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ORIGINAL ARTICLE – BREAST ONCOLOGY

# Improving Wait Times and Patient Experience Through Implementation of a Provincial Expedited Diagnostic Pathway for BI-RADS 5 Breast Lesions

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## ABSTRACT

**Background.** Long diagnostic intervals following abnormal breast imaging (DI) cause patient anxiety and possibly poorer prognosis. This study evaluates the effect of a provincial diagnostic pathway for BI-RADS 5 lesions on wait times and the patient-reported experience (PRE).

**Methods.** With multidisciplinary input, we developed a pathway for BI-RADS 5 lesions featuring expedited biopsy, early surgical referral, and nurse (RN) navigator support. Key diagnostic intervals were captured prospectively and compared with a prepathway control cohort. PRE data were obtained from a voluntary survey.

**Results.** 1205 patients were managed on the BI-RADS 5 pathway with 797 primary care physicians, 57 imaging centers, and 2 regional breast programs participating. Median duration from DI to biopsy was 6 days, from biopsy to pathology report was 5 days, DI to surgical referral was 6 days, and DI to surgical consult was 21 days. Compared with 128 prepathway controls, median intervals from DI to surgical referral and consult were significantly improved (15 vs. 6 days, 26 vs. 21 days, $p < 0.001$). Amongst 294 women who completed the survey, 92% experienced $\geq 1$ anxiety complaint during assessment; prompt surgical consultation and multiple features of RN support reduced anxiety, and wait time satisfaction was high (70%). Patient preferences varied for receiving biopsy results from a surgeon (57%) vs. another provider (43%).

**Conclusions.** A diagnostic pathway for BI-RADS 5 lesions reduced wait times and improved the patient experience through prompt surgical referral and RN navigator support. Differing preferences for receiving biopsy results emerged, and future iterations should incorporate individualized patient wishes.

## BACKGROUND

Long diagnostic intervals from abnormal breast imaging to diagnosis cause patient anxiety and possibly poorer prognosis.[1–5] Increasing time to diagnosis has been shown to be associated with known negative prognostic indicators for breast cancer including larger tumor size and lymph node positivity,[5] and treatment delay has been associated with poorer survival.[6,7] While Canadian national targets exist for timely assessment, a review of organized breast screening programs found that only 55% of women receive a diagnosis within the recommended interval.[8] Further, there are no published Canadian population-based data on wait times extending to time of surgical consultation,

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which we feel represents a significant milestone for patients, as important information related to treatment planning is first provided at this visit.

Other provincial breast programs have significantly reduced wait times from abnormal mammogram to diagnosis using organized pathways that include dedicated comprehensive breast assessment facilities, early involvement of formal breast health programs, and/or dedicated patient navigators.[9–12] In 2017, we developed and implemented a provincial clinical pathway for expedited work-up of all BI-RADS 5 lesions, coupled with early surgical referral and nurse navigator support (BI-RADS 5 Pathway). This study prospectively evaluated the effect of the pathway on wait times and the patient-reported experience (PRE) during its first year of implementation.

## METHODS

### *The BI-RADS 5 Pathway*

The BI-RADS 5 Pathway was established in 2017 as a quality initiative through the Cancer Strategic Clinical Network (CSCN), whose mandate is to facilitate evidence-informed improvements and bring innovation to healthcare through the shared effort of multiple stakeholders.[13] This pathway was designed in collaboration with primary care physicians (PCPs), radiology, and two regional Breast Health Programs (Edmonton BHP and Calgary BHP) in the Province of Alberta serving 80% of breast cancer patients. Prior to the pathway, there were significant variations in imaging report recommendations for BI-RADS 5 lesions across community breast imaging centers. Patients typically required multiple appointments to receive imaging and biopsy results and a surgical referral, with the associated potential for delay or loss to follow-up. Further, no organized system was in place to track referrals and monitor wait times.

In the BI-RADS 5 Pathway (Table 1), an automated textbox is included in all BI-RADS 5 imaging reports prompting the PCP to arrange immediate surgical referral to the local BHP or surgeon of choice, along with a biopsy recommendation and an expedited biopsy date. A BHP nurse (RN) navigator concurrently receives all BI-RADS 5 reports. For patients referred to the regional BHP, the RN navigator schedules a surgical consult approximately 5 business days postbiopsy; this timing aims to ensure that pathology reports are available to review for the majority of patients while minimizing wait times. The RN navigator notifies the patient about her referral, provides preconsultation education, and serves as a contact for further questions during the diagnostic process. If a referral to the BHP is not received, the RN contacts the PCP to confirm a referral is pending or has occurred to an outside surgeon, thus acting as a safety net to ensure that the recommendation for biopsy is acted upon.

All patients on the pathway are added to a BI-RADS 5 registry prospectively maintained by the BHP RN navigator, and a measurement framework was developed to capture key diagnostic intervals for patients in the registry. An electronic survey of PREs during diagnostic assessment was created using REDCap, which patients are invited to complete following surgical consult. The survey includes domains related to anxiety (Generalized Anxiety Disorder 7-item scale, GAD-7[14]), wait time satisfaction, and preferences during diagnostic work-up.

### *Data Sources and Statistical Analysis*

This study includes consecutive patients managed on the pathway from November 2017 to January 2018. Final pathologic diagnosis and dates of BI-RADS 5 imaging, biopsy, pathology report, surgical referral by the PCP, and surgical consultation were abstracted from the BI-RADS 5 registry. Retrospective medical chart review of all BI-RADS 5 referrals at two regional BHP from January to March 2017 was performed to serve as a prepathway control group. Patient-reported experience measures from the voluntary survey offered to pathway patients were

**TABLE 1** Key multidisciplinary roles within the provincially implemented BI-RADS 5 Pathway

| Breast imaging center | Primary care physician (PCP) | Breast Health Program (BHP)/nurse navigator |
|---|---|---|
| Include standard textbox on BI-RADS 5 imaging report prompting immediate surgical referral | Send surgical referral to regional BHP or breast surgeon of choice | Arrange surgical consult 5 days postbiopsy, when feasible |
| Distribute all BI-RADS 5 imaging reports to regional BHP | Arrange follow-up to discuss biopsy results prior to surgical consult, if desired | Confirm surgical consult date with PCP |
| Arrange expedited biopsy | | Provide patient pre-consultation education |
| | | Monitor key diagnostic intervals and maintain patient registry |

obtained from REDCap. As a quality initiative with minimal risk, this study did not require approval through a research ethics board according to our institution's "A Project Ethics Community Consensus Initiative" (ARECCI) ethics screening tool.[15]

We used descriptive statistics to evaluate diagnostic intervals and the PRE. Patients with negative diagnostic intervals (i.e., surgical referral before BI-RADS 5 imaging) or missing data were excluded from respective diagnostic interval calculations. Times from BI-RADS 5 diagnostic imaging (DI) to biopsy and from biopsy to pathology report were calculated for all patients who underwent tissue biopsy. Times from DI to surgical referral and from DI to surgical consult were reported for the subset of patients referred to a regional BHP. Diagnostic intervals were compared between regional BHPs, and between pathway versus prepathway patients using nonparametric median test for two independent means. A two-sample test of proportion was used to assess statistical significance between categorical variables. Statistical tests were performed using SPSS v19.0.

## RESULTS

We identified 1205 patients who had a BI-RADS 5 breast lesion during the study period. There were 797 primary care physicians and 57 community breast imaging centers participating in the pathway. Tissue biopsy was performed in 1182 (98.1%) patients. Amongst 1179 patients with available biopsy results, 1072 (90.9%) were diagnosed with cancer. Of 1195 patients with available surgical referral data, 1006 (84.2%) were referred to a regional BHP (Calgary $n = 368$, Edmonton $n = 638$) and 179 (15.0%) to a surgeon outside of a BHP, while 10 (0.8%) declined surgical referral. The prepathway control group consisted of 128 patients (Calgary $n = 51$, Edmonton $n = 77$).

### *Diagnostic Intervals*

We excluded 4, 44, and 1 patient(s) with negative wait times within the DI to biopsy, DI to surgical referral, and DI to surgical consultation interval, respectively. We excluded 4, 5, and 34 patients with missing dates for pathology reports, surgical referral, and surgical consultation, respectively. Within the prepathway controls, we excluded one patient with a negative wait time (DI to surgical referral interval) and one patient with a missing pathology report date.

Median duration from DI to biopsy was 6.0 days ($\geq$ 90% within 14.0 days) and from biopsy to pathology report was 5.0 days ($\geq$ 90% within 8.0 days). These intervals did not differ between pathway patients and prepathway controls (6.0 vs. 6.0 days, $p = 0.71$; 5.0 vs. 5.0 days, $p = 0.11$). Median duration from DI to surgical referral was 6.0 days ($\geq$ 90% within 18.0 days) and from DI to surgical consult was 21.0 days ($\geq$ 90% within 34.0 days). Both intervals were significantly shorter for patients on the pathway (6.0 vs. 15.0 days, $p < 0.001$; 21.0 vs. 26.0 days, $p < 0.001$). Diagnostic intervals are presented in Table 2.

Diagnostic intervals differed by region, including DI to biopsy (Calgary 8.0 vs. Edmonton 5.0 days), DI to surgical referral (5.0 vs. 7.0 days), and DI to surgical consult (20.0 vs. 22.0 days) (all $p < 0.001$). Comparative intervals between the two regions are presented in Supplementary Table 1.

### *Patient-Reported Experience*

Voluntary PRE surveys were completed by 294 women (Calgary $n = 100/132$, 75.8%; Edmonton 194/283, 68.6%). Most patients (91.5%) experienced at least one anxiety complaint on the GAD-7 during diagnostic assessment (Fig. 1); 61% found it somewhat difficult to "work, take care of things at home, get along with others" and 17% found it very or extremely difficult. Patients were asked what factors reduced their anxiety during the interval to the surgical appointment; prompt surgical consultation was the most commonly selected factor (89.8%). Multiple features of nurse navigator support also reduced anxiety, including the ability to contact an RN with questions (81.4%), having an RN coordinate care appointments (66.4%), and having an RN discuss the reason for surgical appointment (58.8%). Prior to surgical consultation, 89.8% endorsed a clear understanding of the purpose of the visit.

Regarding wait times, 69.7% were satisfied with the interval from abnormal imaging to communication of biopsy diagnosis, 15.6% were neutral, and 14.7% were dissatisfied. Patients in Calgary had higher rates of dissatisfaction than those in Edmonton (21.0% vs. 11.3%, $p = 0.04$). Regarding patient preferences for who to have communicate biopsy results, 56.9% stated the surgeon who would discuss treatment versus 43.1% stated a family doctor or provider other than a surgeon. Of those who wished to receive their diagnosis prior to the surgical visit, 62.6% preferred the opportunity to research their diagnosis and treatment options beforehand, while 37.4% preferred a provider with whom they had an established relationship even if this may delay surgical consultation. Most patients (75.4%) received their cancer diagnosis from their PCP, followed by their surgeon (13.6%) or other physician (11.0%). Patients were significantly more likely to receive their diagnosis from a surgeon in the Calgary BHP compared with the Edmonton BHP (33.0% vs. 3.9%,

**TABLE 2** Diagnostic intervals for patients managed under the BI-RADS 5 Pathway versus prepathway controls

| | Prepathway control group | BI-RADS 5 Pathway | *p* value* |
|---|---|---|---|
| DI to biopsy | | | |
| Count | 128 | 1178 | 0.71 |
| Median (days) | 6.0 | 6.0 | |
| Range (days) | 0–57.0 | 0–88.0 | |
| 90th percentile (days) | 16.0 | 14.0 | |
| Biopsy to pathology report | | | |
| Count | 127 | 1178 | 0.11 |
| Median (days) | 5.0 | 5.0 | |
| Range (days) | 0–29.0 | 0–39.0 | |
| 90th percentile (days) | 9.0 | 8.0 | |
| DI to surgical referral | | | |
| Count | 127 | 957 | < 0.001 |
| Median (days) | 15.0 | 6.0 | |
| Range (days) | 0–39.0 | 0–93.0 | |
| 90th percentile (days) | 26.0 | 18.0 | |
| DI to surgical consult | | | |
| Count | 128 | 971 | < 0.001 |
| Median (days) | 26.0 | 21.0 | |
| Range (days) | 5.0–70.0 | 0–113.0 | |
| 90th percentile (days) | 38.0 | 34.0 | |

*Calculated for median

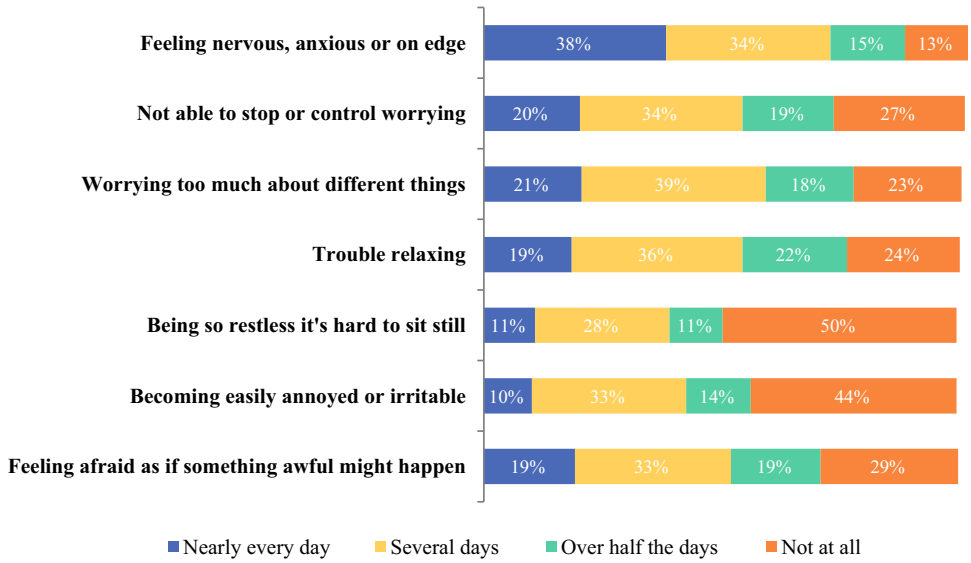


**FIG. 1** Patient responses to Generalized Anxiety Disorder 7-item scale (GAD-7) during interval from BI-RADS 5 diagnostic imaging result to surgical consultation

$p < 0.001$). Selected patient-reported experience measures are presented in Table 3.

## DISCUSSION

In a coordinated effort amongst primary care physicians, community breast imaging centers, and two regional breast health programs, we successfully implemented a pathway for expedited evaluation of BI-RADS 5 lesions. This pathway significantly improved wait times to surgical consultation, and we are the first province to report on this diagnostic interval. Further, this is one of few studies to include patient-reported experience outcomes. We confirm that the diagnostic work-up is a highly anxiety-provoking experience for patients, and multiple elements of the pathway reduce anxiety, including prompt surgical referral and nurse navigator support.

**TABLE 3** Patient-reported experience measures for those on the BI-RADS 5 Pathway who received surgical consultation at the two regional breast health programs

| | Calgary BHP ($n$ = 100) | Edmonton BHP ($n$ = 194) | $p$ value |
|---|---|---|---|
| At least one anxiety complaint during diagnostic work-up | 93 (93.0%) | 176 (90.7%) | 0.51 |
| Found it very or extremely difficult to "work, take care of things at home, get along with others"* | 13 (13.9%) | 33 (18.8%) | 0.32 |
| Felt prompt surgical consultation reduced anxiety | 91 (91.0%) | 174 (89.7%) | 0.72 |
| Were dissatisfied with interval from DI to communication of diagnosis | 21 (21.0%) | 22 (11.3%) | 0.04 |
| Would most like to receive biopsy results from a breast surgeon** | 56 (63.6%) | 96 (53.6%) | 0.12 |
| Received cancer diagnosis from a breast surgeon*** | 30 (33.0%) | 7 (3.9%) | < 0.001 |

*Amongst $n$ = 93 (Calgary) and $n$ = 176 (Edmonton) with at least one anxiety complaint

**Amongst $n$ = 88 (Calgary) and $n$ = 179 (Edmonton) respondents

***Amongst $n$ = 91 (Calgary) and $n$ = 181 (Edmonton) with cancer diagnosis following biopsy

National targets for breast screening programs recommend that > 90% of patients receive a diagnosis within 7 weeks of an abnormal screen when tissue biopsy is performed.[8] We do not capture timing of first abnormal imaging, and our population includes both screening and diagnostic mammograms. Nonetheless, with these targets in mind, we demonstrate very timely assessment from BI-RADS 5 imaging, with median time to definitive diagnosis of 11 days (> 90% within 22 days) and to surgical consultation of 21 days (> 90% within 34 days). The pathway significantly reduced time to surgical referral and consultation, however there was no difference for time to biopsy. In both regions studied, community imaging centers can already arrange biopsies based on radiologist recommendations without requiring a separate requisition, thus changes in time to biopsy were not expected in this phase of implementation. Broader implementation of the pathway provincially will likely demonstrate a greater effect on reducing this interval in other regions.

To ensure standardization of timely care across the province, we compared diagnostic intervals between the two regions studied. While statistical differences were observed, the absolute difference was no more than 2–3 days for each measure. Biopsies tended to occur faster in Edmonton, mainly due to one outlier diagnostic imaging center in the Calgary region with longer wait times. Despite earlier biopsies, median time to surgical consultation was 2 days longer in Edmonton. During the time of study, the Edmonton program had a shortage of breast surgeons as compared with usual staffing, which may explain this delay. Future monitoring for discrepancy of this interval between the two programs is required once this reversible staffing issue has been addressed, and should be further explored if persistent. Future study should also focus on identifying specific factors associated with delay. For instance, rural location is known to impact access to cancer control services,[8,16] and was found to be associated with longer diagnostic intervals in the Ontario Breast Screening Program (OBSP) cohort.[9] Identifying such factors in our population will be critical for continued improvement of the pathway.

Other provinces have demonstrated similar success in addressing system-level delay through organized assessment pathways, though most report only on time to diagnosis. In the OBSP, patients evaluated through a Breast Assessment Centre (BAC) were twice as likely to be diagnosed within 7 weeks compared with those receiving usual care (UC) [odds ratio (OR) 1.91, 95% confidence interval (CI) 1.73–2.10], with median wait time from abnormal screening to diagnosis of 28 versus 39 days, respectively.[9] The Manitoba Breast Screening Program reduced wait times using a direct referral system to a breast health center for work-up instead of the PCP arranging necessary investigations.[11] In Nova Scotia, patient navigators liaise with PCPs to facilitate timely investigation and prevent loss to follow-up.[12] Our pathway incorporates many of these features that have demonstrated success, including expedited biopsy, early surgical referral, and coordination of care through an RN navigator.

Our PRE data have significant value to inform further iterations and improvements of the BI-RADS 5 Pathway. We demonstrate the importance of not only timely investigations, but also prompt surgical consultation. Hislop et al. found that, during diagnostic work-up of abnormal mammograms, patient anxiety was highest while awaiting results from the final diagnostic test.[1] We found, however, that > 90% of women continued to experience significant anxiety beyond diagnosis to time of surgical consultation, and almost all felt that a prompt surgical appointment reduced anxiety. Importantly, the role of the RN navigator

was also greatly valued by patients, especially as a clearly identified contact for questions and as a coordinator of care. Further, the RN navigators in both programs cited multiple instances where their intervention was useful in preventing delay. Examples included educating patients on the need for a biopsy in those who were hesitant to proceed with this investigation and liaising with PCPs who had not received imaging or pathology reports and therefore had not initiated a surgical referral.

During pathway development, we aimed to facilitate adequate communication with PCPs during diagnostic assessment and allow PCPs the opportunity to deliver a cancer diagnosis to their patients as a familiar provider. Concerns were expressed about automatic surgical referrals, and we elected to maintain a referral requirement from the PCP. The RN navigator ensures communication of the surgical consultation date to the PCP, allowing the PCP to arrange an appointment to convey biopsy results if desired. For patients who receive biopsy results from the surgeon at time of consultation, the education given by the RN navigator appropriately prepares women for the purpose of the visit and may help reduce anxiety related to an unfamiliar provider delivering a cancer diagnosis.

To further understand patient preferences for receiving biopsy results, we included this topic in our PRE questionnaire. Results were highly variable; many patients preferred to receive their diagnosis from their surgeon, while others preferred another provider prior to surgical consultation, either to allow time to learn more about their diagnosis, or for the familiarity of their PCP. Interestingly, in the Calgary region where a greater proportion of patients received their diagnosis at time of surgical consultation, wait time dissatisfaction was higher. The interval to communication of biopsy results was not captured in our data, but was likely longer for those who were informed at the surgical visit, and this may explain these findings. Alternatively, the higher rates of dissatisfaction in the Calgary region may be due to inherent differences in this population (i.e., socioeconomic status, access to healthcare, etc.). In summary, patients hold different values that impact their preferences for receiving a cancer diagnosis. As such, individualized preferences should be incorporated into our pathway in the future to further improve the patient experience.

Our study has acknowledged limitations. We did not capture demographic and clinical data to compare baseline characteristics of the pre- and postpathway cohorts. However, all patients were evaluated in close temporal proximity, and it is unlikely that significant differences existed between the groups to impact our results. Further, we did not collect diagnostic data prior to BI-RADS 5 imaging (such as an initially abnormal mammogram prompting additional views), and therefore we did not capture the complete evaluation interval for every patient. While our PRE measures provide the patient perspective for those on the BI-RADS 5 Pathway, we do not have this data for the prepathway cohort. Therefore, while patients frequently identified elements of the pathway as having reduced anxiety, this is based on subjective assessment as opposed to formal comparative analysis. Further, survey participation was voluntary, which may introduce bias; main barriers to survey participation included non-English-speaking patients, lack of internet access/ability, and patients feeling overwhelmed with their diagnosis.

## CONCLUSIONS

We successfully implemented a population-based pathway featuring expedited biopsy, early surgical referral, and nurse navigator support for patients with BI-RADS 5 lesions. The pathway reduced diagnostic wait times, including the interval from BI-RADS 5 imaging to surgical consultation. Through patient-reported experience data, we demonstrate that diagnostic assessment is highly anxiety-provoking for patients, but early surgical referral and nurse navigator support improve the patient experience. Wait time satisfaction was high, however differing preferences for the communication of a cancer diagnosis emerged, and incorporating individualized patient wishes into future iterations of the pathway may further improve the patient experience.

**DISCLOSURES** No conflicts of interest to disclose.

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