Enabling system-wide radiology quality assurance and improvement

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Purpose

With diagnostic reports facing increased scrutiny in many jurisdictions, radiologists need to be proactive with regards to quality and accuracy.

To quote W.E. Deming: "Inspection with the aim of finding the bad ones and throwing them out is too late, ineffective and costly. In the first place, you cannot find the bad ones, not all of them. The result of such inspection is scrap, down-grading and rework, which are expensive, ineffective and do not improve the process" "Quality does not come from inspection but improvement of the process."

Measurement is not the goal of quality programs, only a necessary step. The program should be built to identify the issues in a timely way, while not being punitive, overly expensive and most importantly, not create a culture of fear for those participating.

A novel Quality Assurance, Improvement and Collaboration (QAIC™) platform is described.
A web-based Quality Assurance, Improvement and Collaboration (QAIC™) platform for real time peer review was developed as a fundamental ingredient of overall departmental quality control by identifying, correcting and thereby reducing interpretation error, based on the following design criteria:

- Equally functional across all PACS platforms for interoperability (multi-RIS/PACS interoperability), scale and cross-institutional collaboration;
- Applicability to studies of all modalities and sub-specialties;
- Blind, automated and randomized sampling, such that no bias is introduced when selecting studies for peer review;
- Integration to the normal workflow of the reviewer, to avoid disruption;
- Anonymized peer review, to eliminate partiality in monitoring and benchmarking; and,
- Automated distribution to first, second and third readers (if disagreements occur, as required).
- Customizable platform to allow implementation of advanced workflow tools such as "ask a colleague", second opinion, over-read and communication/management of critical results.
- Automated tracking of aggregated results and anonymized personal result feedback, by providing a vast array of customizable metrics.
- Scoring system based on a version of the American College of Radiology (ACR), RadPeer system modified to emphasize relevance of the finding to patient care.
- Real time, anonymized feedback to reviewed radiologist for a clinical opportunity to agree or dispute the reviewer’s findings, modify clinical reports, and learn from errors.
- Concerted emphasis on performance improvement through education, rather than exposure and punishment.
**Fig. 1:** Stakeholders encompassed by QAI software platform. It dynamically connects all stakeholders, to enable shared and advanced workflows and reporting, with workload balancing, coverage management, quality assurance and improvement and stakeholder communication, on a retrospective, prospective and on-going basis.

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**Fig. 2:** Quality Assurance and Improvement Framework. A composite approach to quality assurance and improvement during software design was applied to help ensure consistency of outcomes.

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Results

The Quality Assurance, Improvement and Collaboration QAIC™ software platform was first used during a provincially mandated, retroactive review of a radiologist's work over a period of three years (approximately 30,000 studies). Over a two-month timeframe, a team of twenty-one radiologists working remotely from multiple different jurisdictions carried out the review.

The intent of the review was:

- To measure the accuracy of interpretation results, not to determine suitability for the practice of radiology of the individuals.
- To determine if current clinical findings differ significantly from findings documented in the original report and if so, to immediately communicate to the patient's referring physician whenever clinical discrepancies are uncovered.

Considering the sensitivity of the results and privacy issues, no percentage or numbers can be published.

- **The accuracy** of the diagnostic reports rendered by the radiologist under review was quantified and benchmarked to that of the remote team.
- **We** identification categories were "no, partial and significant discrepancies" as well as "non-diagnostic" and "non-interpretable" studies per modality and subspecialty. Discrepancies are differences in opinion between radiologists. Many of these discrepancies may actually be errors, but not necessarily all. Occasionally, the differences in opinion could be challenged and debated resulting in a consensus opinion, rather than a unanimous opinion.
- **We** focused on clinical impact, identifying discrepancies relevant to patient care.
- **Reviewing** the content and not the style of the report.
- **Used** judgment on incidental findings "incidentalomas" that a radiologist would have normally mentioned in their report.
- **Potentially,** the review highlighted areas of weaknesses, which might be addressed by radiologist refresher training or mentorship.
A few issues became apparent:

- Areas of weaknesses might be addressed by radiologist **refresher training or mentorship** but subsequent reviews would be required to verify the effectiveness of the training. In our first review, the radiologist was no longer practicing.

- Also obvious in the study and subsequent retrospective reviews:

  1. Radiologists resent reviews imposed by their Chief of Department or worse by a Chief of Staff or the Health Authorities. Even feedback and open discussions intended to allow them to approve or disagree with the reviewer(s) doesn't make the process easier. They still perceive the review as punitive.

  2. Radiologists are often opposed to any system of scoring of their performances in fear that the data could be used against them or not be adequately protected.

- Most importantly retrospective identifications of missed diagnoses are not efficient; **an early identification** is always preferable. Additionally, **proactive educational opportunities** will likely improve performance and reduce similar errors in the future. The effectiveness of such measures can be tracked.

**Our analysis highlighted the importance of:**

- **Pro-active (or pre-distribution) review** of reports whenever possible, to prevent patient harm in the event of a misdiagnosis.

- Consistent application of tools and guidelines to build confidence in the quality program and deliver actionable comparative information. These include doing continuous quality improvement to ensure a common understanding of the assessment objectives and criteria, as well as the need for a comprehensive assessment.

- **Anonymization** of the radiologists being reviewed as well as the reviewing radiologist to avoid positive or negative biases. Peer review is inherently subjective and the radiology community small. Confidentiality will encourage fair assessment and active participation.

- Automated and adjustable sampling rates to reduce the effort and expense of surveillance relative to the likelihood of error. Areas where there are few reports issued need only low level monitoring whereas certain types of studies may warrant closer supervision.
The need for **instant feedback** to, and acceptance/rejection of reviewer findings by the reviewed radiologist provides two benefits:

1. First it increases the fairness and accuracy of the results as the reviewed radiologist has a chance to defend their initial assessment. Further, it provides an opportunity for positive re-enforcement and can ensure the quality program is not perceived as punitive. In clinical environments, there may be good and valid reasons for disagreements.  
2. Secondly, it also facilitates an important and timely learning opportunity, which leads directly and immediately to improving quality, not merely measuring accuracy.

**Cross-community participation**, especially in jurisdictions with a small number of radiologists in order to achieve some degree of anonymity as well as avoiding potential conflicts of interest. The fair distribution of quality efforts across the community ensures timely quality measurement as well as true peer assessment. The entire radiology community could be engaged thereby establishing a community standard as well as reducing the burden on any one group.

*When issues are identified*, the same Quality Assurance, Improvement and Collaboration (QAIC™) platform can be used to support **remediation strategies**, for instance:

- Pre-distribution for over-reading while the radiologist in question is undertaking refresher training.
- Enabling multi-centre consults or referrals.
- Re-routing of specific studies to more experienced or specialized peers.
- Creating a multi-site pool for distributing and QA task sharing.
- Forming specialty networks for specific diseases or programs.
**Fig. 3:** Retrospective QA Workflow. The QAIC platform automated the distribution and collection of reports and discrepancies, along with the assignment to reviewers and as needed, 3rd and 4th reviewers

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Fig. 4: Prospective QA Workflow. Cases were sampled seamlessly as part of the original radiologist's workflow in an unbiased and automated manner, and were sent for peer review.

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Conclusion

An efficient, system-wide radiology Quality Assurance, Improvement & Collaboration program can and should be applied proactively. The Quality Assurance, Improvement and Collaboration (QAIC™) platform formalizing continuous quality assurance and improvement into radiologists' workflows enables them to quantify their strengths and weaknesses over time, and to immediately address missed diagnoses.

Our solution maximizes these opportunities by seamless integration with existing workflows and image sources from virtually all manufacturers, thus making quality assurance and improvement a more palatable, and technically feasible undertaking across large provincial, national or even international quality collaboration networks.
References

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