Turnaround times in breast cancer: From screening to diagnosis to treatment

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ARTICLE INFO

ABSTRACT

Objective: To compare our institution with national benchmark times, and identify rate−limiting steps in the process by conducte a retrospective review of the turnaround times in 2009 at the Carilion Clinic Breast Care Center (CCBCC). To evaluate patient satisfaction with the turn around times. **Methods:** A retrospective chart review was performed to evaluate the time intervals from abnormal screening mammogram to diagnostic mammogram, diagnostic mammogram to biopsy, biopsy to MRI, and MRI to surgery of all patients seen for breast cancer in 2009. A patient survey was mailed out to all patients (131) managed from abnormal screening to surgery in 2009, assessing their satisfaction with the turnaround times from screening mammogram to call back, call back to diagnostic mammogram, diagnostic mammogram to biopsy, biopsy to results call, biopsy result to MRI appointment, MRI appointment to surgery consult, and surgery consult to surgery; and assessing possible reasons why patients may perceive the process to be delayed. The MEANS procedure was applied to evaluate the turnaround times, and a Box and Whisker Plot statistical comparison was made between patient satisfaction and turnaround times. **Results:** The mean turnaround time at the CCBCC in 2009 from abnormal screening mammogram to surgery was 45 d. This falls within the 75th %ile of the National Quality Measures for Breast Centers (NQMBC), established by the National Consortium of Breast Centers (NCBC). Of 131 surveys mailed out, 57 were returned (44%). The patient satisfaction rates for each interval ranged from 96%−100%, with an overall satisfaction rate of 98% for abnormal screening mammogram to surgery. **Discussion:** The CCBCC ranks at the 75%ile in overall turnaround times; however, this turnaround time included an interval of MRI, not previously measured in NQMBC benchmark. Rate−limiting steps were identified as the time from screening mammogram to diagnostic mammogram, and biopsy to surgery−specifically, the sub−interval MRI to surgery. Since 2009, the CCBCC has already improved the process for obtaining insurance approval and preauthorization for MRIs; and has added an additional breast surgeon to share the burden of benign cases, and a nurse practitioner to see post−op and follow up patients, improving the accessibility to the primary breast surgeon specialist. Consideration should be given to future time interval studies that evaluate breast cancer turnaround time including MRI to help establish benchmarks.

1. Introduction

The Carilion Clinic Breast Care Center (CCBCC) is a patient−centered program led by an experienced staff using advanced technology. Total procedures performed annually (screening and diagnostic) are about 30 000. Although routine screening and early detection can reduce the number of women affected by breast cancer, about 66% of women in our community are not getting annual mammograms. The CCBCC is dedicated to making a difference in the fight against breast cancer. An interdisciplinary approach is the key to modern breast care. Our team includes radiologists, pathologists, surgeons, medical oncologists, radiation oncologists, technologists and nurses. The result is state−of−the−art care for patients and families.

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The Carilion Clinic Breast Care Center is a local and national leader in mammography screening. Highlights of our program include:

Dedicated breast imagers – All mammograms are read on–site by board–certified radiologists.

Experience – Our 21 technologists have over 360 combined years of experience, and they have provided nearly a quarter million mammograms in the last 10 years.

Nurse navigation – We provide a dedicated advanced practice nurse to support women through diagnosis and treatment, serving as a care coordinator.

High risk program – Genetic testing and counseling is available for people who may be at an increased risk for hereditary cancer.

Timely communication – Any patient with questionable screening results is notified by phone in a timely manner.

Next day biopsy results – 98 percent of biopsies are diagnosed by the next day.

Weekly cancer treatment planning conferences – Every breast cancer diagnosis in our center is reviewed by an interdisciplinary team to determine the best course of treatment.

Weekly benign correlation conferences – Benign findings are reviewed each week by an interdisciplinary team that correlates pathology and imaging results for a second reading.

Large format pathology – This approach has been shown to decrease the need for re–excision and aims to lower the rate of breast cancer reoccurrence.

Breast MRI – This advanced technology allows for precisely targeted treatment and aids in our multimodality imaging protocol.

Bi–Weekly Breast Cancer Support Group – Facilitated by the advanced practice nurse and counselor every first and third Tuesday of each month.

Early diagnosis and treatment are associated with improved survival from breast cancer. Prior studies have demonstrated that there are variations in the times from detection to diagnosis, and diagnosis to treatment of breast cancer. These variations are attributed to what other investigators have called the "patient delay" and the "system delay"[1,2].

System delays are those occurring within the healthcare system, such as scheduling appointments, follow–up, referrals, processing films, pathology reports, and reporting results[1,3,4]. Recent lay publications encourage women diagnosed with breast cancer to slow down the process to allow for digestion of information, investigation and self–education, seeking various medical opinions and options for treatment, and making well–informed and thoughtful decisions, suggesting that the "patient delay" may account for the variable time factor[5,6].

The purpose of this study was to assess the quality of care at the CCBCC, as defined by time intervals and efficiency; to determine the source (patient–based or system–based) of any delays associated with the turnaround time in our breast care continuum, and whether improvements can be made; and to understand what reasons patients may have to delay the process, and whether we can assist them to shorten these delays.

2. Materials and methods

2.1. Turnaround times

A retrospective chart review was performed to evaluate the timeline from screening to treatment for breast cancer. All patients seen with breast cancer at the CCBCC less than 90 years old, and with a surgery date in the calendar year 2009 were included. The patient population for this clinic closely mirrors the indigent population of adult and adolescent women in the greater Roanoke Valley: 49% White, 28% Black, 21% Hispanic, <1% Asian, 1% Unknown; Payer Mix: 53% Medicaid, 31% Self–Pay, 7% Anthem, 5% Medicare, and 4% other. Patients were excluded if they were not diagnosed with breast cancer. Time intervals in calendar days, including weekends, were calculated for the following time intervals: abnormal screening mammogram to diagnostic mammogram, diagnostic mammogram to biopsy, biopsy to MRI, and MRI to surgery.

2.2. Statistical analysis

A sample size of 121 achieves 80% power to detect non–inferiority using a one–sided Wilcoxon test assuming that the actual distribution is normal when the margin of equivalence is 1.4 (+10%) and the true difference between the mean and the reference value is 0.0. The data are drawn from a single population with a standard deviation of 4.8. The significance level (alpha) of the test is 0.012 5 to adjust for multiple tests[3]. The MEANS procedure was applied to evaluate the turnaround times.

The national benchmark utilized for comparison was from the National Quality Measures for Breast Centers (NQMBC), established by the National Consortium of Breast Centers (NCBC), and published in 2010[7]. The

median time in days (business d) between screening and diagnostic mammogram was 6.5 (25%ile 4.0 d, 75%ile 10.5 d); between diagnostic mammogram and needle biopsy was 6.0 d (25%ile 3.9 d, 75%ile 9.0 d); between needle biopsy and surgery was 14.0 d (25%ile 11.0 d, 75%ile 19.5 d).

2.3. Patient satisfaction

An anonymous patient survey (Appendix) was mailed out to all patients managed at the CCBCC in 2009 from the point of an abnormal screening mammogram through surgery. Patients were excluded if they did not begin their evaluation with the CCBCC from screening mammogram through surgery; that is to say, any patients who were referred to the CCBCC for care anywhere in the process after an abnormal screening mammogram or more were performed elsewhere.

The patient survey assessed bi–modal patient satisfaction rates (Yes/No) with the turnaround times from screening mammogram to call back, call back to diagnostic mammogram, diagnostic mammogram to biopsy, biopsy to results call, biopsy result to MRI appointment, MRI appointment to surgery consult, and surgery consult to surgery, as well as assessed possible reasons why patients may have perceived the process to be delayed.

2.4. Statistical analysis

A Box and Whisker Plot statistical comparison was made between patient satisfaction and turnaround times.

3. Results

One hundred ninety–eight (198) patients were treated for breast cancer with surgery in 2009. Of these, five patients had two mammogram procedure dates within this timeframe. These cases were researched and it was determined that they were FN. They were deleted from the final analysis. Four patients had neoadjuvant chemotherapy prior to surgery; one patient chose to delay surgery until her gardening was completed; one patient was being treated for a recurrent breast cancer; these patients were all deleted from the final analysis.

An additional 16 patients were considered to be outliers: 10 patients required specialty visits, i.e. second opinions, genetic testing, radiation oncology and/or reconstruction; four patients rescheduled surgery due to personal circumstances; one patient required a second consultation because the original surgeon became ill, which delayed her surgical procedure; and one patient could not be biopsied using conventional methods due to the lesion location.

An excisional biopsy was performed, which was positive for malignancy and had positive margins, which required a re–excision. All 16 were included in the final analysis.

One hundred eighty–seven (187) patients were included in the final analysis. The mean interval time for abnormal screening mammogram to diagnostic mammogram (SCRN to WKUP) was 13.19 calendar days (includes weekends); subtracting weekend days from the end of the interval forward equals 10 business days. The mean interval time for diagnostic mammogram to biopsy (WKUP to BPSY) was 3.92 days (calendar days equals business days).

The mean interval time for biopsy to MRI (BPSY to MRI) was 12.02; subtracting weekend days equals 10 business days. The mean interval time for MRI to surgery (MRI to SURG) was 35.06 d; subtracting weekend days equals 25 business days. The mean interval time for abnormal screening mammogram to surgery (SCRN to SURG) was 61.24 d; subtracting weekend days equals 45 business days (Table 1).

Of the 131 surveys mailed out, 57 were returned (44%). Of 57 responses, 55 were satisfied with the interval screening to call–back (96%); of 57 responses, 57 were satisfied with the interval call–back to diagnostic appointment (100%); of 56 responses, 56 were satisfied with the interval diagnostic appointment to biopsy appointment (100%); of 55 responses, 54 were satisfied with the interval biopsy appointment to biopsy results call (98%); of 51 responses, 50 were satisfied with the interval biopsy results call to MRI appointment (98%); of 49 responses, 48 were satisfied with the interval

Table 1.

Summary statistics of time difference (in days) between selected procedures run the means procedure.

	n	Mean	Std dev	Minimum	Lower quartile	Median	Upper quartile	Maximum
Interval=SCRN to WRKP	57	13.19	8.18	2	7	12	17	50
Interval=WRKP to BPSY	110	3.92	18.46	−180	2	5	7	43
Interval=BPSY to MRI	98	12.02	7.63	−12	9	11.5	14	68
Interval=MRI to SURG	123	35.06	30.6	3	20	27	41	221

MRI appointment to surgery consult (98%); and of 55 responses, 53 were satisfied with the interval surgery consult to actual surgery (96%). Several surveys were marked in the margin indicating the patient had not had an MRI (Table 2).

Combining the survey intervals to compare with turnaround time intervals, 98% were satisfied with the interval screening to diagnostic appointment (SCRN to WKUP), 100% were satisfied with diagnostic appointment to biopsy (WKUP to BPSY), 98% were satisfied with biopsy appointment to MRI (BPSY to MRI), 97% were satisfied with MRI appointment to surgery (MRI to SURG); an overall 98% were satisfied with the time from screening mammogram to surgery (SCRN to SURG) (Table 2).

Table 2.
Number and percentage of patients satisfied with turn–around time for selected intervals.

Original intervals from questionnaire	Patients satisfied with turn around time
Screening to call back	55/57 (96%)
Call back to Dx Appt	57/57 (100%)
Dx Appt to Bx Appt	56/56 (100%)
Bx Appt to Bx results call	54/55 (98%)
Bx cesults ball to MRI Appt	50/51 (98%)
MRI Appt to surgery consult	48/49 (98%)
Surgery consult to surgery	53/55 (96%)
Combined intervals	
Screening to Dx Appt	98%
Dx Appt to Bx Appt	100%
Bx Appt to MRI Appt	98%
MRI Appt to surgery	97%
Screening to surgery	98%

Regarding patient perception of delay, 44 answers were registered on the patient surveys; 41 perceived there was no delay in the time from abnormal screening to surgery, two perceived there was a system delay, and one indicated she had imposed a delay (patient delay).

4. Discussion

The CCBCC falls within the 75%ile of the NQMBC benchmark (top 75%, 45 business days); however, this turnaround time included an interval of MRI, not previously measured in the NQMBC benchmark, which was established utilizing 2005 data[7]. This study also included all–comers to the CCBCC, which accounts for gaps in the interval data, as not all patients began or finished the process of screening to diagnosis to treatment with our institution. We noted that as the variation in time intervals increased, patient satisfaction decreased (Figure 1).

The MRI to surgery interval had a standard deviation of 30.6 d, by far the widest, and demonstrated the lowest combined satisfaction rate of 97%. However, it must be acknowledged that overall; patients maintained a high satisfaction rate (96%–100% per individual intervals).

Two significant rate–limiting steps were identified as the time from screening mammogram to diagnostic mammogram, and biopsy to surgery–specifically, the sub–interval MRI to surgery. The CCBCC turnaround time for screening to diagnostic mammogram was 10 d, compared with the NQMBC 50%ile of 6 d.

One patient indicated on her survey that, "Only the screening mammogram results were too slow. 3 weeks is too long." This suggests an internal system delay, which could be improved by changing processes from within the Clinic.

The CCBCC turnaround time for biopsy to surgery was 35 d, compared with the NQMBC 50%ile of 14 d. The benchmark states this interval includes biopsy results, surgery consultation, and surgery scheduling[7].

At the CCBCC, this includes MRI, which added 10 business days (BPSY to MRI), was the interval with the greatest variability, and the lowest patient satisfaction. In addition, the majority of consults were performed by one surgeon (at the time of the study).
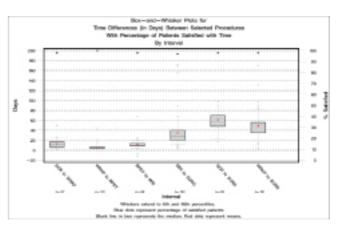

Figure 1. Box–and–Whisker Plot.

Several strengths of the CCBCC were also identified. The diagnostic mammogram to biopsy interval was 3.9 d, equal to the 25%ile of the NQMBC benchmark (top 25%). This interval had the lowest variability and the highest patient satisfaction. The primary breast surgeon's re–excision rate is 6.7%, compared with the national average of 20%–60%[8–10].

It is suggested that the practice of the breast program with pre–treatment MRI adds days, but also clinical specificity in cancer treatment planning for the surgeon. In other words, the time spent obtaining the MRI is an opportunity cost for a significantly lower recurrence rate among our patients. Additionally, the CCBCC

demonstrates the unique model of a Clinical Nurse Navigator, who is personally involved with each patient, offering both clinical and emotional support: she assists with scheduling appointments, relaying results to patients, and organizes patient support groups. Many patient surveys contained narrative comments reflecting the care and attention received at the Breast Care Center.

Since 2009, the CCBCC has already improved the process for obtaining insurance approval and preauthorization for MRIs (improves access); and has added clinical staff. There is now an additional breast surgeon to share the burden of benign cases, and a nurse practitioner to see post–op and follow–up patients, both of which changes have improved the accessibility to the primary breast surgeon specialist.

Strengths of the study include its qualitative as well as quantitative analyses, retrospective as well as prospective arms, an excellent survey return rate of 44%, the internal quality review this provides, and the first description of processes that incorporate MRI in turnaround times.

Potential limitations of the study include the incomplete data for Part 1 (i.e. missing dates for various appointments)–this is due to inclusion of some patients who received aspects of their care outside the CCBCC; calculation of business days from calendar days to compare Part 1 data with the national benchmark; the endpoints of the time intervals in Part 1 were different from Part 2 (survey includes sub–intervals not assessed in retrospective chart review); and the comparison of the CCBCC with a benchmark that does not include MRI, a key component in 2012 of standard breast cancer care.

These results demonstrate the need for future studies, not only of our Breast Care Center's turnover times, including all sub–intervals in its evaluation, and limited to patients seen solely at the CCBCC; but also to establish a new national benchmark, including MRI in the screening to surgery process.

Conflict of interest statement

We declare that we have no conflict of interest.

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