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IMPLEMENTING A TRIAGE SYSTEM TO REDUCE TIME TO BIOPSY FOR HIGHLY CONCERNING SCREENING MAMMOGRAMS

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AUTHORS AND DISCLOSURES

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INTRODUCTION

- At the start of the COVID-19 pandemic, like many breast centers across the nation, our healthcare institution initially paused outpatient breast imaging services, and then slowly resumed screening and diagnostic exams using safe practices [1, 2].
- During the initial weeks of the pandemic, our radiologists needed to review all BI-RADS 0 screening examinations and schedule the ones with the most concerning findings for diagnostic workup first.
- This raised the question of the potential benefit of an internal triage system for highly concerning screening mammograms.

INTRODUCTION

- Some imaging findings on screening mammography stand out as obviously suspicious for malignancy.
- Also, most screening mammograms within our healthcare system utilize digital breast tomosynthesis (DBT), which has a higher positive predictive value for malignancy than digital mammography (DM) alone [3].
- By implementing a triage system for highly concerning mammograms, not only would we be better prepared for another pandemic-type shutdown, we hypothesized that we could also reduce the time to biopsy for the true positive (TP) exams that were triaged for expedited workup.
- This would benefit those patients by allowing sooner diagnosis and quicker surgical and oncologic treatment planning.

METHOD AND MATERIALS

- After IRB approval of this HIPAA compliant study, a retrospective chart review of the electronic medical record was performed to identify TP screening exams from September 1st, 2019, to the initiation of the COVID-19 shutdown on March 16th, 2020, as well as TP screening exams after the implementation of our triage protocol, examining the same time period one year later, from September 1st, 2020, to March 16th, 2020.
- Screening mammograms in this study were performed at three hospitals and 13 clinics.
- The majority of DM and DBT studies were performed on Hologic Selenia Dimensions Mammography Systems. Some DM studies were performed on a GE Senographe Essential unit.
- Diagnostic exams (dx) and biopsies were performed at the three hospitals sites and three standalone clinics.
- There were 12 fellowship trained breast radiologists interpreting screening and diagnostic mammograms and performing image-guided biopsies over the period of this study with years of post-training experience ranging from less than one year to 24 years.

METHOD AND MATERIALS

- Triage System Details
 - Screening examinations with findings that were very likely to require a biopsy and would likely lead to a BI-RADS 4C or BI-RADS 5 designation were flagged as “high priority” including but not limited to:
 - an irregular mass
 - a new mass or focal asymmetry with associated suspicious calcifications or ipsilateral enlarged lymph nodes
 - calcifications with a suspicious morphology and/or distribution
 - two-view architectural distortion
 - Screening reports were flagged by adding a standardized statement to the end of screening reports:
 - “The radiology department will arrange for additional imaging evaluation.”
 - This alerted our support staff to expedite the scheduling of the patient's diagnostic imaging appointment.
 - Dedicated appointment slots were held weekly for flagged high priority cases.
 - A system for scheduling biopsies of highly suspicious findings was already in place at our institution but was standardized at all sites.
- Time to biopsy was recorded for TP exams in both time periods as well as for flagged “high priority” exams.
 - Statistical analysis was conducted using Mann-Whitney U tests.

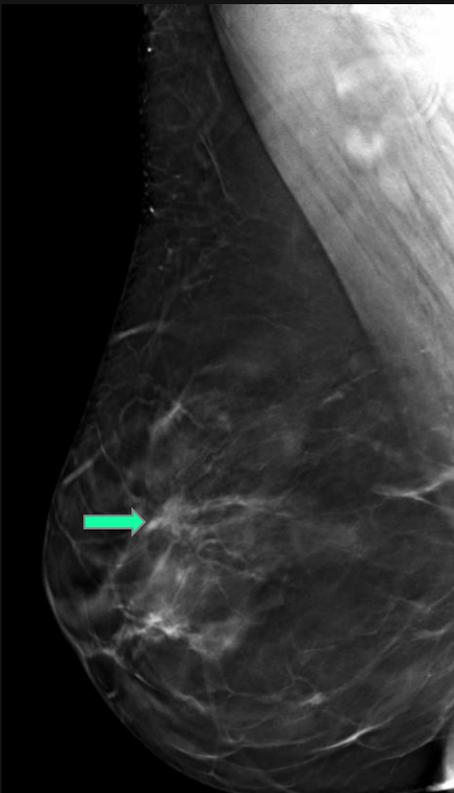


Fig. 1A

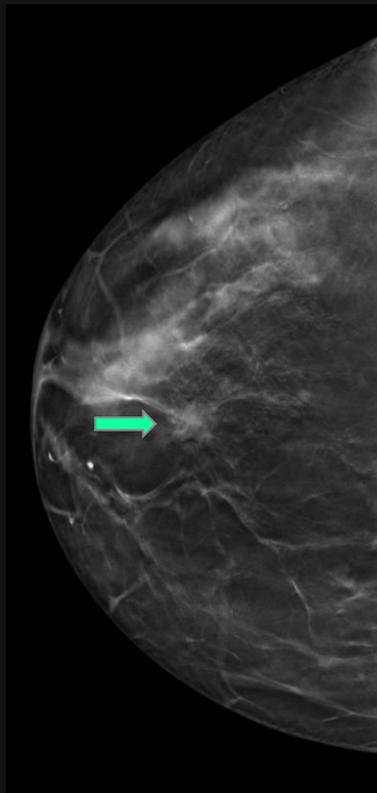


Fig. 1B



Fig. 1C

CASE 1: 44 year-old female presented for baseline screening mammography. This case was flagged as a “high priority” case for expedited workup. Tomosynthesis slice in the right MLO view (Fig. 1A), right CC view (Fig. 1B), and targeted ultrasound (Fig. 1C) demonstrate an irregular mass with spiculated margins. Biopsy yielded invasive ductal carcinoma, grade 1.

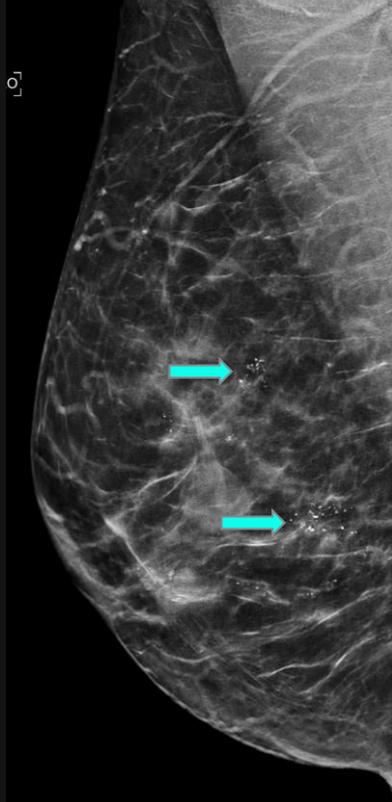


Fig. 2A

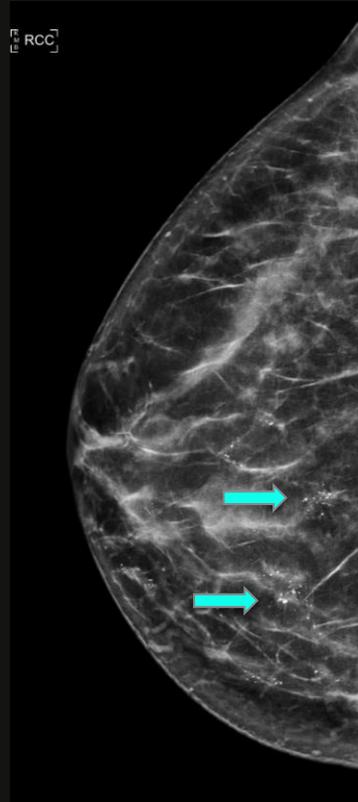


Fig. 2B

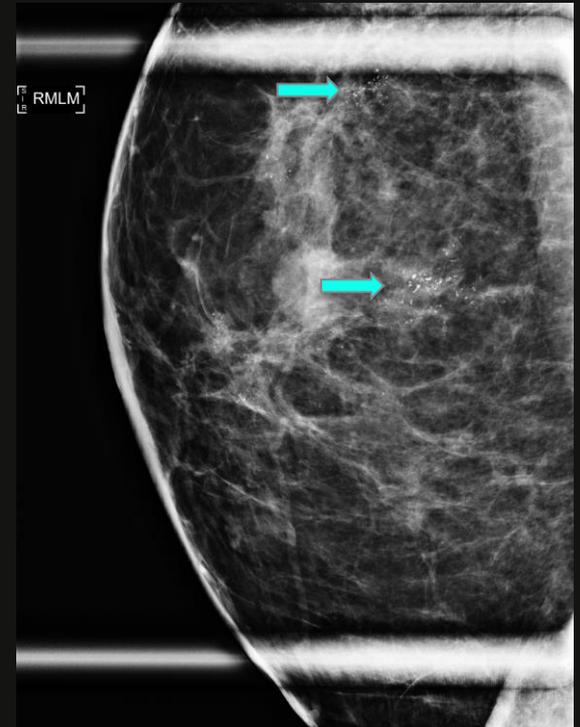


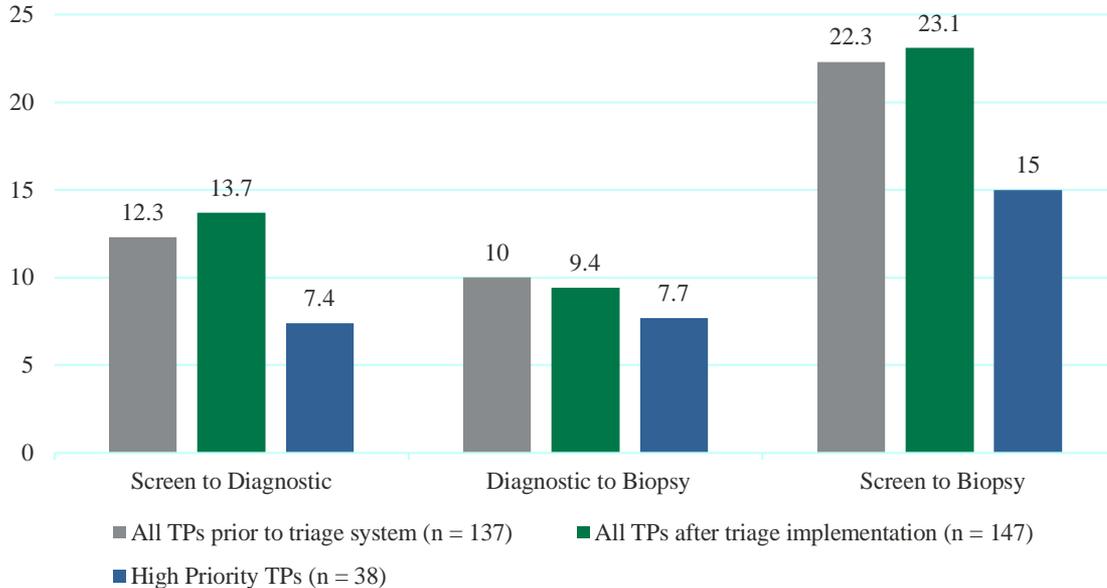
Fig. 2C

CASE 2: 55 year-old female presented for baseline screening mammography. This case was flagged as a “high priority” case for expedited workup.

Right MLO C-view (Fig. 2A), right CC C-view (Fig. 2B), and right magnification LM view (Fig. 2C) demonstrate multiple groups of suspicious microcalcifications in the medial and superomedial right breast. An oval mass is also seen but was shown to be a benign cyst on ultrasound. Stereotactic guided biopsy yielded invasive ductal carcinoma, grade 2 and ductal carcinoma in situ, grade 3.

RESULTS

Average Time (days) from Screening to Diagnostic to Biopsy



- 137 TP exams in the pre-triage study period
 - Time from screen to dx: 12.3 days
 - Dx to biopsy: 10 days
 - Screen to biopsy: 22.3 days
- 147 TP exams in study period after triage system started
 - Time from screen to dx: 13.7 days
 - Dx to biopsy: 9.4 days
 - Screen to biopsy: 23.1 days
- 38/147 (25.9%) TP exams were flagged as “high priority”
 - Time from screen to dx: 7.4 days
 - Dx to biopsy: 7.7 days
 - Screen to biopsy: 15 days

RESULTS

All TPs Prior to Triage System vs. All TPs After Triage System

	U-Value	P-Value
Screen to Diagnostic	9609.5	0.25
Diagnostic to Biopsy	9802	0.35
Screen to Biopsy	9588	0.24

All TPs Prior To Triage System vs. High Priority TPs

	U-Value	P-Value
Screen to Diagnostic	1784	0.002
Diagnostic to Biopsy	2328.5	0.16
Screen to Biopsy	1874.5	0.004

All TPs After Triage System vs. High Priority TPs

	U-Value	P-Value
Screen to Diagnostic	1796.5	<0.001
Diagnostic to Biopsy	2574	0.23
Screen to Biopsy	1786.5	<0.001

- Statistically significant reduction in time from screen to diagnostic exam and overall time from screen to biopsy for high priority cases
 - When compared to all true positives both before and after triage implementation
- Reduction in time from diagnostic exam to biopsy for high priority cases did not reach statistical significance
- No statistically significant difference in time to biopsy when comparing all TPs prior and post-triage implementation

DISCUSSION

- Improving workflow to expedite the diagnosis of breast cancer from screening mammography can be challenging at multisite healthcare systems.
- The triage system we implemented at our institution was simple and inexpensive, but it did require coordination and cooperation between staff spanning multiple breast centers at both hospital and clinic sites.
- Despite logistical challenges, the time to diagnosis of breast cancer for TP screening exams was significantly reduced for the subset of patients flagged as high priority.

DISCUSSION

- Though there was a statistically significant reduction in time from screen to biopsy and screen to diagnostic exam, the reduction in time from diagnostic exam to biopsy was not significant.
 - This was not surprising as our intervention was specifically targeted at reducing the time from screening examination to diagnostic evaluation.
 - A system for expediting BI-RADS 4C and BI-RADS 5 diagnostic exams to biopsy already existed in our system. We standardized the process across all sites, but this did not significantly reduce the time from the diagnostic exam to the biopsy.
- There was no significant difference in the time to biopsy of all TP cases prior to the implementation of our triage system compared to all TP cases after triage implementation.
 - This could suggest prioritizing some TP cases caused delay of those TP cases that were not triaged for an expediated work up.

DISCUSSION

- Limitations
 - Patients ultimately chose to come in when it was most convenient for them despite scripting used by schedulers to encourage sooner appointments.
 - Our triage protocol addresses an opportunity for improvement that we identified at our multisite institution, but this may not be generalizable to other practices and institutions.
- The two time periods of this study were marked by very different challenges.
 - The study period after triage implementation occurred in the first year of the pandemic.
 - There were still some constraints secondary to the adherence of recommended safe practices.
 - We experienced a rebound of both screening and diagnostic cases in the summer of 2020, and it is difficult to quantify the resultant backlogs and delays in care that extended from this.

CONCLUSION

- Screening mammograms with highly concerning findings can be successfully identified and appropriately triaged for expedited workup.
- This enables quicker diagnosis and treatment planning for a subset of TP screening examinations.
- Additional studies investigating methods of triaging concerning imaging findings across differing institutions may provide useful information to improve the timeliness of breast cancer diagnoses and subsequent treatment.

THANK YOU

References

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