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Title

Peer learning on a shoe string: success of a distributive model for peer learning in a community radiology practice.

Permalink

<https://escholarship.org/uc/item/4rt5z9sf>

Journal

Clinical imaging, 59(2)

ISSN

0899-7071

Authors

Haas, Brian M
Mogel, Greg T
Attaya, Hesham N

Publication Date

2020-02-01

DOI

10.1016/j.clinimag.2019.10.012

Peer reviewed

1. Introduction

There is a movement afoot within the radiology community to answer the call of the 2015 Institute of Medicine (IOM) report titled, “Improving Diagnosis in Health Care.” The report calls for health care professionals to develop a non-punitive culture that fosters identification of and learning from errors in diagnosis [1,2]. Many radiology practices are rising to this challenge by transitioning radiologist performance feedback from random audit-based peer review to continuous improvement and education-based peer learning [2-4].

Peer learning was initially proposed as a way to address shortcomings in the peer review model, including: concerns over response bias, data reliability, lack of utility, and damage to collegiality within groups [2,5,6]. While peer review and peer learning share the underlying intention to improve radiologist performance, there are crucial differences in design and implementation of the two that have profound impact on if and how error is identified and managed.

Peer review was conceived as a way to measure and evaluate radiologist performance. In 2009 Mahgerefteh *et al.* writes in *Radiographics*: “Peer review, a key process in physician performance evaluation, is geared primarily toward measuring diagnostic accuracy.” Peer review requires radiologists to grade their colleagues’ mistakes, with the results used by

administrators to monitor radiologist performance and judge competency. Despite initial enthusiasm within the radiology community, peer review faltered in its ability to generate meaningful performance data; multiple studies have demonstrated the very low number of discrepancies and learning opportunities that peer review systems have identified [3,4,6-10]. Other survey based assessments of peer review have demonstrated that radiologists perceive little value in peer review as currently practiced and find peer review damaging to interpersonal relationships [5,11].

In comparison, peer learning focuses on improving diagnostic performance through learning from errors, near misses, and great calls, and by developing a culture of collaboration, respect, and individual betterment [2-4]. Peer learning programs within radiology emerged in the early 2010s due to shortcomings in the effectiveness of peer review to drive meaningful quality improvement [2]. Peer learning has sought to avoid the deleterious effects the adversarial nature of peer review has on organizational culture by removing many punitive aspects of peer review, and focusing solely on identification of and learning from error [12]. In general, in peer learning systems, numerical scoring of discrepancies has been eliminated, with some institutions choosing to categorize cases based upon type of learning opportunity and, when appropriate, by type of discrepancy. These categorization systems are set up in a way to promote learning and facilitate conference organization, rather than to evaluate radiologist performance [3].

Initial descriptions of peer learning programs have employed a model of centralized case collection and curation, and have been proposed as a replacement for peer review [2,4,9]. This model requires one person or a group of people to review all of the submitted cases, and prepare the cases for presentation at the peer learning conference. Case curation is time consuming with one author reporting 12 hours of radiologist administrative time to run the conference [4]. Additionally, by replacing peer review, these systems lack an ability to measure and monitor individual radiologist performance. We implemented a peer learning conference, which operates in addition to a pre-existing peer review system and requires minimal administrative effort to run; we did this through the adoption of a novel distributive model of case collection and curation.

We describe here our experience with employing minimal resources to start a peer learning program amongst a group of radiologists practicing within a large multi-specialty medical group. We discuss the structure of our program, resources utilized, radiologist perceptions of peer learning versus the existing peer review program in place, and key factors that contributed to our success.

2. Methods

2.1 Practice Setting

The practice in which we started the peer learning program is part of a large integrated health system. The radiology group consists of 24 radiologists, and covers two hospitals and multiple associated free-standing outpatient clinics within an area of the Central Valley of California that spans from Modesto to Stockton. The radiologists cover twenty-four hours per day, seven days a week, and spend about 50% of their working days split between the two hospitals and one of the outpatient medical offices; the remaining working time is done remotely.

2.2 Peer Review

Prior to and following the launching of the peer learning program, the practice employed a 2% random audit, peer review system. Cases were anonymized and adjudicated by a group of 6 radiologists who formed the peer review committee, and ultimately assigned a grade of no lapse in care, opportunity for learning, or major opportunity for improvement. Interpreting radiologists were informed if any of their cases were deemed an opportunity for learning or improvement. Cases graded as a major opportunity for improvement were referred to the Chief of Radiology for review, and potential development of an improvement plan and ongoing monitoring. These cases rated a major opportunity for improvement were also subsequently reviewed by medical group leadership, which also oversaw any ongoing monitoring of physician performance. If a systems factor was identified in the department peer review, the medical group leadership

would empanel a group to perform a root cause analysis. This peer review system was continued in its existing form after the rollout of peer learning.

2.3 Our Peer Learning Program

We started a peer learning program in June of 2016. It consists of a monthly videoconference. Participation is voluntary, and radiologists participate directly from their PACS workstation in their office, or can join via any computer on the health system's network or their work issued iPhone (Apple, Inc. Cupertino, CA). All participants join virtually; there is no in person or conference room based component to the conference. We use Webex (Cisco Systems, Inc; San Jose, CA) to host the conference. The conference is scheduled during the lunch hour, and box lunches are arranged for those radiologists present onsite.

Cases are selected for presentation by individual radiologists. Radiologists are instructed to maintain a list of any cases of educational value to other members of the group. Specifically, diagnostic errors, systems problems, interesting pathology, great calls, or any case with any educational value whatsoever are encouraged and welcomed. Radiologists maintain their own lists of cases for conference, and individual radiologists choose which of these cases they wish to individually present at the conference; there is no centralized collecting and curating of cases.

During the conference, any radiologist can share one or multiple cases. Volunteers are solicited in real time, and whoever volunteers to share brings up the case(s) on their workstation and broadcasts their screen via the teleconference platform so that all participants in the conference can view the presenter's screen and see the case. Cases are anonymized by hiding the display of DICOM headers, and, when needed, by cropping of ultrasound images. It is also possible to share an anonymized slide deck during the conference instead of presenting images via PACS. Following the presenting radiologist's narration of the case, there is an open discussion with any participant free to comment. There is no assessment of error type, assignment of discrepancy score, identification of whose case was shown, or record keeping. Anecdotally, about four to six radiologists share cases at each conference, with each person sharing between one and four cases. We estimate that on average between eight and fifteen cases are shared during the hour.

2.4 Assessment of Peer Learning Program

Cost of the peer learning program was calculated by adding up the marginal unit costs for direct out of pocket expenditures for the organization. These are the costs that the organization bears over and above what it would have otherwise bore had the program not been started. These costs include: administrative time for the conference convener, software, and food. The hourly cost for the conference convener used is \$194, which is the average

radiologist salary as reported on salary.com [13]. The organization already maintained an institutional license for a videoconferencing platform, and the marginal cost of this is \$0. As the organization did not bear any direct out of pocket expenditures for opportunity costs for radiologist time spent preparing cases and for the radiologist time spent attending the conference, these items were not included in our cost calculation.

Radiologist's opinions were assessed via an anonymous survey. Survey respondents rated statements about peer learning on a five-point Likert scale ranging from "strongly agree" to "strongly disagree" (Table 1). Respondents were also asked to rate both peer learning and the tradition peer review system on a five-point Likert scale ranging from "very high" to "very low" on the following attributes: educational value, supportive environment, punitive process, and culture of blaming.

3. Results

3.1 Program Cost

We calculated the costs below from an analysis of direct financial outlays by the employing organization; our analysis, therefore, does not include opportunity costs incurred by radiologists voluntarily participating in the peer learning conference. The marginal costs of running the peer learning program included radiologist administrative time and participants' lunches. The conference requires less than one hour per month of administrative time

(\$194/hr average hourly salary for a radiologist): administrative demands included scheduling the conference, arranging lunches, and answering colleague's questions about suitability of cases for presentation. We utilized our institutional license for a videoconferencing platform, which has a \$0 marginal cost for the program (should an organization need to purchase a videoconferencing subscription, a basic plan costs \$168-\$216 per year) [14-16]. The crowdsourcing of the case collection and curation resulted in a \$0 marginal cost, as well. Food expenses averaged \$80 per month for participants' lunches. Attendees voluntarily join during their lunch breaks, and, so, we did not factor attendee time into our cost estimate. Total marginal cost of the program is \$3288 per year, or approximately \$3,480 if a videoconferencing subscription must be purchased.

3.2 Survey

After twenty-one months of holding the conference, an anonymous survey was conducted to assess participants' satisfaction with the conference and to see how it could be improved. There were ten respondents to the survey. All respondents had attended at least one conference in the past year, with most respondents reporting attendance at 3-5 conferences (Fig. 1).

Respondents' attitude toward the peer learning conference was very positive with 70-90% stating they agree or strongly agree with the following statements: "I feel comfortable sharing cases," "I feel comfortable

commenting on cases other shares," "I learn from others' misses," "I think it is important to discuss near misses and safety events," "I can apply what I learn in the conference to my daily practice," "I enjoy attending the conference," and "the conference contributes positively to group morale" (Table 1).

On questions where respondents rated both peer learning and peer review, 80% of respondents rated peer learning more favorably than peer review for educational value, supportive environment, punitive process, and culture of blaming (Table 2). Besides for one respondent that rated peer review as having a less punitive process and less of a culture of blaming than peer learning, all respondents rated peer learning equally or more favorably than peer review.

Respondents were also asked about their desired frequency for holding the conference with 60% favoring the current monthly conference format, 30% requesting more frequent, and 10% less frequent conferences.

4. Discussion

We established a successful peer learning program with minimal resources. Case curation and presentation were attendee driven, and attendees were able to join from anywhere, including their work issued smart phone.

Respondents to our survey rated peer learning very positively with nearly all

preferring peer learning to peer review across a range of attributes that were queried.

Several elements were key to the success of the conference and are unique to our peer learning model. First, case selection and curation was voluntary, democratized, and entirely crowdsourced. Crowdsourcing case selection and curation had two important effects: it reduced the administrative time needed to support the conference, and increased conference participant engagement. Conference participants kept their own records of cases to share and presented their own cases at the conference. We observed that this model encouraged active participation, which promotes group member learning both in advance of the conference as they prepare cases to share and during the conference as they are more engaged and attentive. Many participants look forward to presenting their cases to colleagues, and although we did not quantify this metric, participants provided didactic information about underlying pathologies, shared related cases, and offered key teaching points about the cases. This increasing engagement created a positive feedback cycle by augmenting the educational value of the conference, which further motivated group members to attend. We believe that our model for peer learning may have contributed to higher attendance rates than if the conference was not crowdsourced.

A theoretical risk of crowdsourcing was variable quality of the cases presented. Our satisfaction data showed this concern was not realized. One downside of crowdsourcing the case selection is that some group members were self-conscious about presenting or otherwise wished not to share cases, and so we missed out on capturing peer learning cases that these group members may have otherwise contributed. While we realize that centralizing case selection and curation may reduce variability, we believe the benefits of democratized peer learning far outweigh its risks, especially in non-hierarchical, community practice groups. These benefits include increased engagement and the resultant enhancement of professional bonds in groups that find themselves increasingly geographically distributed.

This crowdsourcing model is in contrast to other peer learning programs that have been described in the literature, which involve centralized case submission, and an individual or a small group responsible for reviewing the cases and presenting the most instructive. The centralized model of case collection and curation poses a hurdle for groups' adoption of peer learning. Centralized case collection requires an information technology platform to support the submission and collection of cases, and necessitates substantial time commitment from a peer learning radiologist-leader to review all submitted cases. One program offered CME credit for in person participants, constructed online learning modules of anonymized cases with discussion of learning points, self-assessment questions, and SA-CME credit; the time

commitment for the peer learning program director amounted to twelve hours per month [4], which is a commitment many groups may not wish to make. Of note though: if these other peer learning programs are able to function independent of a peer review program, the organizations may experience cost savings from retiring the peer review system.

Other reports about peer learning programs describe use of elaborate information technology systems that are either custom built by the institution [7,8] or part of an existing software package previously purchased [9]. One article does describe a method to modify the American College of Radiology's RADPEER interface to support peer learning, and so if a group has already purchased RADPEER, this modification could be made without additional software cost to the group, but would likely require IT personnel time to support the RADPEER modification and to upkeep the system [4]. Our program, though, requires no special software for the submission of cases or requires time from any IT personnel beyond what the organization was already spending to maintain its peer review system; this lack of additional IT cost removes a substantial impediment to groups' adoption of peer learning.

The second key difference between our program and other peer learning programs previously described is our program's fully virtual nature with no central location or in-person cohort. Our radiology group is spread over

multiple work sites, with about half of the group working from non-institutional sites each day. Given this decentralized structure, the sole use of videoconference greatly increased the number of possible participants while ensuring that all, regardless of location, were able to participate equally. Our experience with meetings held in a central conference room with others joining via video or teleconference is that those joining remotely end up as “second-class” attendees: they face technical challenges in accessing the material, hearing the conversation, and they often miss important physical cues and body language that enrich the peer exchange. Exclusive use of teleconferencing standardizes the experience and encourages all group members to share cases, and not just those physically present in the meeting room.

A third important difference between our program and previously described programs is that we launched peer learning not as a replacement to peer review, but as a supplement. We viewed peer review and peer learning as complementary, with peer review focused on measuring radiologist performance and identifying low performing physicians, and peer learning focused on promoting learning, and improving the diagnostic process. As well, multiple authors advised that peer review data can be used to meet the requirements of The Joint Commission for Ongoing Professional Practice Evaluations (OPPE) [17-19]. However, due to the lack of monitoring of individual performance metrics, our peer learning program would not meet

The Joint Commission's 2007 guidelines [18]. Similarly, for American College of Radiology accreditation of CT, MRI, ultrasound, and nuclear medicine programs, facilities are required to have peer review programs that involve random selection of cases for double reading with scoring of agreement or disagreement, and with performance statistics for each radiologist [20-23]. Our peer learning program, as well as others that have been described in the literature, does not meet these requirements by the ACR. Therefore, we decided to proceed with peer learning as an addition to, and not a replacement of peer review. Again, this decision helped to reduce the administrative burden of running the program, as there were no administrators to appease, regulatory requirements with which to comply, or site visitors to assuage.

Our survey respondents' attitudes regarding peer learning were very positive, and in keeping with radiologists' attitudes toward peer learning systems that have been reported elsewhere in the literature. In our survey 90% of respondents reporting that they enjoy attending the conference, learn from other group members, think the conference is important, and think it contributes positively to group morale (Table 1). As well, respondents rated peer learning far more favorably compared to peer review on educational value, supportive environment, punitive process, and culture of blaming (Fig. 2). These results are similar to results reported by Donnelly *et al* whose peer learning system was strongly considered an improvement

over the group's prior peer review process; peer learning compared to peer review was rated as contributing more important learning, better serving the goals of ongoing professional practice evaluations (OPPE), driving increased improvement in departmental performance, and better helping individuals improve their practice [9]. Another survey by Sharpe *et al* of group members who had undergone the transition from peer review to peer learning also found very positive attitudes toward the educational value and benefits to the group's culture, and demonstrated that group members strongly preferred peer learning to peer review [4].

The main limitation of our study is that we did not keep records of the conference. As well, our survey is limited by response bias. We had a response rate of 10/22 radiologists (45%), which was likely enriched in radiologists who attend the conference regularly; these people by virtue of their attending the conference likely find the conference of higher value than those who choose not to attend. Another limitation of our peer learning system is that feedback was not provided directly to the radiologists who interpreted the cases. Radiologists chose which cases to present, and presented the cases anonymously. Therefore, the interpreting radiologist would not necessarily be aware if one of their cases was presented. We believe this anonymous case presentation helped to create a culture of trust that was important for the success of the conference. Individual radiologists were encouraged to let each other know about each other's' errors, but this

was done outside of the bounds of the peer learning program and conference. Due to concerns about hampering radiologist participation, other peer learning programs have also chosen to conspicuously omit individual feedback from their programs [4].

In summary, we describe our experience starting a peer learning conference with minimal resources and time commitment. Our group members collected and presented cases they each identified at the conference, and participants reported very favorable attitudes toward the peer learning conference. We believe this article serves as a roadmap to other groups who wish to answer the call of the 2015 IOM report, by meeting its objectives of fostering teamwork, and identifying and learning from error [2].

5. Conclusions

Peer learning can be successfully adopted and run with minimal resources, including as little as one hour per month of administrative time and no IT solutions other than a videoconferencing platform. Crowdsourcing case submission and curation greatly reduces administrative burden and anecdotally promoted group member enthusiasm for and participation in the peer learning conference. Respondents to our survey reported very positive attitudes toward peer learning, and rated peer learning more favorably than peer review in multiple attributes.

6. Acknowledgements

We would like to thank Sanjay Marwaha, MD for his guidance and encouragement through the process of starting our peer learning program.

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% Agree or Strongly Agree	Question
80%	I feel comfortable sharing cases.
80%	I feel comfortable commenting on cases others share.
70%	I learn from others' misses.
90%	I learn from others' good calls.
90%	I think it is important to discuss near misses and safety events.
90%	I can apply what I learn in the conference to my daily practice.
90%	I enjoy attending the conference.
90%	The conference contributes positively to group morale.
40%	Because of the conference I feel more comfortable asking colleagues for help when encountering challenging cases in clinical practice.

Table 1. Survey questions and results regarding attitudes toward peer learning.

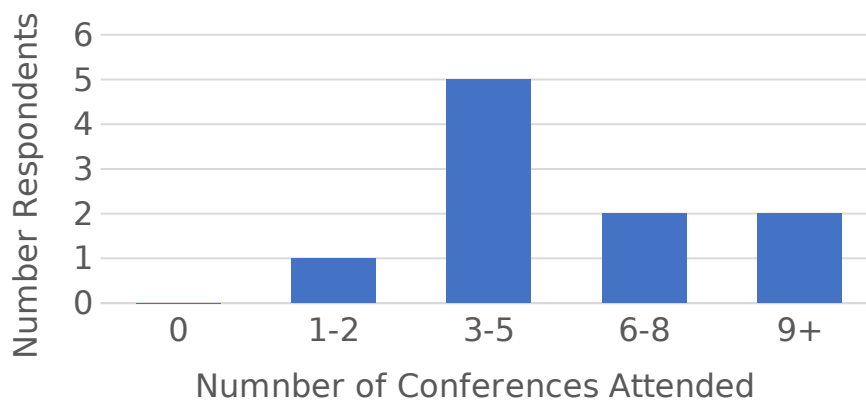


Figure 1. Numbers of conferences attended by survey respondents.

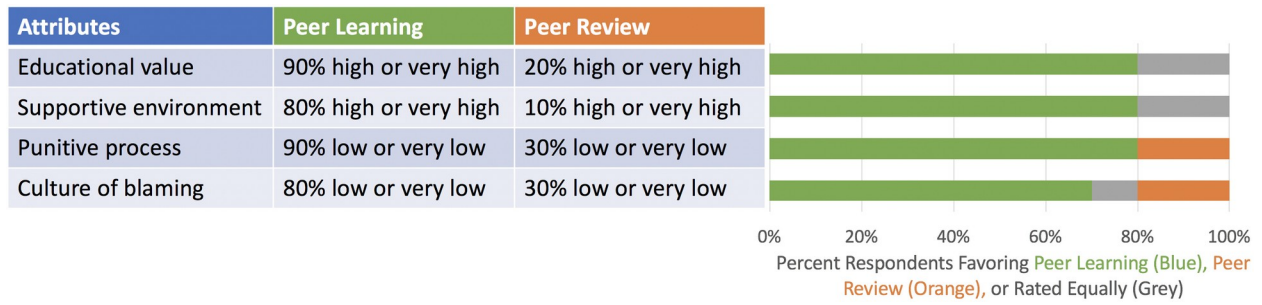


Figure 2. Survey results pertaining to prompts for which respondents rated both peer learning and peer review.