The Transition to Peer Learning
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Introduction

Problem Description:
Historically, peer review has been compelled by regulatory and legislative mandates, such as the Joint Commission Ongoing Professional Practice Evaluation requirement and the Health Care Quality Improvement Act (HCQIA) enacted by Congress in 1986. [1] However, these external mandates were focused on quality assurance, generally carrying punitive connotations and practically translated into rote compliance without the benefit of learning and improvement. In fact, the lack of quality improvement focus prompted the Institute of Medicine (IOM) to release its 2015 report, "Improving Diagnosis in Health Care," stating that a "critical type of error in health care—diagnostic error—that has received relatively little Attention." [2] The IOM report alarmingly reports that 5% of the US population experience diagnostic error annually, most experience diagnostic error in the course of a lifetime and diagnostic error contributes to 10% patient deaths and 6-17% of adverse events in hospitals. The IOM report framed a number of recommendations that potentially informs peer review and learning activities more broadly (Figure 1).

In radiology, the dominant peer review methodology evolved into a scoring-based system intended feature random review and designed to record concordance or assess the egregiousness of errors or missed findings. While useful for regulatory compliance, "score-based peer review has not been shown to have meaningful impact on or be a valid measurement instrument of radiologist performance." [3] In the wake of the 2015 IOM report, numerous initiatives have been launched to meet the IOM goals and foster peer learning. These initiatives generally focus on identifying learning opportunities, focusing on system failures rather than individual blame and providing constructive feedback.

Available Knowledge:
There is ample evidence that historic scoring-based peer review is rife with problems:
- Scoring is perceived as punitive. [4]
- Low agreement rate between reviewers. [5, 6]
- Missed findings are not translated into widespread learning. [7,8,9]
- Most radiologists at a large academic practice view this as a waste of time and simply to meet requirements. [10,11]

Additionally, logistical problems have hampered attempts at meaningful peer review, including:
- The administrative burden. [12]
- Lack of integration into the clinical workflow. [13,14,15]
- The reluctance to review colleagues. [16]

Reports from practices that have designed new systems focused on peer learning, typically focused on voluntary submission of learning opportunities and removing punitive scoring system have shown increased participation and user satisfaction. [17, 18]

Rationale:
Scoring-based peer review intended to be random has been shown to have little to no quality improvement potential with punitive connotations and widely negatively perceived by radiologists. Non-scoring-based systems focused on constructive feedback and learning opportunities have been shown to be received more favorably by radiologists with higher levels of engagement in various radiology practices.

Figure 1. Selected IOM Goals for Improving Diagnosis and Reducing Diagnostic Error

Facilitate more effective teamwork in the diagnostic process among health care professionals, patients, and their families
Enhance health care professional education and training in the diagnostic process
Ensure that health information technologies support patients and health care professionals in the diagnostic process
Develop and deploy approaches to identify, learn from, and reduce diagnostic errors and near misses in clinical practice
Establish a work system and culture that supports the improvement of diagnosis and improvements in diagnostic performance
Develop a reporting environment and medical liability system that facilitates improved diagnosis by learning from diagnostic errors and near misses
Design a payment and care delivery environment that supports the diagnostic process
Provide dedicated funding for research on the diagnostic process and diagnostic errors

Specific Aims:
Our transition to peer learning has been an organic process beginning in 2010 with implementation of a PACS-based system initially serving as a conduit to the ACR RADPEER system. Subsequent adaptations have been introduced and the collective aims from the inception of this program are to:
- Incorporate peer learning (PL) into the workflow at the point-of-care (POC).
- Increase participation in the peer learning program.
- Improve delivery of feedback and perceived value of feedback.
- Increase satisfaction and engagement in the peer learning program.

Methods

Context:
The peer learning system was initially deployed in an academic radiology department in 2010 with approximately 55 radiologists working in a 3-hospital system with numerous outpatient imaging facilities. In its initial iteration, the system served as a PACS-based portal for RADPEER submissions. Beginning in 2018, our hospital system merged with 3 community hospital systems and our department absorbed 2 community radiology groups into our department bringing us to a total of nearly 100 radiologists in our enterprise. At the same time, an enterprise imaging quality and safety council was established charged with developing a quality and safety scorecard and the following peer review measure was adopted: median of at least 50 submissions per quarter for each radiology group. In 2020, our Peer Review Committee elected to transition to a non-scoring-based system and subsequently added additional functionality to host the entire life cycle of the peer review system at the POC on the PACS at the end of March 2021.

Interventions:
In 2010, a custom applet written in Javascript was deployed adding an icon for peer review onto the PACS, providing an anonymized version of the final report serving the dual purposes of reviewing the prior report and offering the opportunity for peer review (Figure 2) based on the ACR RADPEER® format. Reviewers were precluded from reviewing themselves and from providing a duplicate review. The accumulated submissions were converted to the ACR PR XML schema and transmitted automatically to the ACR.

Beginning in 2019, the Peer Review Committee elected to adopt a non-scoring-based peer learning system and reviewed a number of existing options, finally adopting a new system by consensus (Figure 3), including the following categories:
- Concur
- Great Call!
- Constructive Feedback
- Discrepancy.

Free text is encouraged for all submissions except for "Concur" for the purposes of providing useful feedback.

Figure 2. Peer Review (PR) API Layered on the PACS

Thereafter at the end of March 2021 (end of 2021Q3), additional capabilities were developed and deployed closing the POC peer learning life cycle, adding the following functions:
- The ability to assign second reviewers and adjudicate cases,
- Popup to launch assigned second reviews,
- Popup to access adjudicated cases to review feedback from 2 reviewers and adjudicator and
- An administrator portal featuring the peer learning data (Figure 4).

These changes were presented at monthly faculty meetings and Great Call! examples were also presented.

Figure 3. Peer Learning Assessment Categories in the New Submission Window
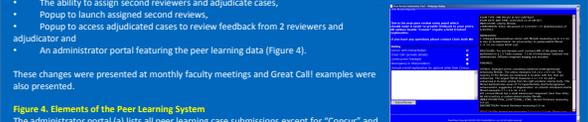

Figure 4. Elements of the Peer Learning System
The administrator portal (a) lists all peer learning case submissions except for "Concur" and allows the administrator to assign a second reviewer. When the second review is complete, a green checkmark appears after which the administrator adjudicates the case. Upon log in, a popup window (b) will appear alerting the radiologist that he/she has an assigned second review and will fire the second reviewer window (c), which highlights the first reviewer's comments in yellow for reference. After the second reviewer submits a response, the reviewee will have the option to review the feedback (d) the next time he/she logs in.

Study of the Intervention:
We endeavored to study the impact of our intervention by getting as close to the desired effects—improvement in the delivery of care, constructive feedback and learning and a positive effect on culture and morale—as possible. As such, we assessed the level of faculty engagement through participation rates and survey responses; faculty satisfaction with the PL system, the feedback provided and the impact on morale through survey responses. We also tracked the rates of constructive feedback submissions as an indicator of learning opportunities generated from the PL system. Overall user data is tracked by the PL system in the administrator's portal where quarterly data is displayed for all users and gathered for analysis. A 16-question survey posing questions to all 94 faculty members about each component of the PL system and their level of satisfaction (on a 1-5 point Likert scale).

Measures:
- Total peer learning submissions per quarter
- Percentage engaged (above the threshold number of submissions)
- Percentage participating (submitting at least 1/quarter)
- Comparison with traditional scoring-based system (1-5 point scale)
- Feedback rating (1-5 point scale)
- Overall satisfaction (1-5 point scale)

Analysis:
Regarding the user data, we charted the total number of submissions on a Series of run charts (Figures 5-8):
- University group submissions starting in 2008 prior to the integrated PACS-based tool and
- Submissions for each group starting 2021Q1 prior to deployment of the feedback tool 2021Q2.

We also charted the percentage of faculty members meeting the historic target of 50 submissions per quarter (Figure 9) and the percentage of faculty members with at least 1 submission (Figure 10).

Regarding the survey data, we compared the number of negative responses (1 and 2) versus positive responses (4 and 5) for each question to assess user sentiment for each aspect of the PL system. To assure broad representation and perspective, we asked respondents to record their clinical divisions and years in practice and we asked for feedback to explain any potential negative perceptions of the various elements of the PL system.

Results

The PACS-integrated peer review tool deployed in 2010 increased the number of peer review submissions at a group level and per user (Figure 5), which was sustained over a decade. [19] In the 2 quarters following the subsequent incorporation of the feedback mechanism at the beginning of 2021Q4, there was no significant change in the number of submissions observed in either the University or Community A groups (Figures 6 and 7) and a decrease in submissions was observed in Community B (Figure 8, likely a consequence of staffing changes having a disproportionate effect on the relatively small group size, n = 10). The proportion of faculty members meeting the 50/quarter target (Figure 9) and submitting at least 1 PL case (Figure 10) has gradually increased even before the deployment of the feedback tool. (The dramatic increase in Community A numbers coincides with the timing of IT-integration at the end of 2021Q1.)

Survey Results
- 58/94 survey responses = 61.7% response rate
- PL compared with scoring-based peer review:
  - 46/53 positive responses = 86.8%
  - 7/53 neutral responses = 13.2%
  - 0/53 negative responses = 0%
- Content of the feedback:
  - 43/56 positive responses = 76.8%
  - 12/56 neutral responses = 21.4%
  - 1/56 negative responses = 1.8%
- Overall satisfaction with PL:
  - 54/57 positive responses = 94.7%
  - 3/57 neutral responses = 5.3%
  - 0/57 negative responses = 0%

Discussion

Summary: The survey results clearly indicated an overwhelmingly favorable perception of the new peer learning system and the feedback provided and is in line with the 1) increase in participants meeting the departmental target of 50/quarter and in 2) the increase in number of faculty with at least 1 submission per quarter. Of course, the orchestration of the peer learning system and delivery of the feedback is dependent on the POC-integrated solution, which operationally facilitates its use. The positive perceptions of the peer learning system and its increased adoption were observed in both the academic university and community divisions of the enterprise.

Interpretation: A successful peer learning program requires engagement on the part of the participants, which is engendered by a non-punitive system that promptly provides meaningful feedback without unnecessarily burdening participants.

Limitations: A significant limitation in assessing the impact of peer learning programs is the difficulty in assessing the impact on the quality of care delivered. User perceptions through survey data and engagement rates serve as surrogates for the true outcome measure of quality improvement. Another potential measure of the positive impact of the peer learning program would be the value of the peer learning conferences that have been supported by the program's case submissions, which was not included in this project. Another factor that was not considered was workplace culture and whether the PL program has had a positive impact, possibly assessed through the use of a survey.

In terms of the design of the peer learning program, the inclusion of the "discrepancy in interpretation" category arguably has the potential to conjure fear of punishment, which is anathema to creating the safe space necessary for peer learning. In order to mitigate punitive impact of the program, each case undergoes a second review process followed by adjudication by the peer review physician analogous to the process applied to scientific work products. It is also expected that users learn to provide better and more constructive feedback as they receive frequent peer learning feedback at the workstation from their peers. Additionally, "Great Call!" cases are shared at each faculty and various division meetings to celebrate and acknowledge peers and showcase the positive dimension of the peer learning program.

Conclusions: Peer review/learning needs to be conducted in as unobtrusively as possible and our example of a PACS-based, POC-integrated solution shows how this can be done to increase user participation and engagement. The combination of an integrated solution and a non-scoring-based constructive feedback-oriented system results in greater faculty satisfaction and engagement.

Figure 5. University Group Peer Review Submissions

The red arrow indicates the deployment of the PACS-integrated submission tool and the purple arrow indicates electronic medical record go-live (which negatively affected system usability).

Figure 6. University Group Peer Learning Submissions

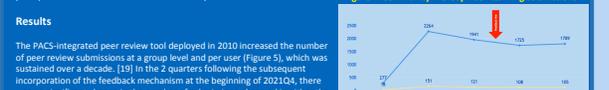**Figure 7. Community A Group Peer Learning Submissions**

Figure 8. Community B Group Peer Learning Submissions

Figure 9. Percentage Meeting 50/Quarter Target

Figure 10. Percentage with at Least 1 Submission

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