AI Assessment of Mammography Positioning Performance:
A Paradigm Shift in Evidence-Based Quality Improvement

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BACKGROUND

- Image quality assessment is burdensome and subjective
- **Objective:** To determine whether these tools can reliably and objectively quantify inter-MRT variability, identify special cause variation (i.e. non-random process) at scale, and enable benchmarking of MRT performance in alignment with the ACR Learning Network Mammography Positioning Improvement Collaborative framework.

METHODS

- December 15, 2022, and June 30, 2023.
  - 36,787 mammograms
  - Acquired by 36 MRTs

Statistical Analysis:

- MRTs were ranked by image-level unmet positioning criteria rates and rates of **Perfect** + **Good** (**P+G**) studies in an anonymized leaderboard which compared MRTs to each other and to the overall department.
- Statistical process control charts were used to identify occurrences of special cause variation in MRT unmet positioning criteria rates.

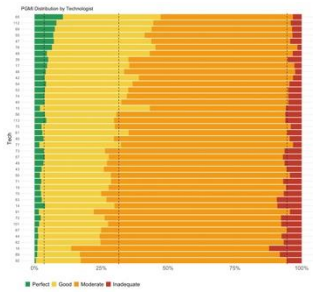


Figure 1. MRT **PGMI** Rate Leaderboard

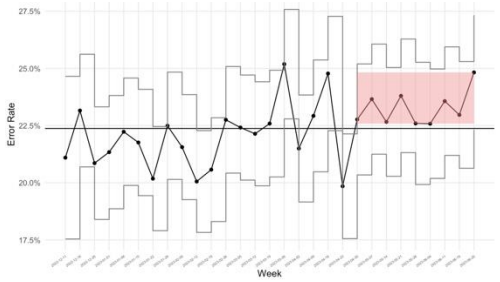


Figure 2. Inadequate Pec Muscle Length Quality Control Chart

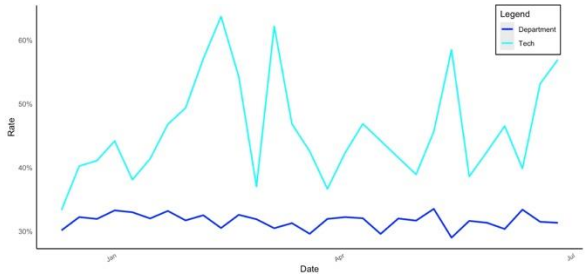


Figure 3. Temporal **P+G** Rates of top-ranked MRT vs Department

KEY FINDINGS

- Performance based on PGMI scores varied widely across MRTs (P+G rates: range=17.3-47.2% median=28.0%)
- Leaderboard style rankings of all MRTs effectively differentiated MRTs by their **P**, **G**, **M**, **I** rates.
- SPC charts identified occurrences of special cause variations in the study period as indicated by
  - Increasing Inadequate Pec Muscle Length, IMF Obscured rates and decreasing CC Posterior Tissue Missing rates.
- Temporal trend plots of **P+G** rates effectively differentiated the MRT from the department benchmark
  - Temporal plots of unmet positioning criteria rates by MRT were consistent with this result.

CONCLUSION

AI paired with advanced analytics and statistical process control has the potential to support mammography positioning improvement initiatives with evidence-based root-cause analysis for benchmarking and targeted interventions to improve mammography positioning quality.