BREAKING DOWN THE MAMMOGRAPHY MEDICAL AUDIT: DEFINITIONS AND APPLICATIONS IN THE CLINICAL PRACTICE

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BACKGROUND

Mammography, an important tool for breast cancer screening, has proven to decrease breast cancer mortality. The goal for screening mammography is to detect cancers while maintaining an acceptable rate for recommendation for additional imaging and/or biopsy (to minimize cost and morbidity), and to find a high percentage of small, early-stage cancers, which are more likely to be curable. These goals ultimately improve patient outcomes.

The 1992 Mammography Quality Standards Act (MQSA), mandated by the FDA, ensures nationwide quality control in mammography facilities. It requires personnel training, rigorous quality control, and record-keeping with continuous outcome monitoring for accurate interpretations. The American College of Radiology (ACR) guides data recording for clinically relevant analysis, comparing it with national benchmarks to evaluate breast cancer screening goals.

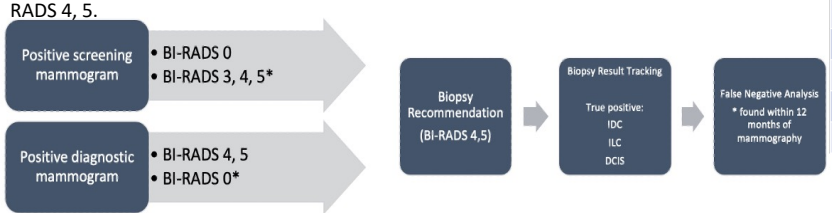
PURPOSE

- Create an overview of the breast imaging audit as outlined by the ACR
- Depict current national benchmarks
- Review recent literature for optimal performance of screening and diagnostic mammography
- Provide examples of how to apply this information in breast imaging facilities to optimize mammographic interpretation, with the goal of improving patient care by early detection and timely treatment of breast cancer.

THE BASIC CLINICALLY RELEVANT AUDIT: DATA COLLECTION

DATA TO BE COLLECTED		
Modality or modalities	Dates of audit period with total number of examinations	Number of screening and diagnostic exams (separate statistics for each)
Number of recommendations for additional imaging (recalls, BI-RADS 0)	Number of recommendations for short-interval follow up (BI-RADS 3)	Number of recommendations for tissue diagnosis (BI-RADS 4 and 5)
Tissue diagnosis results: Malignant or benign for all BI-RADS 0, 3, 4 and 5	Cancer staging: Histologic type, invasive cancer size, nodal status and tumor grade	Analysis of known false-negative mammograms by attempting to obtain surgical/or pathology results and review of negative mammograms

All positive screening and diagnostic mammograms must be tracked. Positive screening mammograms should only include BI-RADS 0. Positive diagnostic mammograms include BI-RADS 4, 5.



*The use of BI-RADS 3, 4, and 5 on screening mammography and BI-RADS 0 on diagnostic mammograms is strongly discouraged. Tracking of true positive and false negative results is necessary for adequate analysis.

THE BASIC CLINICALLY RELEVANT AUDIT: DATA COLLECTION

DATA TO BE CALCULATED	
True Positives	False Positives
Positive Predictive Value PPV1, PPV2, PPV3	Cancer detection rate for screening mammography
Percentage of node negative invasive cancers	Percentage of minimal cancers: <1cm or ductal carcinoma in situ (DCIS) of any size
Percentage of stage 0 or 1 cancers	Abnormal interpretation (recall) rate for screening mammography

	POSITIVE BIOPSY	NEGATIVE BIOPSY	
POSITIVE MAMMOGRAM	True Positive	False Positive	PPV TP/(TP+FP)
NEGATIVE MAMMOGRAM	False Negative	True Negative	NPV TN/(TN+FN)
	Sensitivity TP/(TP+FN)	Specificity TN/(TN+FP)	

Sensitivity, specificity, positive predictive value, and negative predictive value are then calculated. Three types of positive predictive values are obtained: abnormal findings at screening designated as ACR BI-RADS 0, 3, 4, or 5 (PPV1), biopsies recommended on positive diagnostic mammogram designated as ACR BI-RADS 4 or 5 (PPV2), and positive biopsy rate (PPV3).

ACCEPTABLE RANGES OF PERFORMANCE

Screening Mammography

Cancer Detection Rate (per 1000 exams)	≥ 2.5
Abnormal Interpretation (recall) rate	5%-12%
PPV1 (abnormal interpretation)	3%-8%
PPV2 (recommendation for biopsy)	20%-40%
Sensitivity	≥ 75%
Specificity	88%-95%

These parameters are based on ACR Breast Imaging Reporting and Data System (BI-RADS), 5th edition, benchmarks by the Breast Cancer Surveillance Consortium (BCSC), the National Mammography Database, and performance recommendations by expert opinion.

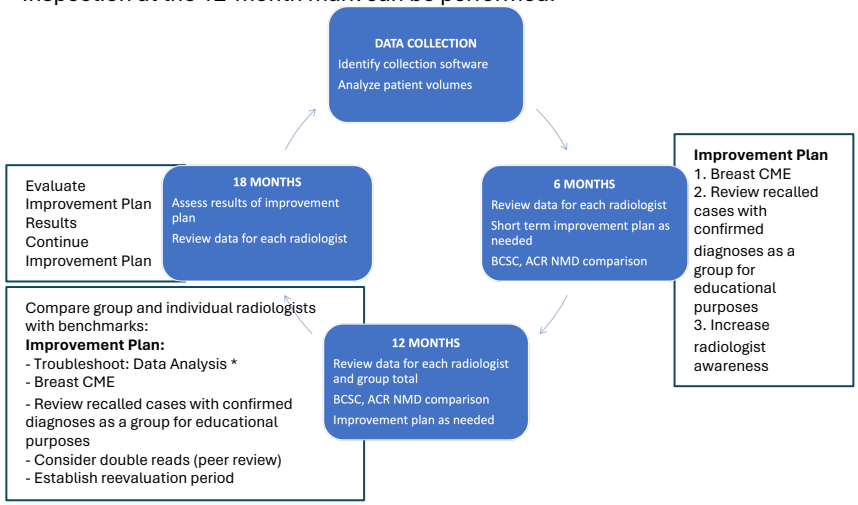
Diagnostic Mammography

	Workup of Abnormal Screening	Palpable Lump
Cancer Detection Rate (per 1000 exams)	≥ 20	≥ 40
Abnormal Interpretation (recall) rate	8%-25%	10%-25%
PPV1 (abnormal interpretation)	15%-40%	25%-50%
PPV2 (recommendation for biopsy)	20%-45%	30%-55%
Sensitivity	≥ 80%	≥ 85%
Specificity	80%-95%	83%-95%

Diagnostic mammography has higher cancer detection rates, recall rates, and PPV because patients have either had a positive screening exam (BI-RADS 0) or symptomatic breast complaint. Additionally, patients with palpable lumps have a higher probability of having breast cancer than all patients undergoing diagnostic mammography and thus have higher acceptable performance ranges as well.

IMPLEMENTATION IN THE CLINICAL PRACTICE

A cycle for practice improvement plans based on MQSA inspection timing is proposed. The cycle starts with optimal data collection, which can be performed through multiple available software and with an understanding of the projected number of reported mammograms per radiologist. The latter is important, as it determines data accuracy. Performing the audit yearly is suggested, as it provides higher volumes and more representative data. Comparison to national benchmarks at a 6-month timeframe with corrections through a structured improvement plan for optimization prior to MQSA Inspection at the 12-month mark can be performed.



If a radiologist is not within the benchmarks, a troubleshoot analysis (*) can be performed, where cancer detection and recall rates, amongst other variables, can be analyzed to determine data variations, validity, and propose a continuous improvement plan. The cycle continues with analysis points every 6 months. The Lead Interpreting Physician (LIP) coordinates and analyzes data.

CONCLUSION

By aligning with MQSA requirements, following ACR guidelines, and leveraging the latest advancements in the field, radiologists can enhance the accuracy and effectiveness of mammographic interpretations. Commitment to maintaining and exceeding standards through a cycle of continuous improvement is essential for ensuring the best possible outcomes for our patients with the goal of improving patient care by early detection and timely treatment of breast cancer.

REFERENCES

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