Breast Care Program

Cancer Center | University of Virginia Health System

Reducing False Positives on Breast MRI: How We Improved PPV2 for Biopsy Recommendation and Maintained Desirable Cancer Detection Rates

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Purpose

Breast MRI is commonly used for screening high-risk patients and staging patients with a known malignancy. Although breast MRI offers high sensitivity for cancer detection, low specificity can result in unnecessary biopsies. In the fall of 2014, increases in false positives on breast MRI and low positive predictive value (PPV2) following biopsy recommendations were identified at our institution. Our goal was to improve performance to achieve BI-RADS benchmark of PPV2 >15% while maintaining a cancer detection rate (CDR) of 20-30/1,000.

Methods

We employed the Plan-Do-Study-Act (PDSA) model of quality improvement to determine the causes of the low PPV2 and establish interventions that could improve performance.

PLAN: Data collection

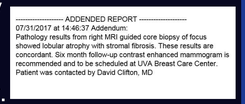
Retrospective review of our local biopsy database from 2013-2014 revealed PPV2 of 12% for all MRI detected lesions with recommendation for tissue diagnosis. CDR could not be determined due to lack of data within our reporting software (MagView). Biopsy and surgical pathology results were not linked to the original reports which resulted in difficulty collecting data for audit. This pre-intervention data also did not separate screening exams from cancer staging MRIs.

DO: Interventions

Several opportunities for improvement were identified. We first improved data collection and raised awareness of performance for each radiologist. We then aimed to improve PPV2 and decrease unnecessary biopsies by instituting real time second opinion readings on borderline cases, discussing all biopsy cases at rad-path consensus conference, and discussing articles on this topic at journal club.

1. Improved Data Collection

Pathology results were entered into both the reporting system and a biopsy database. All pathology results were tracked at the lesion level. Pathology was linked to the finding(s) on MRI reports. This was performed by our nurse navigator at the time that the pathology addendum was added to the biopsy report.

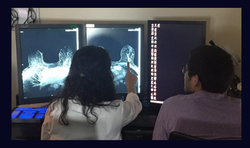


2. Awareness of Performance Audits

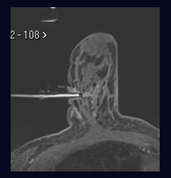
Performance audits were performed. CDR and PPV2 was presented to each radiologist during quarterly breast imaging faculty meetings. This kept each radiologist informed of their current performance.

3. Second Opinion

Borderline cases were discussed in real time at the viewbox with a second faculty member.



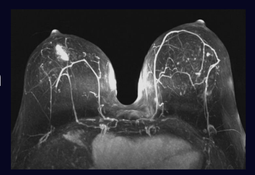
4. Rad-Path Conference



Radiologic-pathologic correlation was presented for all biopsies during quarterly MRI biopsy conference attended by all faculty members and trainees. Discussions placed an emphasis on reducing unnecessary biopsies.

5. Journal Club

Articles and presentations frequently placed a focus on screening MRI, particularly outcomes and performance measures.



STUDY: Analyzing the Results

Data on PPV2 and CDR were then collected following these interventions.

ACT: Project Decision

Multiple cycles of the PDSA model were performed until the goal was achieved. The project continued for an additional year to ensure maintenance of performance.

Results

A total of 161 high risk screening contrast-enhanced MRIs were included in the first cycle of data collection after the interventions. A second cycle of data collection included 359 screening MRIs following adoption of interventions as routine part of work flow. Data was collected for individual readers as well as the entire group. Data was not included for one radiologist that departed the group and another that joined in mid cycle 2.

PPV2 Pre and Post Intervention			
	Pre-Intervention	Post-Intervention (Cycle 1)	Post-Intervention (Cycle 2)
Reader A	6%	11%	26.7%
Reader B	6%	22%	14.3%
Reader C	21%	38%	40%
Total	**12%**	**23%**	**22%**

Table 1: Improvement in PPV2 to desired range noted in both cycles post-intervention.

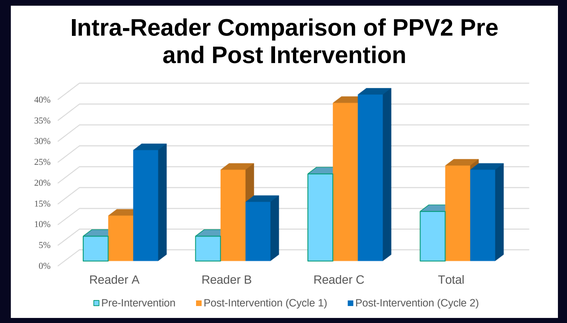


Table 2: Improvement noted for all readers individually and as a group.

CDR Post Intervention		
	Post-Intervention (Cycle 1)	Post-Intervention (Cycle 2)
Reader A	15.7	25.3
Reader B	34	21.1
Reader C	77	34.5
Total	**38**	**25.1**

Table 3: Cancer detection rate (CDR) maintained at >20.

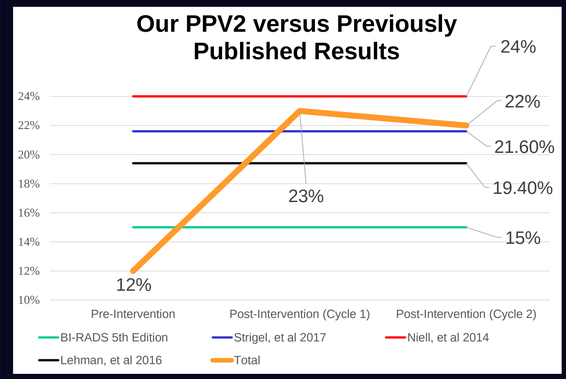


Table 4: Comparison of our PPV2 (orange line) to published benchmarks.

Conclusion

This project improved PPV2 while maintaining desirable CDR for screening breast MRIs performed at our institution. Several key areas of improvement were identified. The process improvement plan included contributions by the radiologists and nurse navigator. This project raised awareness of the BI-RADS performance benchmarks and need to reduce false positives on breast MRI. The project also promoted a team approach by the radiologists and nurse navigator to achieve a common goal. To date, we have continued audit data collection which is shared with individual radiologists to ensure maintenance of performance.

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