the pandemic.

1. Introduction

During the first wave of the COVID-19 pandemic in early 2020, there was limited access to screening and diagnostic breast imaging. Many outpatient diagnostic imaging facilities were forced to close or significantly reduce the number of patients seen due to stay-at-home orders, decreased referrals, staffing shortages, safety concerns, and mandates to suspend elective imaging.¹ A simulation model has predicted that a six-month interruption in breast cancer screening would result in 4100 missed breast cancer cases (including DCIS) in Canada.²

The Gattuso Rapid Diagnostic Centre (GRDC) was established at the Princess Margaret Cancer Center in Toronto, Ontario, Canada in 2009. The GRDC is an innovative clinic that provides a patient centered approach to investigating suspicious breast abnormalities. Benchmarks include time from referral to first contact, time of contact to appointment, and consultation to diagnosis. One critical benchmark is set for access to the program within 24 hours. Before the founding of the GRDC, patients waited 37 days on average for a diagnosis. The GRDC is structured as a single destination or 'one-stop shop' for breast cancer screening, diagnosis, and exceptional care. This lean process ensures that patients are triaged and treated optimally. A collaborative team

including radiologists, pathologists, surgeons, and nurse practitioners cares for patients and guides them through their diagnosis. The nurse practitioners review and facilitate appointments with the in-house surgeons within 48 hours from completion of their investigations. The clinic sees approximately 1200 patients per year.^{3,4} During the COVID-19 pandemic, this clinic remained open, ensuring patients could still undergo investigations for breast concerns despite social distancing and other restrictions. Measures adopted during the COVID-19 pandemic were aimed at reducing the number of hospital visits while ensuring appropriate delivery of care. The intent was to triage patients who may need a biopsy based on referral to ensure an entire workup in one visit.

The objective of this study was to assess the impact of the COVID-19 pandemic on patient volumes and treatment timing at this high-volume breast rapid diagnostic centre.

2. Methods

2.1. Study cohort

In this single-center retrospective study, a review of consecutive patients who presented to the GRDC from the start of the declaration of

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<https://doi.org/10.1016/j.amjsurg.2022.09.051>

Received 18 April 2022; Received in revised form 24 September 2022; Accepted 28 September 2022

Available online 3 October 2022

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the pandemic on March 12, 2020, until August 31, 2020, was performed and compared to the corresponding time period in 2019. Patients were generally eligible to be referred to the clinic if they had breast imaging that showed a BIRADS 4 or 5 breast lesion or a palpable breast mass that had not been biopsied.

For this study, we included patients who underwent a biopsy with a new diagnosis of stage 0–3 breast cancer. Patients were excluded if they had a biopsy showing benign pathology, if they had recurrent disease, or were found to have metastatic breast cancer. Patients with recurrent breast cancer were excluded as the treatment algorithms often differ and involve additional specialist consultations and diagnostic tests. Patients with metastatic breast cancer were excluded in this study of diagnostic wait times. The demographic details, clinical and pathological disease data (laterality, date of core biopsy, clinical stage, histology, grade, hormone receptor status, pathologic stage), wait times between investigations, diagnosis, treatment, and treatment details (neoadjuvant endocrine/chemotherapy) and surgical details were obtained through a

retrospective chart review.

2.2. Outcome measures

The primary outcomes were the number of patients, reasons for referral, the proportion of patients with a cancer diagnosis and wait times for all patients seen in the GRDC during the two time periods. The secondary outcomes included demographics and treatments for patients diagnosed with breast cancer through the GRDC.

We defined three separate wait times for the study cohort within the COVID (2020) and pre-COVID (2019) time periods. Time 1 was from the first imaging abnormality (either performed at an outside facility or through GRDC) to diagnosis (date of core biopsy result), Time 2 was from diagnosis (date of core biopsy result) to surgical consultation, and Time 3 was from surgical consultation to surgery date for patients undergoing upfront surgery.

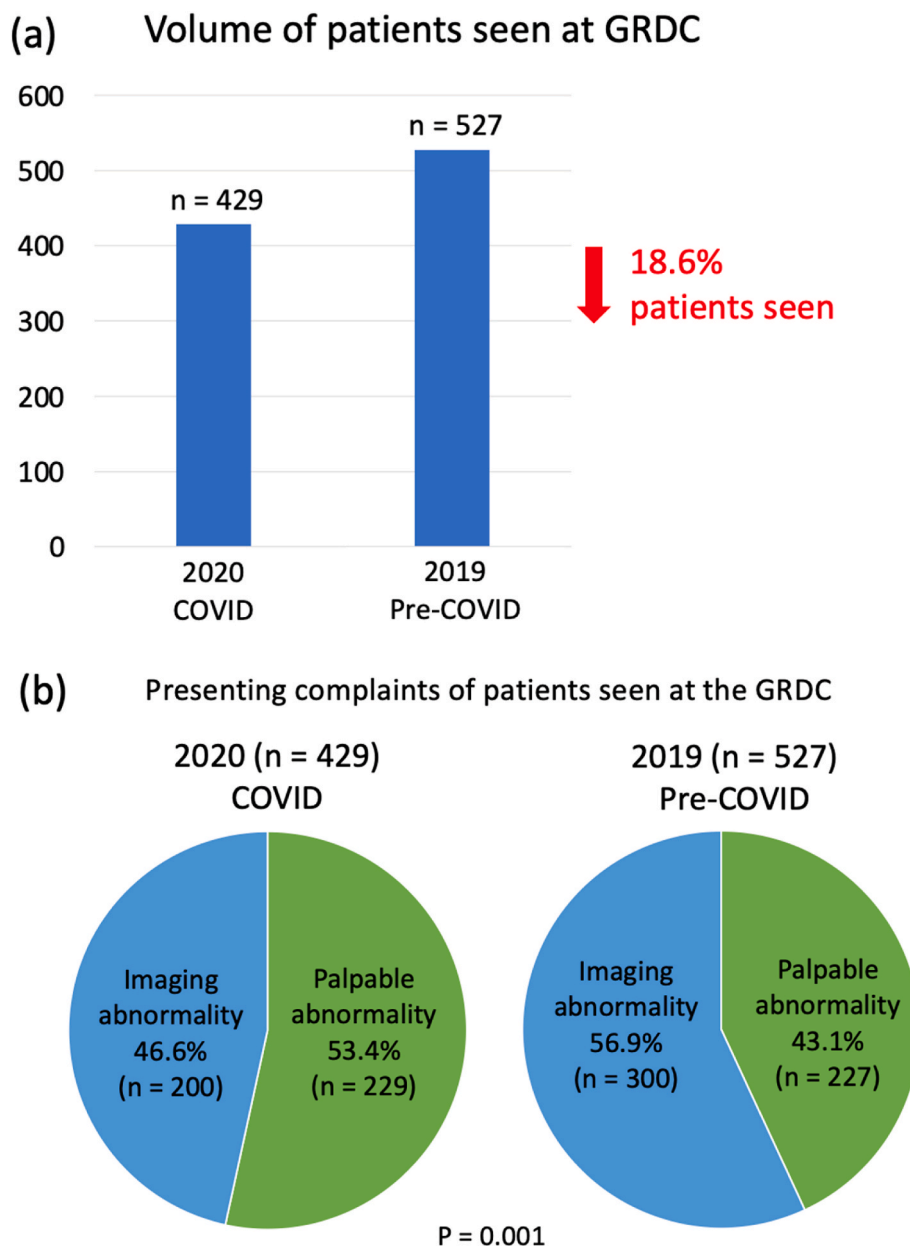


Fig. 1. a) Volume of patients who presented to the Gattuso Rapid Diagnostic Clinic (GRDC) and b) their presenting complaints between March 12 – August 31, 2020 and the comparison time period in 2019 (March 12 – August 31, 2019).

2.3. Statistical analyses

The proportion of patients was calculated for categorical variables and compared using Chi-square or Fisher's exact test. In addition, mean and interquartile ranges (IQR) were calculated for continuous variables and were compared using an independent T-test was used for continuous variables. A p-value of less than 0.05 was considered statistically significant. Statistical analyses were performed using SPSS software Version 9.4 for Mac (SAS Institute Inc., Cary, NC).

2.4. Research ethics

This study was approved by the institutional research ethics board.

3. Results

Fig. 1 shows the number of patients assessed through the GRDC in the 2020 and 2019 study periods. In 2020, 429 new patients were seen, corresponding to an 18.6% decrease compared to 2019 (n = 527). A higher proportion of patients presented for investigation of a palpable abnormality (53.4% [n = 229] in 2020 vs 43.1% [n = 227] in 2019; p = 0.001) and a lower proportion of patients presented with imaging abnormalities (46.6% [n = 200] in 2020 vs. 56.2% [n = 300], p = 0.001) during the COVID period.

The investigations performed as part of the GRDC assessment during the two study periods are shown in Table 1. A significantly higher proportion of patients underwent mammography (primary mammogram and/or compression or magnification views) in 2020 (77.4% [n = 332]) compared to 2019 (67.0% [n = 353] p = 0.002). A higher proportion of patients had a breast MRI (35.7% [n = 153] in 2020 vs. 27.7% [n = 146] in 2019; p = 0.008) during the COVID period. A significantly lower proportion of patients underwent an ultrasound guided core biopsy (44.8% [n = 192] in 2020 vs. 60.0% in 2019 [n = 316]; p < 0.001). The proportion of patients who underwent a stereotactic core biopsy was similar (9.3% [n = 40] in 2020 vs. 11.6% in 2019 [n = 61]; p = 0.260) while the proportion of patients who underwent MRI guided biopsy was higher (5.8% [n = 25] in 2020 vs. 3.0% in 2019 [n = 16]; p = 0.034).

The proportion of patients who were diagnosed with breast cancer among all patients who were seen at the GRDC was significantly lower during the COVID period at 36.8% (n = 158) compared to 44.0% (n = 232) in 2019 (p = 0.024) as shown in Fig. 2.

The characteristics of the patients who received a new diagnosis of stage 0–3 breast cancer through the GRDC are shown in Table 2; 103 patients (24.0% of all GRDC patients) presented with a new diagnosis of

Table 1

Breast imaging investigations performed on all patients who presented to the Gattuso Rapid Diagnostic Centre (GRDC) between March 12 – August 31, 2020 and the comparison time period in 2019 (March 12 – August 31, 2019).

Variable	Time Period		p-value
	2020 (COVID)	2019 (pre-COVID)	
Patients (n)	N = 429	N = 527	
Breast Imaging			
Mammogram	77.4% (332)	67.0% (353)	<0.001
Ultrasound	93.0% (399)	92.2% (486)	0.213
MRI	35.7% (153)	27.7% (146)	0.008
Biopsies			
Stereotactic Core Biopsy	9.3% (40)	11.6% (61)	0.260
Ultrasound Guided Core Biopsy/Fine Needle Aspirate (FNA)	44.8% (192)	60.0% (316)	<0.001
MRI guided Biopsy	5.8% (25)	3.0% (16)	0.034

stage 0–3 breast cancer in 2020, compared to 169 patients in 2019 (32.1% of GRDC patients). While a significantly higher proportion of patients with breast cancer presented with a palpable abnormality (65.0% [n = 67] in 2020 vs. 47.9% [n = 81] in 2019; p = 0.021), there was no significant difference in tumour stage, nodal status, tumour morphology, or biomarker status.

The initial management of patients diagnosed with breast cancer through the GRDC is displayed in Fig. 3. A significantly lower proportion of patients underwent upfront surgery as the initial management (63.1% [n = 65] in 2020 vs. 76.3% in 2019 [n = 129]; p = 0.019). A significantly higher proportion of patients were offered neoadjuvant endocrine therapy (14.6% [n = 15] in 2020 compared to 3.6% in 2019 [n = 6] in 2019; p < 0.001). There was no significant difference in the proportion of patients who received neoadjuvant chemotherapy (22.3% [n = 23] in 2020 vs. 20.1% in 2019 [n = 34]; p = 0.664).

Fig. 4 summarizes the mean wait times for Time 1 and Time 2 for stage 0–3 breast cancer patients. The mean for Time 1 (first imaging test to diagnosis) was significantly lower during the pandemic (17.4 days [IQR 13.0–21.8] in 2020 vs. 25.9 days [21.0–30.8] in 2019; p = 0.020), with no significant difference in the mean for Time 2 (diagnosis to surgical consult): 8.5 days [IQR 5.6–11.3] in 2020 vs. 6.1 days [IQR 4.8–7.5] in 2019 (p = 0.149). The Time 3 (surgical consult to surgery) is reported for patients who underwent upfront surgery (n = 65 in 2020 and n = 129 in 2019). There was no significant difference in wait time for surgery (38.4 days [IQR 32.0–44.8] in 2020 vs. 38.3 days [IQR 34.1–42.5]; p = 0.971).

4. Discussion

Our study showed an 18.6% reduction in the number of patients seen in the GRDC clinic during the first wave of the COVID-19 pandemic compared to a similar time period in the year before. Although the proportion of GRDC patients diagnosed with breast cancer was lower, they had a significantly shorter wait time between the first imaging investigation, core biopsy, and surgical consultation. Although the reduced patient volume may have contributed to this, modifications to our workflow during the pandemic may have also led to the reduction in wait times. While there have been some studies assessing wait times and volumes of breast cancer patients treated,^{5,6} this is the first to assess the impact of the presence of a rapid diagnostic centre on breast investigations and treatment during the pandemic.

In our study, we identified a lower proportion of patients with screen-detected abnormalities and more patients presented for investigations of palpable concerns. This is not surprising given the paucity in access to primary care and breast imaging early in the pandemic. During the first wave of the COVID-19 pandemic, many healthcare facilities including breast imaging centres, saw significantly fewer or no patients. A survey of 77 breast imaging facilities within the Breast Cancer Surveillance Consortium in the United States showed that 97% of facilities were closed or operating at a reduced capacity during March–September 2020.⁷ In Ontario, Canada, there was a complete cessation of breast cancer screening between March to June 2020, with a 99% decrease in volume of mammograms performed compared to the same time period in 2019.⁸ Even when cancer screening resumed, the decrease in volume of screening mammograms completed during the first pandemic wave compared to 2019 persisted.⁹ The volume of screening mammograms did not return to baseline until March 2021, resulting in a backlog of 340,876 screening mammograms.⁸

Despite the change in patient presentation, a lower proportion of GRDC patients were diagnosed with breast cancer during the first six months of the pandemic compared to the similar time frame the year prior. We hypothesize that this was due to patients presenting to the GRDC with breast symptoms (e.g., palpable lesion) during the pandemic period, who would have otherwise been assessed by their family physician and had breast imaging at external facilities. Since our radiology group does not routinely repeat mammograms, patients with

Proportion of GRDC patients diagnosed with breast cancer

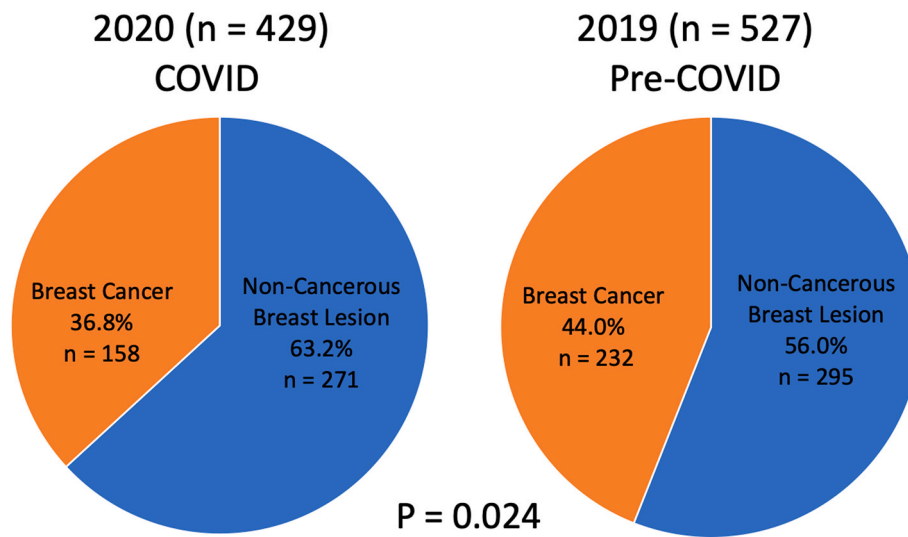


Fig. 2. Proportion of patients seen at the Gattuso Rapid Diagnostic Centre (GRDC) with a new breast cancer diagnosis between March 12 – August 31, 2020 and the comparison period in 2019 (March 12 – August 31, 2019).

Table 2

Demographics and clinical characteristics of patients who were diagnosed with stage 0–3 breast cancer through the Gattuso Rapid Diagnostic Clinic (GRDC) between March 12 – August 31, 2020 and the comparison time period in 2019 (March 12 – August 31, 2019).

Variable	Time Period		P-value
	2020 (COVID)	2019 (pre-COVID)	
Patients (n)	N = 103	N = 169	
Median age in years at diagnosis (interquartile range)	55.0 (43.8–67.3)	59.0 (49.0–69.0)	0.206
Reason for referral			
Palpable abnormality (n, %)	65.0% (67)	47.9% (81)	0.021
Imaging abnormality	35.0% (36)	52.1% (88)	
Clinical characteristics			
T stage [n (%)]			
DCIS (Ductal Carcinoma In Situ)	10.7% (11)	12.4% (21)	0.821
T1 (<2 cm)	43.7% (45)	49.1% (83)	
T2 (2–5 cm)	36.9% (38)	32.0% (54)	
T3 >5 cm	6.8% (7)	4.7% (8)	
T4	1.9% (2)	1.8% (3)	
Lymph Node Involvement			
Yes	14.6% (15)	22.5% (38)	0.110
No	85.4% (88)	77.5% (131)	
Tumour morphology [n (%)]			
DCIS	9.7% (10)	9.5% (16)	0.471
Invasive Ductal	83.5% (86)	87.0% (147)	
Invasive Lobular	6.8% (7)	3.6% (6)	
Biomarkers			
Hormone Receptor positive, HER2 negative	68.9% (71)	67.5% (114)	0.950
Triple negative	7.8% (8)	9.5% (16)	
HER2 enriched	13.6% (14)	12.4% (21)	
DCIS	9.7% (10)	10.7% (18)	

benign findings (BIRADS 1, 2, or 3) would not usually be referred to the GRDC for further investigation if patients had been able to access breast imaging. This is reflected by a higher proportion of patients who had mammograms through the GRDC and the lower proportion of patients undergoing biopsy in 2020. We also had a higher proportion of patients undergoing MRIs through our RDC compared to the pre-pandemic period, where patients may have come with an MRI, but an incomplete work-up (e.g., contralateral breast finding, suspicious nodes on

MRI that were not biopsied). Therefore, the GRDC represented an avenue for assessing clinical concerns when no other imaging and diagnostic options were readily available.

Our study found a significantly shorter time from the first image to diagnosis and no significant difference in time from diagnosis to surgical consult or from surgical consult to surgery. These results are similar to another single institutional study in Canada¹⁰ where wait times from core biopsy to surgery were reduced from 58 to 28 days for patients seen during the pandemic. While these results may be partially explained by the reduction in patient volumes, we believe measures adopted during the COVID-19 pandemic may have contributed to the shortened wait times and can potentially be employed in the long term to reduce surgical wait times. These measures included triaging consults and prioritizing patients who did not have outside imaging requiring review and ensuring additional time when triaging patients who may have needed a biopsy based on referral to ensure an entire workup in one visit. The GRDC also created “add-on” slots for patients seen in breast imaging who needed a biopsy to expedite the pathology and ensure appropriate consultation. Surgical wait times were also preserved at our institution as the hospital endeavored to maintain breast cancer surgical volumes by prioritizing oncologic surgery.

These data suggest that the measures employed at our rapid diagnostic centre during the pandemic (triaging referrals, prioritizing patients without previous imaging and ensuring additional work-up time) may help reduce diagnostic delays for patients with breast cancer. These measures could also be employed in institutions without a rapid diagnostic centre, as referrals can be triaged and referred for imaging prior to consultation in to reduce wait times. This is especially important as studies have shown that pre-operative treatment delays are associated with worse oncologic outcomes for patients with both DCIS¹¹ and invasive breast cancer.¹²

This study is limited by the small sample size and the single-institution cohort design. We are further limited in what information is collected in our patient records. For instance, one study on breast cancer care during the pandemic in New York City¹³ showed that patients identified as Black or African American, Asian, or other races were more likely to experience a delay and/or change than Caucasian patients. Information on ethnicity is not routinely collected in our system, and we would not be able to conduct a similar analysis. Lastly, the time of our data collection is relatively short, and we do not have enough data

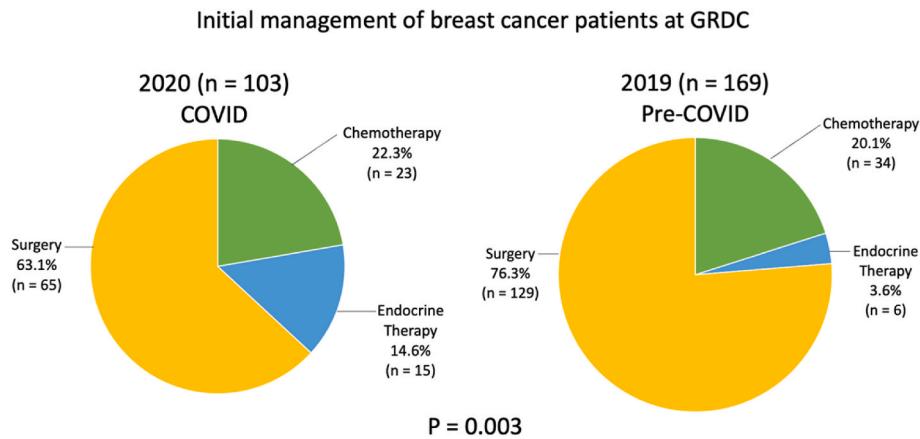


Fig. 3. Initial management of patients diagnosed with Stage 0–3 breast cancer through the Gattuso Rapid Diagnostic Clinic (GRDC) between March 12 – August 31, 2020 and the comparison time period in 2019 (March 12 – August 31, 2019).

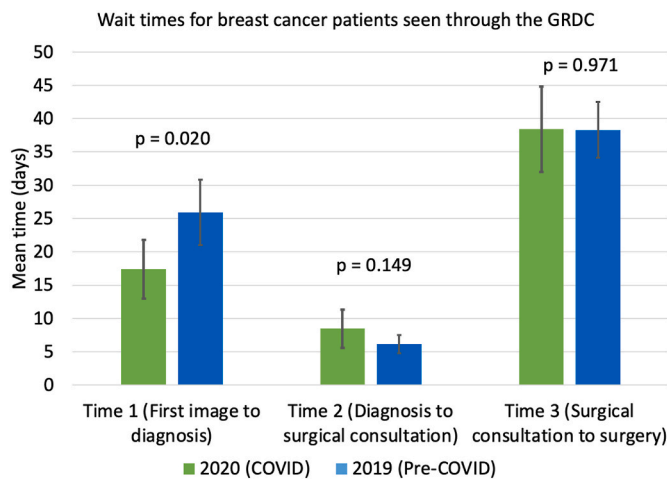


Fig. 4. Mean and interquartile (IQR) wait times for patients with a diagnosis of Stage 0–3 breast cancer through the Gattuso Rapid Diagnostic Clinic (GRDC) between March 12 – August 31, 2020 and the comparison time period in 2019 (March 12 – August 31, 2019).

to assess long-term oncologic outcomes or to assess how return to pre-pandemic patient volumes impacted wait times. This study is part of an ongoing project assessing breast cancer outcomes during the COVID-19 pandemic, which may help determine if these reductions in wait times will remain in the post-pandemic era.

5. Conclusion

While fewer patients presented for breast investigations to the GRDC during the pandemic period, we observed a significant increase in the percentage of patients with palpable abnormalities, most of which were benign, as reflected by a significantly lower proportion of cancer diagnoses. Importantly, our study showed that measures implemented during the pandemic reduced the wait time from the date of the first breast imaging investigation to diagnosis. The presence of a rapid diagnostic breast center enabled patients with concerning breast symptoms to access and receive an expedited assessment during the first wave of the pandemic. This ensured patients did not undergo diagnostic delays despite the health care restrictions that emerged during the COVID-19 pandemic. Measures adopted at our RDC during this time could help reduce diagnostic delays associated with breast cancer treatment in the future.

Source of funding

Princess Margaret Cancer Centre Foundation.

Declaration of competing interest

None to declare.

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