Improving Radiologist-IT Staff Communications and Collaboration Through a Shadowing Project

Adam Kaye · Tessa Cook

Abstract It is important for radiology practices to have efficient and skillful IT staff to provide support for issues that arise during patient care. However, an anecdotal barrier exists between radiologists and IT staff that can hinder the delivery of this care, either by lengthening the time required to solve problems with the IT infrastructure or not bringing critical issues to the IT staff's attention. We first created a survey of the radiologists and IT staff in our department to investigate this barrier, and found that there was, at baseline, a significant difference in how one group viewed the other, and, at times, there were irrational expectations from either party of what their counterparts were responsible for or capable of. We then instituted a shadowing project, whereby radiologists shadowed IT staff and vice versa, in order to give each group a better understanding of the others' daily workflows. We gave the participants a post-intervention survey to assess their experiences, which were markedly positive. In one case, an IT issue regarding pre-fetching of cardiovascular studies was, in fact, solved during the shadowing session.

Keywords PACS Administration · Workflow optimization · Organizational behavior · Interpersonal communication

Background

An efficient and resourceful information technology (IT) staff is critical to running a seamless radiology practice. Modern radiologists rely heavily on a smoothly functioning IT infrastructure to effectively care for their patients. This reliance necessitates good communication between the radiologists and the IT staff. At our institution, we have hardworking, knowledgeable IT staff, available 24 h a day, that are extremely dedicated to solving IT issues in a timely manner, upgrading workstations, and educating the radiologists. However, as at many institutions, there is an anecdotal "barrier" between the two groups that can create strife and, in turn, increase turnaround times for issues and thus hinder patient care.

Much of the literature on picture archival computer system (PACS) administration is focused on the development of a PACS administration group [1, 2], debate as to whether that group should reside within radiology or be integrated into enterprise-level IT [3], and the specific skills required by a PACS administrator [4, 5]. A paper by Nagy et al. discussed the varying backgrounds of PACS administrators, as well as the importance of various skills often held by these IT professionals [6].

A quality improvement project by Stockman et al. showed the importance of having an efficient mechanism for solving IT workflow issues in a radiology department and gave an example of one way to achieve better efficiency [7]. However, there is a lack of research in the literature on the dynamics of this barrier, both in terms of its cause and its potential effects on workflow and patient care. For example, are there actual deficits in radiologists' knowledge of IT issues, or is there a breakdown in communication along the way? In an ever-changing environment of radiology IT and system administration [8], how these IT professionals interact with the physicians whose systems they manage is of increasing importance. The purpose of this study is to identify these barriers between radiologists and IT staff, better acquaint each group with the workflow issues faced by the other, and engineer solutions that streamline these workflows.

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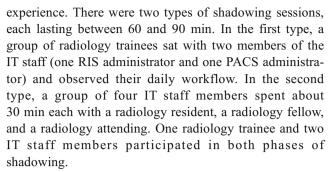e-mail: adamkaye22@gmail.com

Methods

The project consisted of two phases, both of which were performed under approval from our institutional review board. First, two surveys were created using survey management software (Qualtrics, Provo, UT) to assess the pre-intervention attitudes of each group towards the other. One survey was distributed via email to all radiologists (including residents and fellows) and the other to the radiology IT staff. The survey was also used to collect volunteers from each group that would be willing to spend a short period of time during the clinical workday shadowing a member of the other group. After completing the shadowing experience, the volunteers were asked to complete a post-survey to evaluate the overall experience.

We collected demographic information about each participant's level of training and number of years of service to the radiology department. We also asked participants to estimate certain figures related to the IT department, such as how many calls the on-call IT staff member receives on a given overnight call, how many workstations the IT staff supports throughout the department on a daily basis, or the average turnaround time for an IT-related issue to be solved.

We also proffered a series of questions asking each respondent to rate recent interactions with the other group on a five-point Likert scale. Questions were tailored to be appropriate to the audience, rather than being generic for both the radiologists and IT staff members. For example, while radiologists were asked if they felt that the IT staff member with whom they interacted had adequate knowledge to correct the problem, the IT staff were asked if they were provided sufficient information by the radiologist to solve the reported problem. We used a second series of five-point Likert scale questions to evaluate the importance assigned by each respondent to different aspects of their interaction with the other group. For example, one question asked respondents to rate the importance of professionalism from the other entity against the turn-around time for the issue to be resolved.

Respondents were then asked to briefly describe their best and worst experiences with the other group. We also requested participants to provide their email addresses if they wished to participate in the next phase of the project involving shadowing the other group for a few hours. The email addresses were separated from the rest of the survey responses to maintain anonymity. Means and standard deviations were calculated, and differences between the groups were estimated using Student's t test. For questions involving Likert scales, means and standard deviations were again calculated.

Using the volunteers from the survey, we enrolled six radiologists and four IT staff members into the shadowing experience. There were two types of shadowing sessions, each lasting between 60 and 90 min. In the first type, a group of radiology trainees sat with two members of the IT staff (one RIS administrator and one PACS administrator) and observed their daily workflow. In the second type, a group of four IT staff members spent about 30 min each with a radiology resident, a radiology fellow, and a radiology attending. One radiology trainee and two IT staff members participated in both phases of shadowing.

After the shadowing sessions, all volunteers who participated were sent a brief post-survey to collect their experiences and assess their opinions. The post-survey included both five-point Likert scale questions about their attitudes toward the project and open-ended questions which allowed for free-text responses about the positive and negative aspects of the project.

Results

Pre-survey Data

We received 14 responses from the IT staff (74 % response rate) and 95 responses from the radiologists (63 % response rate). Of the radiologist responses, 54 % were from faculty, 27 % from residents, and 19 % from fellows.

When comparing baseline knowledge of the radiologists versus that of the IT staff, there were significant differences in their estimates of various aspects of our department's radiology practice (see Table 1). The mean estimate for number of workstations in the department by radiologists was 87, while it was 224 for the IT staff. This difference in means was statistically significant ($p=0.03$). Estimates from IT staff ranged from 28 to 1100, while estimates from radiology staff ranged from 25 to 200.

Differences in estimates of number of calls to the on-call IT staff member overnight and on a weekday were all also statistically significant ($p<0.05$ for both overnight and weekday estimates). The average estimate for radiologists for an overnight shift was 18, with a wide range from 1 to 500. The average estimate for IT staff for an overnight shift was 2 to 13 with a mean of 6.

The mean estimate of number of studies read per day was 1729 for the radiologists (range 300 to 10,000) and 85,706 for the IT staff (range 80 to 650,000); the difference was not statistically significant ($p=0.06$). However, when removing three unreasonably high responses from IT staff (155,000, 298,000, and 650,000), the mean estimate for IT staff was 1118, and the difference in the means was statistically significant ($p=0.03$).

Table 1 Baseline knowledge of the radiologists versus that of the IT staff

Question	Radiologist mean	IT staff mean	Mean difference	*p* value
How many workstations are there in the department?	87	224	−137	0.03
How many studies are read in the department per day?	1729	85,706	−83,977	0.06
How many studies are read in the department per day?—less outliers	1729	1118	611	0.03
How many calls does the IT department receive on any weeknight?	18	6	12	0.04
How many calls does the IT department receive on any weekend day?	31	5	27	<0.01
What is the average turnaround time for an issue to be resolved by IT (in minutes)?	64	23	40	<0.01

When asked about average turnaround time to resolve IT issues, the mean radiologist estimate was 64 min (range 5 to 302 min), and the mean IT staff member estimate was 23 min (range 10 to 30 min), resulting in statistically different means ($p<0.01$).

IT staff estimates of number of radiologists in the department varied between 25 and 232, with a mean of 122. IT staff also estimated that there were between 1 and 25 radiologists on call on a weekend day (average 14) and between 3 and 20 on a weeknight or weekend night (average 9).

Radiologists were also asked about their recent experiences with the IT staff and to agree or disagree with a number of statements regarding those encounters (see Table 2). When grading their experience in various aspects from 1 to 5 (1 being "I completely disagree" and 5 being "I completely agree"), the mean score for "I was greeted in a courteous, professional manner" was 4.3. The mean score for the staff showing "the appropriate level of expertise" was 3.7, with 12 respondents saying that they at least somewhat disagreed with that statement.

When IT staff were asked about their last few calls from radiologists, the mean score for the same "professionalism" question was 4.07 (see Table 3). However, the mean score for the statement "The radiologist provided me enough information to solve their problem" was 3.43.

The next set of Likert scale questions to both IT staff and radiologists asked how important certain aspects of their interactions were to them (see Tables 4 and 5). The mean scores for both groups were greater than 4 for issues related to the interaction itself (professionalism, turnaround time, expertise, and resources), while the mean scores for feedback were less than 4 for both groups.

Post-survey Data

We received eight responses to our post-shadowing survey (80 %). Six of the respondents said that their experiences gave them a better understanding of radiology workflow issues, and the frustrations involved with those issues, with the other two participants responding neutrally to that statement.

Five of the respondents said that the experience gave them an idea for a project or workflow improvement that they plan to implement in the future, while three of the respondents said they had already begun or had already completed the implementation of a solution based on the discussion during their shadowing session.

Every respondent said that they would recommend the shadowing project to be required of all residents once per year or once during residency. Four respondents thought attending radiologists should be required to shadow once during their employment, and three other respondents thought that attendings should shadow once every 2–5 years. One respondent did not think it was necessary to require attendings to shadow but said it should be optional for them.

Table 2 Radiologists' recent experiences with the IT staff

The last few calls to the IT department	I completely disagree	I somewhat disagree	Neutral	I somewhat agree	I completely agree	Mean
I was greeted in a courteous, professional manner.	1	1	9	28	37	4.3
The issue was resolved in an efficient manner.	1	9	7	38	21	3.91
After resolution, I had a better understanding of why the problem happened and/or how to keep it from happening in the future.	7	12	23	21	13	3.28
The staff that helped me showed the appropriate level of expertise to handle my problem.	4	8	13	33	18	3.7
Overall, I receive adequate help from our PACS/RIS staff.	2	6	12	31	25	3.93

Table 3 IT staff's last few calls from radiologists

The last few calls from radiologists	I completely disagree	I somewhat disagree	Neutral	I somewhat agree	I completely agree	Mean
I was treated professionally by the resident/fellow/attending.	0	0	2	9	3	4.07
The radiologist provided me with enough information to solve the problem.	0	3	5	3	3	3.43
The radiologist chose the correct branch of the phone tree.	0	0	3	10	2	3.93

Two respondents (one IT staff member and one resident) thought shadowing should be required of each IT staff member annually. All other respondents agreed it should be mandatory, with three respondents saying it should be required once during employment. One respondent wrote that IT staff should be required to shadow radiologists "every 2 years, or when workflow changes."

Discussion

Our results show that there is clearly a difference in knowledge of IT issues and resources between radiologists and IT staff members in our department. For example, while the estimated range of studies for radiologists was relatively reasonable, IT staff had a much higher estimate of a radiologist's daily productivity. IT staff, however, were much better at predicting the number of calls they received during a given night or weekend, while radiologists did not appreciate the scope of the IT staff member's responsibilities when calling them with IT issues in the middle of the night.

Most radiologists and IT staff had no issues with professionalism during their encounters. Only two radiologists and none of the IT staff members rated the professionalism of their encounters with the other group less than "neutral". In general, the IT staff members were positive about their encounters with radiologists. The negative comments about interactions between the two groups were mainly focused on breakdowns in communication. For example, a number of IT staff members commented that they did not receive enough information from the radiologist about the problem being reported. This usually occurred as a result of unrealistic expectations on the part of the radiologist. For example, one IT staff member described "being yelled at by a radiologist when the network [was] down. Our section does not control networking." Another described "[getting] strongly-worded emails from a physician for not moving fast enough to fix an issue…when the physicians rarely will give us time and/or information to help track down the problem."

For radiologists, many of the worst experiences were also related to poor communication. For example, one radiologist described trying to resolve an issue with a monitor, in which he felt he was made to feel "stupid" and that he was "wasting [the] time" of the IT staff member, and was told that he "wouldn't understand [the problem] but [that] it shouldn't happen again."

Our post-intervention survey revealed almost exclusively positive reactions by the participants, and no negative reactions. On one occasion, while the IT staff members were shadowing an attending radiologist, a workflow issue was identified immediately and fixed by the end of the session. The attending radiologist describes the experience as follows: "[I was r]eally pleased to see how interested the IT staff were in the workflow and thrilled to report that they proposed a solution to one of our regular challenges (manually retrieving prior studies for the scheduled cases) and have now successfully implemented it. This saves us significant time on service both for the fellows at the beginning or end of the day and for the faculty during readout." One IT staff member said of the experience: "[f]ollowing the different workflows allowed me to uncover certain issues that I did not previously know about it. There do seem to be times where the residents/fellows work around issues instead of reporting them. I think some of that may be due to the fatigue in reporting the issue." The only

Table 4 Importance of aspects of interactions to IT staff

How important are the following to you when handling an IT issue?	Not at all important	Somewhat unimportant	Neutral	Somewhat important	Very important	Mean
Professionalism: The radiologist is courteous and professional.	0	1	1	3	8	4.38
Turnaround time: The issue is resolved efficiently so the radiologist can return to work.	0	1	1	1	10	4.54
Resources: I have the proper resources to solve issues when they are brought up.	0	0	2	4	7	4.38
Feedback, email/Web: I would like to provide status updates to the radiologist via an email/website system rather than calling them back.	2	1	7	1	3	3.14

Table 5 Importance of aspects of interactions to radiologists

How important are the following to you when handling an IT issue?	Not at all important	Somewhat unimportant	Neutral	Somewhat important	Very important	Mean
Professionalism: The IT staff is courteous and professional.	0	2	2	43	31	4.32
Turnaround time: The issue is resolved efficiently so I can return to work.	0	0	3	4	71	4.87
Expertise: I want to understand why the problem happened and take steps to avoid it in the future.	1	2	4	25	46	4.45
Feedback, phone: I would like to hear back from IT by phone after calling with an issue with updates about the problem.	1	4	16	30	27	4
Feedback, email/Web: I would like to be able to track my issue via email from support staff or a web portal.	2	6	17	38	15	3.74

negative comments on the experience from either radiologists/ trainees or the IT staff members involved scheduling of the sessions.

All respondents thought the program should continue, with the majority of the respondents saying that the shadowing should be mandatory for all radiologists, residents, and IT staff at least once during their employment, if not more frequently.

Our study has multiple limitations. There was a very wide range of responses in the pre-survey involving estimates of workstations and number of exams, among other values. While the reasoning for this wide range is unclear, it may have been secondary to poor wording of the questions or a lack of understanding of the purpose of the study.

We had only ten participants in the intervention portion of the study. While we would have preferred a higher number, the goal of this pilot phase was primarily to gain some initial experience for a more robust future rollout of the project to a greater number of radiologists and IT staff at more than one hospital on our health system. Second, there was no strict curriculum for any of the shadowing interactions. Given our lack of experience with such a project, we simply gave basic instructions to those being shadowed and hoped that observation of their usual daily workflows would be sufficient to provide a positive experience for both parties. In practice, however, workflow during the shadowing session was not quite identical to everyday use because of the presence of the shadowing volunteers. While residents were shadowing the IT staff, for example, the staff gave a rundown of their everyday activities but probably did not perform their exact workflow as they would without these visitors present. Similarly, due to lack of availability of an ultrasound attending or resident during one of the shadowing sessions, the IT staff instead sat with one of the authors (AK), who took one ultrasound case during their time and explained the workflow steps involved in its interpretation.

While this relatively informal interaction, instead of strict shadowing of normal workflow, was unexpected and unintended, the authors feel it resulted in a more effective way of instructing the other group on workflow issues. In future implementations of this project, the authors hope to have a more precise curriculum of activities to perform during each shadowing session that is more conducive to identifying workflow issues, as it provides an open forum for dialog between the two groups.

Finally, the authors believe that stricter pre- and post-survey measures of the impact of this project would be ideal, as it would allow us to possibly quantify the impact of the shadowing experience on some objective measure of workflow or productivity, such as turnaround time or number of cases. However, this is a larger-scale project that would require many more resources than were available to us at the time of project initiation. Furthermore, many of the benefits of the project, such as the streamlined pre-fetching of cardiovascular studies, were spontaneously discovered at the time of shadowing. Thus, getting data on "pre-intervention" statistics, such as time spent on manually fetching prior studies, would have taken longer than simply rolling out the solution, which seems like a "common sense" answer to a simple problem. Nevertheless, a true objective measure of the impact of our study would have included such data.

Conclusion

Our pre-intervention survey revealed that one of the biggest barriers to efficient communication between radiologists and IT staff is a lack of understanding of the responsibilities of and demands on the other group and a dichotomy between what is expected and what is attainable by the other group. Our post-intervention survey showed that by introducing this shadowing experience, we broke down many of these barriers. By participating in a shadowing session, both radiologists and IT staff members felt more comfortable with individuals from

the other group. Furthermore, both groups felt that the experience not only improved their professional relationships but was conducive to an environment of innovation, collaboration, and problem solving.

In addition, studying the interactions between radiologists and IT staff members, our goal was to provide an example of how we can overcome barriers in communication within a radiology department. Indeed, all the participants who took part in the post-survey agreed that the shadowing project should continue and at least be mandatory for the residents. We feel that this study was a step in the right direction with regard to collaboration between radiologists and IT staff. We plan to implement this project on a wider scale with more residents during subsequent academic years.

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