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# Reflective Writing:

## *A Potential Tool to Improve Interprofessional Teamwork with Radiologists*

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**Rationale and Objectives:** Studies show that problems with interprofessional collaboration can result in adverse patient outcomes. These problems are common in the field of radiology, where technology has decreased opportunities for direct communication and collaboration with referring physicians. To our knowledge, critical reflection has not been studied as an intervention to better understand one's own and/or others' roles in the context of an interprofessional team, or more specifically, to improve interprofessional collaboration between radiologists and other physicians.

**Materials and Methods:** We trialed a reflective journaling assignment in our fourth year medical student general radiology elective. Student journal content was scored by percentage of comments reflecting on elective experiences versus recounting events. Content was categorized as "reflection" using an established measurement tool. Reflective content was evaluated to identify common themes.

**Results:** A total of 31 journals (178 entries and 26,749 words) were analyzed. Reflective content accounted for 43% of overall content and was subdivided into three categories: insight into one's own role and responsibilities as an ordering physician (20%), insight into a radiologist's role and responsibilities (12%), and thoughts on improving interprofessional collaboration with radiologists (11%).

**Conclusions:** Reflective writing allows students to explore their own role and responsibilities in the context of an interprofessional team and may improve interprofessional teamwork with radiologists.

**Key Words:** Reflective writing; teamwork; interprofessional education; medical student education.

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Diminished collaboration between radiologists and other physicians is an unfortunate side effect of computer-based interpretation via picture archiving and communications systems, systems which are now commonplace in most health care systems (1–3). Radiologists and other members of the health care team no longer need to gather in the same location to review films, given they are now readily accessible online. Imaging examination results are also increasingly communicated electronically (4). These trends have caused concern amongst radiologists who worry that their decreased visibility is harming interprofessional collaboration and communication with their physician colleagues (1–3). The problem is further exacerbated by the overall poor penetration of radiology education in medical school curricula in the United States (5); medical students do not consistently learn about the role of radiologists on the health care team during their education, and that knowledge gap can carry over into clinical practice (6).

Many studies have demonstrated that problems with interprofessional collaboration can result in adverse patient outcomes (7–10). Recognized barriers to effective interprofessional collaboration include 1) problematic power dynamics, 2) poor communication patterns, and 3) lack of understanding of one's own and/or others' roles and responsibilities (7–12). Studied interventions to improve interprofessional collaboration, such as interprofessional rounds, have focused predominately on improving communication among team members (11).

It has been shown that practicing "critical reflection" can improve interprofessional teamwork (13–15). Sandars defined "reflection" as an activity "occurring before, during, and after situations with the purpose of developing greater understanding of both the self and the situation so that future encounters with the situation are informed from previous encounters" (16). Demonstrated positive outcomes of practicing critical reflection in an interprofessional team setting include improved learning and communication (14). Such benefits have led to its growing implementation in medical education curricula (17). To our knowledge, however, reflection has not been well studied as a potential intervention to better understand one's own or others' roles in the context of an interprofessional team, or more specifically, as a tool to improve interprofessional collaboration between radiologists and other physicians on the basis of these insights. Herein, we describe an easy-to-implement curricular innovation to our fourth year medical student radiology electives that addresses these gaps in interprofessional education.

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## MATERIALS AND METHODS

Although students at our institution are exposed to approximately 50 hours of radiology content in years 1–3 in our longitudinal integrated curriculum, most students opt to take one of several fourth year electives as well.

We developed a reflective writing assignment for our 4-week, fourth year general radiology elective. This course teaches the basics of radiology, focusing mostly on information pertinent to appropriate imaging examination ordering and utilization. The target audience for our general radiology elective is future ordering (nonradiologist) physicians, and approximately 100 of 150 students elect to take the course. Students were surveyed as to their plans for residency specialization before placement into an elective to determine the best course for their needs. This 4-week elective is predominately classroom based, and comprised lectures and small group teaching sessions (>70 hours), electronic teaching modules, a presentation assignment, two half-day reading room observation sessions, and an examination. The reflective writing assignment was initially piloted in this general course because, as future ordering providers, these students might derive particular benefit from reflection on their experiences with radiologists as part of the health care team. It was introduced as a make-up assignment for students who exceeded the maximum number of absences as allowed by our school's attendance policy (1 day). Our attendance policy is strict and rigorously enforced. Of note, all allowed absences were for interviews, other medical school obligations, or personal emergencies and were preapproved by the course director. No student had more than three absences.

Subsequently, the assignment was introduced to all students in our fourth year reading room electives as a routine course requirement. Reading room electives at our institution are targeted to students with career interest in radiology or students with focused interest in a related subspecialty (for example, a student with career interest in neurology taking a neuroradiology elective or a student with interest in general surgery taking an abdominal imaging elective). These electives are generally 4 weeks, and include a combination of reading room observation and electronic modules. Students attend some lectures, but most time is spent in a clinical setting.

The full text of the assignment as it was provided to the students is shown in [Figure 1](#). To emphasize the ongoing nature of

the assignment, the assignment was titled a “journal,” and instructions specifically highlighted it was to be a “running document.” There was no required minimum or maximum length and no required number of journal entries. Although the journal assignment was required of these students, its content did not count toward their course grade. Of note, students were not specifically asked to address interprofessional interactions per se, mainly in an attempt for the assignment to be an open and personal process, although many did. Reflection is not necessarily an intuitive process for learners (18). However, students at our institution receive formal instruction in using reflection during their core medical education and are practiced in the technique from implementation into a variety of educational settings (19). The instructions did remind students that the intent of the journal was *reflection* rather than *recounting*.

We used a previously established and validated tool, to measure the “level of reflection” in student journals, previously established by Wong et al (20) and based on the prior work of Mezirow and Boud et al (21,22). Using this tool, content was categorized as reflective if it included “attending to feelings, association, integration, validation, appropriation, or outcome of reflection” (20). Reflective content was evaluated to identify common themes. A word count was performed to quantify the percentage of comments in each category. To address potential variability between students' writing style, journal content was evaluated using a qualitative content analysis (23,24). Journal content was coded and categorized into themes. The frequency of each theme was counted to quantify the percentage of journal content dedicated to each theme.

Journal entries were scored by two authors with disagreements addressed in a consensus fashion.

## RESULTS

A total of 31 journals (178 entries and 26,749 words) were submitted and reviewed as part of this assignment. The mean length of the submitted assignments was 870 words (standard deviation, 546 words). Journals contained a mean of 5.6 entries per journal (range, 1–18). Ten journals were submitted from our general classroom-based radiology elective and 21 from our reading room electives. The reported career plans of the students from each elective are presented in [Table 1](#).

By word count, journal content was categorized as “reflective” (43%), “recounting” (47%), or other (10%) which included opening and/or closing and/or transitioning text. Students focused a substantial proportion of their assignment on reflective content highlighting roles and responsibilities of radiologists and interprofessional communication. A summary of the assignments' content is reported in [Table 2](#).

Reflective content was further subcategorized into three theme categories:

1. Insight into one's own role and responsibilities as a future ordering physician (16%):

Keep a radiology journal, which you'll turn in at the end of the elective -- journaling is an effective tool to help one process day-to-day situations. So, keep a running Word doc in which you write your reflections about your experiences in this elective. Some possible topics to write about are:

A. Some applications of what you're learning this session to your future career.  
 B. Some "Wow, I never thought of that" moments.  
 C. Thoughts on what kept you engaged this term vs. what didn't keep you so engaged.

There's no right or wrong in journaling. Just write. I've found from my own experience in journaling that it has helped me process what was going on and make sense of it all.

In response to the question of how long does the journal have to be, there's no minimum or maximum. This being said, we expect reflection, and not just a re-telling of activities that happened.

**Figure 1.** Text of the reflective writing assignment.

**TABLE 1. Comparison of Planned Residency Specialization for Students Completing the Reflective Writing Assignment**

Future Specialty	Classroom-Based	Reading Room-Based
	Elective ( <i>n</i> = 10), <i>n</i> (%)	Elective ( <i>n</i> = 21), <i>n</i> (%)
Anesthesiology	2 (20)	2 (9.5)
Emergency medicine	2 (20)	2 (9.5)
Medicine	3 (30)	6 (28.6)
Obstetrics/ Gynecology	0 (0)	1 (4.8)
Otolaryngology	0 (0)	4 (19)
Orthopedics	1 (10)	0 (0)
Pediatrics	1 (10)	1 (4.8)
Radiology	0 (0)	4 (19)
Surgery	1 (10)	1 (4.8)

- “It was helpful to hear about what tests to order and/or not order since as a future internist, I will be on the front lines of ordering scans.”
  - “I usually would read the radiology report but not directly look at the images myself, which of course is a bad and noneducational habit.”
2. Insight into a radiologist’s role and responsibilities (14%):
- “I realize my conception of what a radiologist did was quite different from the reality of what they actually do... spending a few hours in the reading room, I was able to see how chaotic/hectic the workflow can be. There were endless phone calls, frequent visitors from various departments/teams requesting help/advice for something, and a growing number of simple and complex imaging that needed reading. As someone going into emergency department, I was really impressed by the multitasking and frequent reprioritization of tasks in the reading room.”
  - Radiologists choose their words extremely carefully. It is important to be aware of both what they say and what they do not say.”

3. Thoughts on improving interprofessional collaboration with radiologists (10%):

- “I always thought about the pressure of having to interpret images as the whole ward teams await for a radiologist confirmation. I asked my resident this day how she felt about that. She responded with a confirmation that in fact, it is quiet intimidating to interpret an image as a starting second year while attendings have had decades of experiences. I appreciated the “human” side of radiology as my resident voiced her vulnerability during the start of her training. This made me appreciate that regardless of specialties or fields, we are all training together.”
- “Consulting with the radiologist will be an integral part to how I practice medicine and both teams (and the patients) will be better because of it!”
- “I love watching the medicine and radiology teams read out together because it reminds me of how much we all still have to learn from each other, even at an attending level.”
- “This will help me, as an internist, to better interact with the radiology department with respect to accurate ordering of exams, setting patient expectations, planning the timing and preparation of patients appropriately, and even simply speaking their language about images when we communicate.”

Results by qualitative content analysis were consistent. Journal content was categorized as “reflective” (41%), “recounting” (50%), or other (9%). Similarly, reflective content was further subdivided into insight into student’s own role (22%), insight into a radiologist’s role (9%), and thoughts on improving collaboration with radiologist (10%).

Content that was deemed “recounting,” rather than reflective, was subcategorized based on the setting being discussed, either didactic sessions (lectures, tours, and hands on skills sessions) or reading room observations (Table 2).

## DISCUSSION

Reflection can certainly occur in the absence of a required writing assignment. Unconscious reflection is probably quite

**TABLE 2. Summary of the Content of the Reflective Writing Assignment Categorized by Word Count**

Content Categories/ Subcategories	Classroom Based, <i>n</i> = 10, <i>n</i> (%)	Reading Room Based, <i>n</i> = 21, <i>n</i> (%)	Total, <i>n</i> = 31, <i>n</i> (%)
Reflection	3604 (40)	7963 (45)	11,567 (43)
Own role	1466 (16)	3840 (22)	5306 (20)
Radiologists’ role	1237 (14)	1981 (11)	3218 (12)
Collaboration	901 (10)	2142 (12)	3043 (11)
Recounting	4056 (44)	8527 (49)	12,583 (47)
Didactic	3619 (39)	4056 (23)	7675 (29)
Reading room	437 (5)	4471 (26)	4908 (18)
Other	1495 (16)	1104 (6)	2599 (10)
Total word count	9155 (100)	17,594 (100)	26,749 (100)

common, and even targeted reflection without writing (eg, instructors verbally asking students to reflect), can occur. Nonetheless, a written reflection assignment guarantees a certain degree of attention to the process, which can be further refined by the exercise putting words to (digital) paper. Prior research has shown written reflective assignments to be effective (25), and in fact, they have become commonplace in undergraduate medical education in a variety of different settings (26).

Our reflective writing assignment was designed without focusing the students' attention specifically on exploring one's own role in the context of interprofessional development, mainly in an attempt to keep the assignment unrestrictive. That said, the students' responses were surprisingly focused on these topics, which we agree are of great value. Prior research, however, indicates that student reflection without a clear purpose tends to be undervalued by students (27). Given that our instructors and students alike find interprofessional interaction to be an important topic, providing direction to focus on this topic could lead to more refined, higher quality, and useful reflections. Although the instructions for this assignment were relatively unstructured, students at our institution are trained in the practice of reflection. However, this may not be the case at every institution. Previous authors (19) have shown that when more specific guidelines on practicing reflection are provided to medical students, they achieve deeper, more effective reflection in their assignments. This may be of particular importance if such an assignment is to be implemented across different institutions.

This study has several limitations. First, it was conducted at a single institution where students are relatively familiar with practicing reflection. Furthermore, as a pilot assignment, our sample size was small. A proportion of the students in the pilot group were asked to complete a reflective journal as a make up assignment, for absences in violation of our attendance policy (>1 day). Although this could create bias within the sample, all absences were for valid, preapproved reasons and were no more than 3 days during a 4-week elective. We do not believe these students were any less engaged in the course than their peers. Furthermore, when we compared the number of occurrences of reflection and specific themes of reflection between the groups of students, there were no differences between those who completed the journal as a make up versus mandatory assignment. The fact that the reflection was a course assignment could bias the themes the students chose to address, although interestingly, no differences were seen between different educational settings (clinical versus classroom). Finally, although the assignment was effective in influencing students' attitudes about radiologists and their role on health care teams, it remains unproven whether it will have any measurable effect on higher levels of learning including effect on future behavior or patient outcomes (28).

Despite these limitations, based on our initial experience, we have already expanded this activity, making it a required activity for every student in our courses. We also plan to introduce the assignment into other educational settings under our purview. Although we found this pilot curricular innovation

to be worthwhile with very little cost, further research would be valuable. For example, it is unclear how assignment length, the content of the instructions, and collaborative (group) reflection could affect the value of the activity. Some authors have suggested that feedback from mentors or peers may make a reflective assignment even more impactful (29).

We believe that reflective journaling by medical students may improve interprofessional teamwork between radiologists and future ordering physicians by increasing student awareness and insight as to the role of radiologists in medical practice and the potential benefits of collaboration with radiologists. We believe this is of particular value as the radiologist's role in health care delivery is often not well emphasized in traditional medical school curricula. Radiology course directors at other institutions could consider adding such an assignment to their courses or clerkships.

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