USING TEAM AUDITS TO IMPROVE IMAGE QUALITY: Our Institution’s Experience

Lincoln L. Berland, MD
Deborah D. Flint, PE, BIE, MBA
Beth S. Winningham, BSRT, MBA

UAB Health System

University Hospital
900-bed Facility and Level 1 Trauma Center

The Kirklin Clinic of UAB Hospital
Outpatient Center providing examinations and treatment rooms for 660 physicians

UAB Highlands
219-bed facility acquired by UAB Health System in 2006
81 resident, fellow and faculty radiologists working in various imaging subspecialties

**Imaging Areas include:**
- Abdominal Imaging
- Breast Imaging
- Chest Imaging
- Cardiopulmonary
- Emergency Radiology
- General Radiology
- Interventional Radiology
- Molecular Imaging and Therapeutics
- Musculoskeletal Imaging
- Neuroradiology
- Pediatric Imaging
- Physics & Engineering
- VAMC

**Background**

- Radiologists believed that image quality was sub-optimal too often
- Avoidable errors were being made
- Sub-optimal image quality could negatively affect patient care
- Overall patient experience could be negatively affected
Background

• In response, Image Quality Audit Teams were formed

• Teams Consist of:
  • Radiologists
  • Technologists
  • Radiology Educator
  • Facilitator

• This new image quality project was sponsored by:
  • Radiology Vice Chair of Quality Improvement and Patient Safety
  • Radiology Vice Chair for Operations
  • Administrative Director of Radiology, UAB Hospital
Exam Quality Audit Team Timeline

2009: CT Exam Quality Audit Team formed
- (UAB Hospital and UED only)

2011: TKC and UAB Highlands CT added to CT Audit Team

2011: Diagnostic Radiograph Audit Team formed
- (UAB Hospital and UED only)

2013: MRI Exam Quality Audit Team formed
- (UAB Hospital, UED, TKC, and UAB Highlands)

2015: TKC Diagnostic, Highlands Diagnostic and Highlands Orthopedic will be added to the Diagnostic Radiograph Audit Team

Audit Process Overview

- Each month team members review a set of exams randomly selected by the team facilitator.

- Team members use a predetermined list of criteria based on the factors that are most critical to optimal image quality. Each item is scored with “yes” or “no.”

- Criteria include but are not limited to:
  - Appropriate area scanned
  - Appropriate field of view and centering
  - Appropriate technical factors
  - Are avoidable artifacts present
  - Is the area of interest over scanned
  - Appropriate contrast dose and documentation
  - Appropriate contrast enhancement
  - Are markers present and correct (no electronic markers used)
  - Is the exam or protocol correct for the indication given on the order
Audit Process Overview-continued

• Completed audits are returned to the facilitator to be summarized.

• Summarized audits are reviewed at the monthly team meetings.

• Feedback from the meetings is given back to radiology staff through staff meetings, email, notice boards and one to one meetings.

• The number of exams in each audit are based on a 95% confidence interval

• The same basic protocol is used for all of the audit teams, however, some variation in image selection and review is allowed due to the differences in the imaging modalities being reviewed

CT Exam Quality Audit

• Each month the team reviews images selected from a designated section.
  • Auditing by section allows for more exams of each type to be reviewed
  • Physicians are able to attend the meetings related to their specialty/section and provide feedback for improvement

• Sections for CT include:
  • Neuro
  • Body
  • Chest
  • Musculoskeletal
  • Vascular Interventional

• Top opportunities for improvement are identified

• Yearly summaries are given for each section and for CT overall
Example of Audit Summary: CT

Audit scores for each section are reported to the team after the audits are reviewed in the monthly meeting. The audit summary report for CT shows the percentage of the audit without errors.

Pareto of Audit Summary
Opportunities for Improvement: CT Neuro

Opportunities for improvement are identified and tracked.
Each month, techs review a selection of images from Chest, Musculoskeletal and GI imaging (excluding fluoro). The top opportunities for improvement are identified. Current top three opportunities for improvement being tracked are:

- Markers missing or electronic markers used
- Poor positioning
- Anatomy excluded

Overall monthly audit results are given for each of the three sections. Audit results for the top opportunities for improvement are tracked. Yearly summaries are given for each section and for the top opportunities for improvement.

Example of Audit Summary:
Diagnostic Radiography

![Diagnostic Radiograph Audit Results Error Rate by Exam Type](image)

The audit summary report for Diagnostic Radiography shows the percentage of the audit with errors.
Opportunities for improvement are identified and tracked.

The opportunities for improvement that are most often seen are tracked for each exam type. Note: Electronic markers are not permitted and are considered “No Markers.”
MRI

• Each month the team reviews images from a particular section.
• Sections for the MRI audit includes:
  • Neuro
  • Body
  • Breast
  • Musculoskeletal
• Top opportunities for improvement are identified
• Current top opportunities for improvement include:
  • Patient motion
  • Artifacts present
• Yearly summaries are given for each section and for MRI overall

Example of Audit Summary: MRI

Audit scores for each section are reported to the team after the audits are reviewed in the monthly meeting. The audit summary report for MRI shows the percentage of the audit without errors.
Opportunities for improvement are identified and tracked.

6.3% decrease in errors from the baseline to Present
Results: Diagnostic Radiography

Diagnostic Radiograph Audit Scores

- Increase in errors from baseline MSK: 9.0%
- Chest: 12.9%
- GI (Abdomen): 4.8%

This report represents the percentage of the audit without errors.

Results: MRI

MRI Exam Quality Audit Scores - All Sections

- 0.2% decrease in errors from the baseline

This report represents the percentage of the audit without errors.
Conclusions

• All areas have seen a decrease in preventable errors

• Opportunities for improvement are more easily identified and tracked

• Improvement plans are determined jointly by the technologists performing the exams and the radiologists reading them

• Communication between the technologists and radiologists is more open both in and outside of the teams

Conclusions-continued

• Staff members are more engaged in quality improvement because they are active participants in the process

• Team members are publicly recognized for excellent work identified during the audits

• Staff with outstanding recognitions are identified as potential mentors for new staff members
  • Best practices in exam performance and quality management are taught to new staff from the beginning of employment
<table>
<thead>
<tr>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAB School of Medicine Department of Radiology</td>
</tr>
<tr>
<td><a href="http://www.uab.edu/medicine/radiology/">http://www.uab.edu/medicine/radiology/</a></td>
</tr>
</tbody>
</table>