# PEER-TO-PEER: AN INTEGRATED PACS BASED SOLUTION FOR IMPROVING COMPLIANCE WITH THE RADIOLOGY PEER REVIEW PROCESS

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## DISCLOSURES

## INTRODUCTION

- Radiology peer review (PR) is a key process in assessing physician performance evaluation by measuring diagnostic accuracy as part of quality assurance measures.

- The Joint Commission mandates that all radiology faculty participate in continuous random peer review of 5% of cases.

- There are a variety of solutions implemented in Radiology. These include both manual, home-built data collection systems and commercial solutions.

## BACKGROUND RADIOLOGY PEER REVIEW

- In 2000, the American Board of Medical Specialists (ABMS) instituted a program for maintenance of certification (MOC) that stipulates that renewal of certification is contingent upon evaluation and demonstration of quality in:
    - Professional standing
    - Lifelong learning
    - Cognitive expertise
    - Performance in practice
- Physician performance assessment is "the quantitative assessment of physician performance based on the rates at which their patients experience certain outcomes, and/or the rates at which physicians adhere to evidence-based processes of care during their actual practice of medicine." [Landon et al.]
- The Joint Commission mandates that physicians demonstrate ongoing competency in six general areas: patient care, technical skills, professionalism and communications skills, systems-based practice, practice-based learning and improvement, medical knowledge and clinical judgment.
- Medical knowledge and clinical judgment is closely related to performance in practice.

## PERFORMANCE IN PRACTICE = PEER REVIEW

- **Performance in practice** is an attribute that is difficult to objectively assess.

- In Radiology, equating **performance in practice** to performance at the workstation is potentially feasible and unique to the specialty. Workstation case volumes are such that meaningful data can be generated.

- Radiology peer review involves unbiased and transparent evaluation of performance by ones' peers to identify opportunities for self improvement.

- Systematic collection of peer review data at the local/regional or national level could be used to benchmark individuals, subspecialties and facilities to gauge overall diagnostic performance.

- The American College of Radiology (ACR) requires that centers participate in radiology peer review to maintain accreditation.

- Ideally, peer review should identify opportunities for quality improvement, ensure competency, improve outcomes and help to identify sentinel or adverse events.

- Features of effective peer review include: unbiased, objective, randomly selected, timely, ongoing, non-punitive. It should evaluate all aspects of the work done in the department and it should have minimal impact on efficiency.

- *"It is important that peer-review systems be simple, have minimal effects on regular work flow, and demonstrate immediate as well as long-term benefits of participation" (Mahgerefteh etal).*

## INTRODUCTION

- In order for peer review to be accurate and efficient, the capability should be incorporated into the daily clinical workflow and retrospective submission should be avoided. Unfortunately, there are few convenient methods to integrate regular PR into clinical workflow.

- Several custom-built integrated solutions have been showcased previously.

- The current web-based solution such as the ACRs eRadPeer software requires manual logging of cases into a common database using a simple web form.

  - The process, while self-explanatory, is both time-consuming and prone to inaccuracies.

  - Compliance with the process generally is substandard and errors are likely to be underreported.

- Moreover, data that is manually recorded is often not contemporaneously acquired and is subject to bias.

- The purpose of this study was to determine if a PACS integrated PR solution would improve compliance with the PR process in a large multi-specialty academic practice.

## HOW IS RADIOLOGY PEER REVIEW SUPPOSED TO WORK?

- Radiologist (reviewer) randomly selects (or is presented with) previously interpreted examinations and corresponding reports.
- Reviewer assess imaging study and assess the quality of the existing report based upon their interpretation of the images.
- Review process should attempt to maintain anonymity of the reviewee.
- Reviewer cannot review studies that they have interpreted.
- Any exam is limited to only one review.
- Reviewer should *assess the study based upon information available at the time of the service was originally delivered* and not based upon any new information subsequently learned.
- Reviewer should score report based upon:
  - Completeness of the findings.
  - Interpretation of the findings.
  - Significance of any omissions (clinically significant or not)

## CHALLENGES WITH NON-IT SOLUTIONS

- With increased daily work volumes, cross-coverage and complexity of federated practices it may not be realistic to expect faculty to "remember" to consistently comply with the peer review process.
- Historically, prior to the advent of IT PR solutions, the process was limited to maintaining personal index cards, notepads/notebooks in work areas.
- This required manual transcription of PHI, examination records, comments, study date and type, initial reviewer and secondary reviewer identity.
- Process is time consuming and error prone.
- Often retrospective, based upon recollection and inaccurate information.
- Process suffers from selection bias; reviewers typically select for misinterpretations and missed findings.
- Lack of anonymity tends to limit objectivity.

## AVAILABLE METHODS

- ACR eRADPEER system provides simple and reliable method for consistent data entry which is tied to an individual and group user account.
- Management tools for QA officer to easily track participation, identify outliers and maintain quality control adjudication and feedback.
- Access to data from other participating groups to compare individual/group compliance and performance to a more realistic national benchmark.
- Requires separate login process.
- Requires manual transcription of exam data to web portal.
- Not linked to radiology workflow.
- Requires internet access.
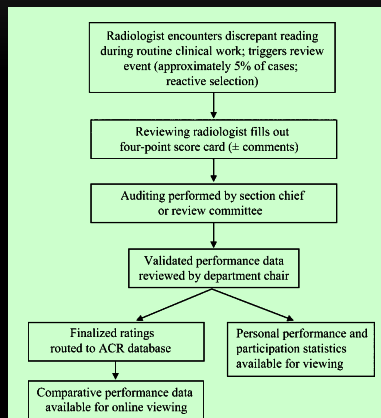- Selection bias still prevails.



## COMMON PROBLEMS TO EXISTING IT SOLUTIONS

- With the exception of some commercial solutions:
  - Single sign on is not supported; requires login to another application.
  - Process is not incorporated into clinical workflow, as a result:
    - Patient identifiers, exam information & dates must be copied/transcribed into the second application.
    - Process is time consuming so compliance diminishes.
    - Participants selectively enter "misses" instead of agreements resulting in excessive bias. This devalues the quality of the data.
  - Data cannot be benchmarked against national data registries.
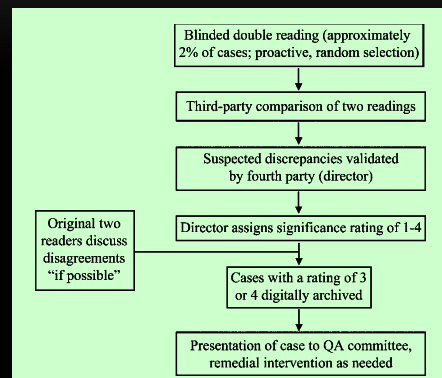
## GOALS FOR THE RADIOLOGY PR PROCESS

- PR should be as objective as possible with a minimum of bias.

- PR should maintain a level of anonymity to improve compliance.

- Participation in PR should be encouraged/rewarded.

- PR should be used to provide feedback to faculty.

- PR should be an essential part of any quality assurance program.

- Yet, PR cannot be effective if it is not readily accessible and easy to implement.

- Should be a point-of-care solution; incorporated into existing workflow.

## *REACTIVE* VERSUS *PROACTIVE* RADIOLOGY PEER REVIEW WORKFLOWS



Reactive methodology for ACR eRADPEER and other workstation integrated systems that incorporate PR into point-of-care activities

Proactive methodology for a more formal and randomized peer review quality assessment that is blinded and adjudicated by 3rd or 4th party.

From Mahgerefteh et al. 2009

## HYPOTHESIS

- To determine if providing a point-of-care peer review solution to the PACS desktop will improve compliance with the Radiology peer review process.
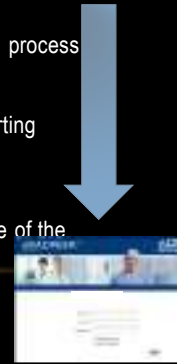
## PROCESS IMPROVEMENT

- Recognition for change management was driven by multiple factors:
- Methods previously used to capture peer review data created scenario whereupon there was uneven participation and poor compliance.
- Time required to generate PR entries prohibitive.
- Goals were primarily quota driven based on a compulsory requirement – less so on capturing useful data.
- Data captured was largely anecdotal and not a direct reflection of peer performance.
- Case selection heavily biased.
- Prior non-integrated web solution required direct identification of original reviewer; this decreased objectivity (aka "judge not lest ye be judged").

## GOALS – FUNCTIONAL CAPABILITY

- Improve compliance and quality of PR submissions.

- Ensure that the PR submission process is extremely simple and is closely integrated to point-of-care workflow.

  - PR submission should mimic the process of reviewing relevant prior studies/reports when interpreting contemporaneous examinations.

  - Entire process should require a minimum of two mouse-clicks to submit a review.

- With this in mind, the goals were:

  - Integrate the PR submission directly into PACS clinical interpretation process

  - Use existing PACS authentication process

  - Manage all of the examination details (study type, date, report, reporting radiologist identity) behind the scenes.

  - Maintain anonymity of the reporting radiologist.

  - Export the data into the ACRs eRadPeer database to take advantage of the management tools and benchmarking data.
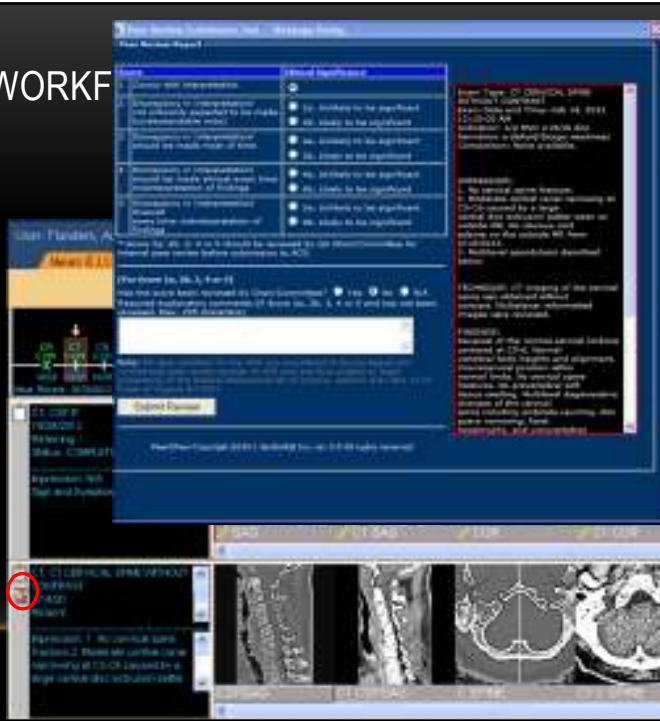
## OVERVIEW OF THE FUNCTIONALITY

- A small custom applet was written in Javascript that adds an additional peer review icon that is selectable next to each finalized examination on the clinical PACS.

- A reviewer is limited programmatically to submit a PR only on another faculty member and only on an exam that has not been reviewed previously using this system.

- Selecting the PR icon displays a floating modal window containing the text of the report and a rating scale (1 – 4) based upon the American College of Radiology (ACR) eRadPeer review form. A compulsory free text explanation field must be completed by the reviewer for any score entered 2a and above as per the ACR RadPeer requirements.

- Selecting submit closes the window and sends the data to a database.

- Data recorded includes the identities of the reviewer and reviewee, study type, accession number and body part in addition to the ACR score and compulsory comments.

- Every thirty days the accumulated submissions are converted to the ACR PR XML schema and transmitted automatically to the ACR where they are supplemented to the departmental account.

- The quality assurance officer for the department then is able to audit and edit the submissions directly using the tools provided by the ACR for eRadPeer subscribers.

- Summary statistics were compiled for submissions that included the two years prior to implementation of the integrated solution and compared to the 2.5 years using the new method.
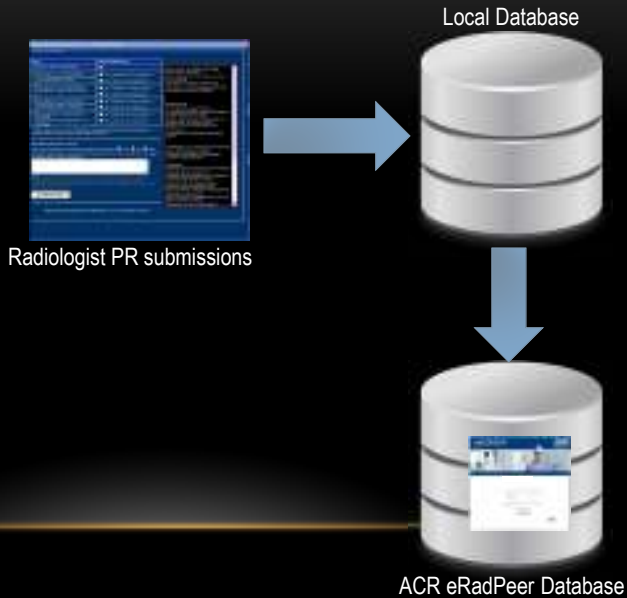
## INTEGRATED WORKFLOW

- User selects the peer review icon on the relevant prior study that is being used for comparison.
- This launches the submission window which mimics the ACR submission screen.
- Report without radiologist identity is available on the right.
- Select score (agree is default) and press submit.
- Two clicks minimum (same number as it would take to launch a prior report for review.
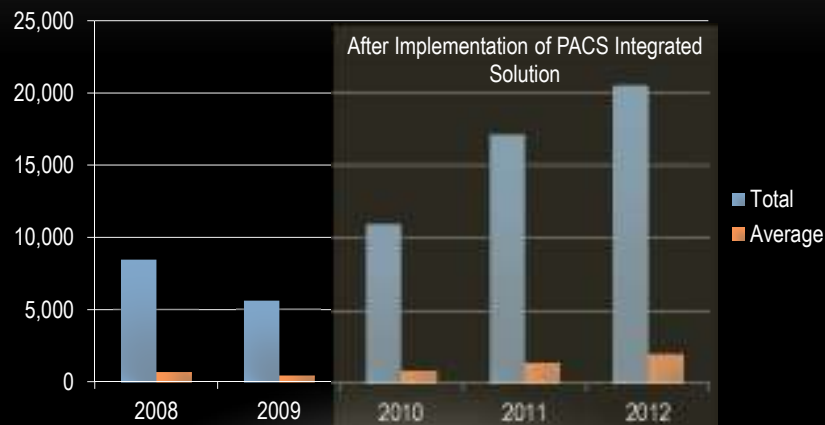
## INTEGRATED WORKFLOW

- Peer Review submissions are held in a local database.
- On a monthly basis, data is converted to the ACR eRadPeer XML format (v 1.3).
- Payload transmitted to ACR headquarters for direct upload to ACR database. (PHI is withheld)
- Data is then accessible to the QA management tools.



Radiologist PR submissions

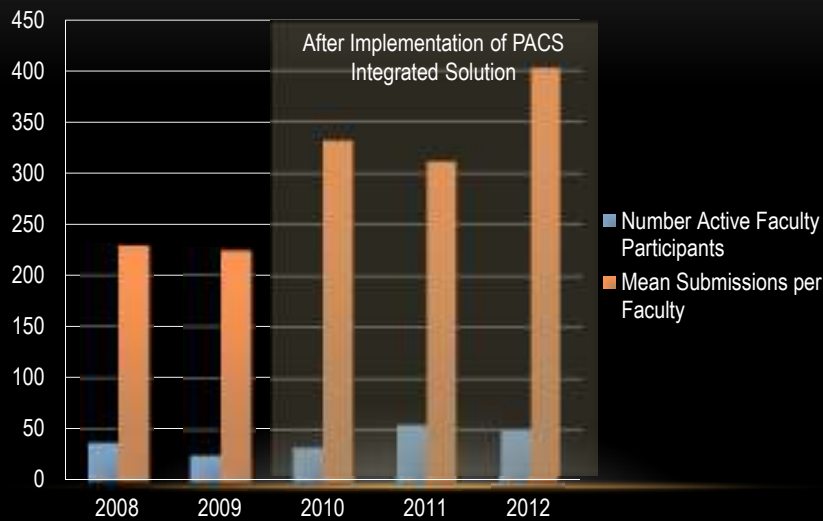Local Database

ACR eRadPeer Database

## UTILIZATION OF INTEGRATED SYSTEM

- Integrated system has been use for 30 months.
- 26,468 total submissions have been logged since 2010 by 55 faculty members with totals ranging from 1 to 2613; mean 490 (±656) submissions per faculty member.
- Submissions by modality:
  - 38% CT
  - 21% MR
  - 16% US
  - 14% CR
- Submissions by ACR score:
  - 98% - agreement
  - 2% - disagreement.

## TOTAL AND AVERAGE NUMBER OF MONTHLY SUBMISSIONS FOR PAST FIVE YEARS

## NUMBER OF ACTIVE FACULTY USERS AND MEAN NUMBER OF SUBMISSIONS OVER 5 YEARS



## RESULTS

- Participation in the ACR eRadPeer program was low prior to instantiation of the integrated PACS solution in 2010.
  - Participation of the entire faculty complement was 61% in 2008 and 44% in 2009.
  - With implementation of Peer2Peer, participation continued to improve in 2010 (60%), 2011 (100%), 2012 (95%) [accounting for variations in total complement of faculty].
- Overall number of submissions per faculty member increased monthly and per year.
- Total number of submissions for 2012 currently exceeds those of all prior calendar years – 4X the number of PR submissions compared to 2009.
- Although difficult to measure, the overall quality of the submissions has improved as they all represent contemporaneous selections made at point-of-care rather than retrospective recollections.

## ADDED BENEFITS

- *Efficiency in interaction*: accomplishing a clinical task and peer review just as easily as the necessary clinical task of looking at an old report.
- *Simplicity in design*: the default choice requires only 1 click and is chosen 98% of the time.
- *Minimizing cognitive load*: by not requiring additional log ins, traversing different platforms and relying on memory for accurate data input, not having to enter type of study or any other information except for the peer review rating.
- *Lack of drag on productivity*: which is increasingly important with reimbursement cuts, declining revenues, healthcare reform and bundled payments, etc.
- *Less coercion is required:* by making the process accessible, seamless and manageable, faculty are more willing to participate.

## LIMITATIONS

- Like all point-of-care solutions, this system is reactive and not proactive.

- System does not select and present cases to user at random; users "encounter" potential peer review cases through relevant prior exams.

- Although convenience factor plays a large role in improved compliance, this model does not address selection bias and underreporting of errors.

- System provides some level of anonymity for the reviewee, but it is not completely confidential.

- Integration to PACS workflow is highly dependent on having access to an API (application programmers interface) that allows extensions to be built to improve the capabilities of the core PACS system. Not all manufacturers provide this capability.

## DISCUSSION

- There are two flavors of radiology peer review; reactive and proactive.

- The "proactive" form of PR is more labor intensive yet has the capability to provide more objective data. Cases are randomly selected and anonymized and presented for a second (blinded) reader opinion. A third party then does a direct comparison of the two readings to search for inaccuracies or discrepancies. This review is then adjudicated by a fourth individual for a final disposition. There are no commercial solutions that integrate this workflow into a PACS or dictation system.

- The point-of-care integrated method described herein is considered "reactive". It has the capacity to improve participation because it requires minimal additional effort on the part of the participant to pass judgment on an existing report that is being used as a relevant prior in a contemporaneous read.

- While this is not the first implementation of its kind (RadReview, eRadPeer, Clinic Station are others), this presentation underscores the value that increased compliance and participation in any compulsory regulatory activity can be realized when the task is readily accessible and does not interfere with clinical activities.

- The quality of the data collected through the PR process will always be in question due to idiosyncratic criteria imposed by individual radiologists or practices that will make comparing data collected from different facilities challenging.

## CONCLUSION

- Adoption of a PACS integrated solution for peer review into the clinical workflow can dramatically increase voluntary faculty participation and compliance in the peer review process.

- As other responsibilities continue to compete for faculty time and requirements for participation in federal quality and safety programs are mandated, it is imperative that any additional burdens neither diminish the efficiency nor the accuracy of the clinical process.

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