

## Voices emerging from the shadows:

### Radiologic practitioners' experiences of challenging conversations

Elaine C Meyer<sup>1</sup>, Giulia Lamiani<sup>2</sup>, Donna Luff<sup>1</sup>, Stephen D Brown<sup>1</sup>

<sup>1</sup> Boston Children's Hospital and Harvard Medical School, 300 Longwood Ave, Boston, MA, USA

[elaine.meyer@childrens.harvard.edu](mailto:elaine.meyer@childrens.harvard.edu), [donna.luff@childrens.harvard.edu](mailto:donna.luff@childrens.harvard.edu),

[stephen.brown@childrens.harvard.edu](mailto:stephen.brown@childrens.harvard.edu)

<sup>2</sup> Department of Health Sciences, Università degli Studi di Milano, San Paolo University Hospital,

Via Di Rudinì 8, Milan, Italy [giulia.lamiani@unimi.it](mailto:giulia.lamiani@unimi.it)

#### Corresponding author:

Elaine C. Meyer, PhD, RN

Institute for Professionalism & Ethical Practice

Landmark Center, Office 5205

Boston Children's Hospital

Boston, MA 02115

Phone: (617) 355-5021 (office)

Fax:(781) 736-0451 (fax)

Email: [elaine.meyer@childrens.harvard.edu](mailto:elaine.meyer@childrens.harvard.edu)

Date: 7-27-2016

Word Count: 3995

## **Abstract**

**Objective.** Traditionally, radiologists have practiced their profession behind the scenes. Today, radiologic practitioners face mounting expectations to communicate more directly with patients. However, their experiences with patient communication are not well understood. The aim of this study was to describe the challenges of radiologic practitioners when communicating with patients.

**Methods.** Twelve day-long interprofessional communication skills workshops for radiologic clinicians were held at Boston Children's Hospital. Prior to each workshop, participants were asked to write narratives describing experiences with difficult radiologic conversations that they found particularly challenging or satisfying. The narratives were transcribed and analyzed through thematic content analysis by two researchers.

**Results.** Radiologists, radiology trainees, technologists, nurses, and medical interpreters completed 92 narratives. The most challenging aspects of healthcare conversations included: Conveying Serious News (n= 44/92; 48%); Expanded Scope of Radiologic Practice (n= 37/92; 40%); Inexperience and Gaps in Education (n= 15/92; 16%); Clinical Uncertainty (n= 14/92; 15%); and Interprofessional Teamwork (n= 9/92; 10%).

**Conclusion.** Radiologic clinicians face substantial communicative challenges focused on conveying serious, unexpected and uncertain diagnoses amid practical challenges and limited educational opportunities.

**Practice Implications.** Innovative educational curricula that address these challenges may enhance radiologic practitioners' success in adopting patient-centered communication.

**Keywords:** clinician-patient communication, radiology, narratives, qualitative research, US

## **1. Introduction**

Radiologic practitioners today face mounting expectations to practice “patient-centered care.” [1,2]. As elsewhere in medicine, this means orienting care to better accommodate patient preferences and values. The increasing emphasis on patient-centeredness has far reaching implications for radiology, where concerted efforts are being undertaken to realign processes at every juncture of interaction between patients and radiologic healthcare [1,2]. These include not only the procedures themselves, but also processes such as billing, scheduling, waiting times, care coordination, and facility accessibility and cleanliness. For individual radiologists, perhaps the most personally impactful challenge of patient-centered care has been revised expectations around direct patient communication. Unlike physicians in most other fields, many radiologists have traditionally practiced behind the scenes and provided primary consultations to other physicians who communicated with patients.

Now, radiologists face mounting expectations to emerge from behind the shadows and to communicate more directly with patients, especially as many diagnostic imaging results have become almost immediately available. [3-11]. Compared to radiologists, other radiologic practitioners, most notably radiologic nurses and technologists, have more routinely been at the frontlines of patient encounters. The increasing immediacy of radiologic results and of patient access to those results also increases pressure on these practitioners to communicate in a timely, effective manner. These contemporary developments influencing the scope and process of radiologic practice beget new challenges for educational curricula to prepare radiologic personnel for these expanded communicative responsibilities.

Across radiologic personnel, insufficient training is central among the barriers to effective patient communication. One recent study reported that radiology trainees are uncomfortable communicating with patients about bad news, have had limited educational opportunities, and desire additional training [3]. Another study of experienced breast imagers found high levels of comfort when informing patients additional mammographic views were required, but substantially

less comfort when telling patients about more serious matters, such as the need for biopsies and cancer diagnoses [12]. Although only a minority of these imagers had formal training in communication, few desired additional training, perhaps because they did not view patient communication as among their primary responsibilities. Given the rapidly changing professional landscape and demands, there is compelling rationale that communication educational curricula are needed immediately.

Little work has been done to characterize radiologic practitioners' real-world patient-related communication experiences. Only rare published narratives have described radiologists' actual experiences in this regard [13]. One small study of practicing radiologists who had participated in a communication skills workshop as trainees suggested their ability to implement the skills depended on the culture of professionalism within their practice environment [14]. To our knowledge, no other work has systematically explored the difficult healthcare conversations in radiology from the radiology personnel's experience. The study was guided by adult learning theory principles positing adult learners need to be involved in the development and evaluation of educational programs, the most effective learning is problem-focused and immediately relevant, and experience should serve as the basis of learning [15,16]. Narratives gleaned directly from radiologic practitioners about their current communicative practice and challenges could enable healthcare educators to tailor training initiatives to meet the identified needs of radiologic practitioners themselves and to improve educational programming. We therefore sought to describe the challenges of radiologic practitioners when communicating with patients.

## **2. Methods**

### *2.1 General Description*

In light of the call to action to promote patient-centered radiology, twelve day-long Program to Enhance Relational and Communication Skills (PERCS) workshops were held between September 2011-May 2013 at Boston Children's Hospital. The aim of each workshop was to enhance

participants' relational and communication skills when discussing radiological results. A detailed description of workshop format, content and efficacy has been previously reported [3,17].

Participants included: radiologists in training and in practice; radiologic nurses and technologists; non-radiologist physicians; and medical interpreters. Fellows and residents affiliated with Boston Children's Hospital radiology department were required to attend; others attended voluntarily.

## *2.2 Data collection*

Prior to workshops, participants voluntarily completed self-report questionnaires that included demographic data, professional experience and previous learning opportunities. The self-report questionnaires have been previously utilized to assess participants' learning across a range of PERCS workshops and countries [18]. As the questionnaires are composed largely of open-ended questions, they have not been subjected to traditional psychometric validation.

As a part of the pre-workshop questionnaire, participants were also asked to write narratives based on the prompt, "Please describe an experience with a difficult healthcare conversation in radiology that you found particularly challenging or satisfying." Participants were provided fifteen minutes prior to the beginning of the workshops to complete the pre-questionnaire and narrative.

## *2.3 Research Ethics*

Participants signed voluntary consent forms granting permission for self-report questionnaires and narratives to be utilized for educational and research purposes. The narratives were anonymous. The project received an educational research exemption from the Boston Children's Hospital Institutional Review Board.

## *2.4 Data Analysis*

Demographic characteristics were summarized with descriptive statistics. Chi-square and t-tests were conducted to compare the demographic characteristics of participants completing narratives and those who did not.

Written narratives were transcribed verbatim in Word and analyzed through thematic analysis [19-21]. Thematic content analysis is a widely used method to analyze qualitative textual data. It can encompass both inductive and deductive analytic processes through which qualitative data are organized into themes. As inductive thematic analysis has an exploratory aim, it is particularly useful when there is no preliminary knowledge about a phenomenon. Where appropriate, as in this study, existing theories or findings from previous research may also guide analysis, so that a more “hybrid” approach is taken, combining some deductive as well as inductive coding [22]. In this way, our analysis was informed by relevant literature on patient-centered radiology, including our own previous work [23,14]. Thematic analysis has been previously applied in healthcare research to analyze qualitative data such as interviews and narratives [24, 25].

The qualitative analytic process was conducted by two researchers (ECM, GL) who were well versed with the educational pedagogy and workshops, but were unknown to participants, and not from within radiology, to increase credibility of the analysis [26]. First, researchers independently read the narratives to familiarize themselves with the entire data set. Second, researchers independently coded the narratives by identifying and labeling categories that best captured the issues participants described in their narratives. During this phase, researchers identified specific labels that reflected the issues described by participants such as “serious diagnosis,” “adverse event” or “bad news.” Third, through a series of joint meetings, researchers discussed categories they identified in the open-coding phase and then grouped categories into broader conceptual themes. For example, the issues previously mentioned were consolidated under the broader theme labeled “Conveying Serious News.” Then, researchers manually developed an initial thematic coding framework with a provisional name and definition for each theme. Fourth, narratives were co-coded by researchers using this framework to test the adherence of the themes to

the data. Given the different length and complexity of the narratives, some contained more than one theme and were coded accordingly. Coding disagreements were reconciled through discussion until consensus was achieved and it was determined that thematic saturation had been reached (with no new themes emerging and all data fitting within emergent themes). We also discussed themes with colleagues from within radiology (including co-author SDB) to assess the plausibility of the emergent analysis. Finally, researchers refined and finalized the labels of each theme, computed the number of narratives containing each specific theme, and selected illustrative excerpts.

### **3. Results**

#### *3.1 Participants*

182 practitioners attended the workshops, including radiology trainees and practicing radiologists from 20 programs across 12 states. Of those, 92 (51%) completed written narratives. Table 1 reports demographic characteristics of all participants, subdivided into those who did and did not complete narratives. There were no significant differences on any of the demographic variables between the participants who did and did not complete narratives. Participants who completed narratives had a mean age of 36.47 years (range 27-77) and 8.78 years of clinical experience (range 1-53). Most participants (60%) were radiologists-in-training.

#### *3.2 Narratives*

We analyzed a total of 92 narratives. Handwritten narratives ranged in length from a minimum of 4 words to a maximum of 134 words. The most challenging aspects of radiologic healthcare conversations experienced by participants in order of magnitude included:

Conveying Serious News (44/92 = 48%); Expanded Scope of Radiologic Practice (37/92 = 40%); Inexperience and Gaps in Education (15/92 = 16%); Clinical Uncertainty (14/92 = 15%); and Interprofessional Teamwork (9/92 = 10%). Several narratives (27/92 = 29%) were

coded for more than one theme. Next, we describe the themes and offer illustrative narrative excerpts.

### *3.2.1 Conveying Serious News*

The most common challenging conversation for radiologic practitioners occurs when serious diagnoses, such as tumors and fetal demise, must be conveyed. When radiologic findings reveal medical error, the difficulty of sharing such news can be further amplified.

*“Giving news to patient waiting in MRI about brain mass”-Trainee, male, 29 years*

*“Informing a patient that I, a well trained and experienced radiologist, missed seeing and reporting a density on a X-ray film that later was diagnosed as an advanced cancer was the most challenging conversation”- Attending, male, 77 years*

The element of unexpectedness further increased the complexity of communicating difficult news to patients. Under these circumstances, it can be challenging for clinicians to bridge the gap between what the patient may have expected or been hoping to hear and the actual news.

*“I was working in [a satellite radiology setting] when a routine ultrasound on a 3-month-old infant discovered a large mass in the retro-peritoneum and a liver metastasis. I needed to speak to the new parents and send them to [the main hospital] for care. This was an unexpected and potentially devastating diagnosis”- Attending, female, 37 years*



*“I entered the ultrasound room to confirm a fetal demise. I had not met the patient yet. I introduced myself and she asked, “Can I have some pictures for the baby book?” It was very difficult for me to respond.” –Trainee, male, 33 years*

Challenging aspects of conversations were related not only to communication of serious and unexpected medical circumstances that affect the patients, but also to the concomitant management of complex emotional circumstances and responses.

*“Telling patient about her newly diagnosed miscarriage. She and her husband had been trying for years” – Trainee, female, 28 years*

*“Telling a parent about child’s brain tumor diagnosis complicated by the fact that the child had failure to thrive and was taken away from the family for neglect.” –  
Attending, female, 52 years*

### 3.2.2 Expanded Scope of Radiologic Practice

Many participants described the inherent tensions and insecurities associated with changing professional role expectations for radiologic practitioners, specifically the challenges of expanding their scope of practice to include direct, timely patient communication.

*“Several times I’ve seen findings that were consistent with malignancy and I was faced with the dilemma of whether I should bear the burden of communicating the diagnosis or defer to the referring clinician.”-Trainee, male, 31 years*

Some participants expressed discomfort when communicating with patients about diagnosis or management, noting the dilemmas of coordinating with referring physicians, time delays

for patients to receive news, and addressing treatment planning beyond the expertise of radiologic practice.

*"We recently had a patient with a new tumor diagnosis. The patient had a follow-up 2 days later with her physician. The patient's mother was asking me questions to try to find out what was wrong. I told her to follow-up with the ordering physician, but it is a tough situation." –Technologist, female, 30 years*

*"I had to tell a patient that we had found something on his ultrasound after discussing the results with his doctor first. Delivering the bad news but not having the answers to all his questions was a difficult experience because as a radiologist my job is to diagnose, but not to discuss treatment options. However, this is inevitably the first question someone will have" –Trainee, male, 28 years*

Challenges aside, some participants described how engaging directly with patients and families in deeper conversations, beyond the usual scope of imaging findings, could serve as a source of professional satisfaction and pride.

*"Many of my co-residents don't like to give the results to patients, preferring to have the Emergency Department (ED) deliver the news. However, I think it is important to give the patient results after the discomfort of an invasive exam. I try to be clear with the results but empathetic, making sure to give them some time to process and ask questions. Sometimes sitting during the silence of the patient processing the news is uncomfortable, but worth it." – Trainee, female, 31 years*

*“I am frequently in the position of letting patients know that they have an unsuccessful pregnancy during their ultrasound exams. I feel very comfortable with this discussion, drawing on both personal experience and years of patient care. I take great satisfaction in being able to be available emotionally for my patients during this interaction.”-*

*Attending, female, 52 years*

### *3.2.3 Inexperience and Gaps in Education*

Numerous narratives conveyed how lack of preparation and training devoted to communicating with patients put practitioners at a disadvantage. Participants recalled episodes when they did not know what to say or bore the responsibility for communicating bad news when they felt unprepared to initiate and manage patient communication.

*“In a patient with wrong diagnosis for 1 year I had to explain that they actually had cancer. The patient was readmitted 2 years later and died that night. I asked the family*

*“How are you feeling?” Worst question ever.” – Trainee, male, 30 years*

Amidst a lack of formal communication training, some clinicians found the process helpful to learn from more experienced radiologic practitioners, by observing positive role models.

*“One experience that I found to be satisfying was when disclosing bad news about a lesion that was seen on both ultrasound and mammogram which was suspicious for breast cancer. My attending disclosed the news in a straightforward manner and gave the patient information regarding the next step and treatment options. It was a thorough discussion that was well handled.”- Trainee, female, 30 years*

### *3.2.4 Clinical Uncertainty*

Participants described how difficult it can be to tolerate and manage uncertainty when discussing particular radiologic findings and diagnoses. Uncertainty of results can be emotionally stressful for patients who may have expected definitive radiologic findings and information, but also for radiologic practitioners who have the job of explaining the uncertainty while also potentially experiencing parallel insecurity and anxiety.

*“When on call one evening, the secretary put a call through to me from a patient who had had an MRI that day to evaluate a renal lesion .... Because the results were indeterminate, I had a challenging time explaining to her that the results were not definitive and that we would need to wait 1-3 months and repeat to determine the pathology” - Trainee, female, 34 years*

*“I discussed newly diagnosed mass on ultrasound with parents in their 18-month old child. It was challenging because we/I wasn't 100% sure what the mass was and needed more imagining. The hard parts were the emotions, the family questions regarding prognosis which I didn't know because [we] didn't know diagnosis” - Trainee, male, 32 years*

Similarly, explaining the hard-to-describe and uncertain risks of radiation can pose particular challenges for radiologic clinicians.

*“Challenging conversations was one I had with a pregnant patient in the 3<sup>rd</sup> trimester who needed a chest x-ray. While I tried to explain the low risk to the fetus, the mother demanded very specific information regarding her ‘absolute risk’ and the ‘absolute risk to the fetus.’ I felt very tired by the vague language I am required to use because we*

*don't know the risks. The patient would end up getting the exam but I think she did it begrudgingly and without confidence in me as a doctor.” –Trainee, male, 29 years*

### *3.2.5 Interprofessional Teamwork*

Participants highlighted challenges related to teamwork and interprofessional collaboration, such as coordinating with medical interpreters in the case of language differences, coordinating with referring clinicians in the case of discovery of positive findings, telephone communication, or accessing needed psychosocial support services.

*“Sometimes, as interpreters, we don't know what the situation is until we start interpreting. It would be very helpful if doctors/nurses could give us prior information ... so we can be prepared for a difficult [radiologic] situation.” –Interpreter, female, 39 years*

*“The most difficult scenarios are when I am with the patient and the referring physician gives the results that are significant over the phone”- Technologist, female, 32 years*

Other participants emphasized the importance of having available psychosocial resources when the communication of bad news goes beyond the clinicians' expertise.

*“Recently I met with a family of a 21-year old female who had debilitating lower tract symptoms and rule out urinary tract infection (UTI). On imaging a mass was noted in the bladder. The diagnosis was revealed to the family while they waited during CAT scan. The challenges included a lack of time, space, and resources to educate and comfort the family in the moment.” –Nurse, female, 54 years*

## **4. Discussion and Conclusion**

### *4.1 Discussion*

Interpersonal and communication skills are now recognized as essential competencies for radiologists and crucial components of optimal patient-centered radiologic care [27].

Narratives in this study revealed the nature of difficult conversations as experienced by radiologic practitioners and the scope of necessary communicative competencies to support patient-centered radiologic care. Radiologic practitioners faced challenges related to conveying serious news, distress associated with clinical uncertainty despite state-of-the-art radiologic procedures, expanded communicative role expectations and responsibilities, interprofessional teamwork, and lack of adequate communication and relational education. They described situations where they were called upon to convey and confirm serious findings, discuss clinical matters outside the bounds of their expertise with patients in need of information, manage uncertainty when discussing particular diagnoses or radiation risks, and coordinate with other healthcare professionals.

Radiologic practitioners bear substantial responsibility and burden associated with these conversations; yet, many remain ill-prepared or/and uncomfortable engaging interpersonally [3]. The narratives revealed particular challenges and vulnerabilities experienced by radiologic practitioners. The conversations between radiologists and their patients can be uniquely challenging when significant or unexpected findings must be shared based on the results of radiologic tests, especially in the context of typically brief interactions without the benefit of previous therapeutic relationship. Radiologists, not unlike other subspecialists in high-technology fields, such as cardiology and surgery, often choose their careers because of the appeal of medicine, science and technology. The emotional, interpersonal and ethical demands of such challenging conversations may go beyond what some practitioners are prepared to undertake [28]. The professional and market forces that currently propel the expanded scope of radiologic practice may, frankly, be welcomed by

some but spurned by others [29,30]. Previous studies in primary care have highlighted how redefining clinicians' scope of practice can be a time when challenges and opportunities are confronted [31]. Some participants described tensions and insecurities associated with changing role expectations for radiologic practitioners to embrace direct patient communication, whereas others experienced the opportunity as a source of professional satisfaction and pride. In either case, the results suggest that inexperience and gaps in education can bedevil practitioners, leaving them feeling ill equipped for high-stakes conversations with patients.

Radiologists have historically communicated their findings through written reports or via referring physicians who then hold the direct conversations with patients [32]. Paradoxically, when radiologists are called upon to communicate with patients and families, it tends to be under emotionally intense circumstances such as radiologic confirmation of serious findings or disclosure of medical errors that can have negative implications on treatment and prognosis. Radiologists have therefore mainly remained "in the shadows" but been held in reserve for the "most" difficult conversations [33]. Thus, many diagnostic radiologists have limited experience with direct communication with patients. Given such circumstances, it is little wonder why radiologic practitioners may be reluctant to embrace patient-centered radiology, particularly if it means more communication, without more training and resources.

Another challenge that emerged from the narratives was related to the communication and management of clinical uncertainty. The discussion of clinical uncertainty with patients has been identified as a difficult task across different clinical fields [34]. In the radiologic context, expectations may be unrealistically high for radiologic procedures and practitioners to provide immediate diagnostic certainty. Circumstances that fall short of patients' expectations can sometimes lead to disappointment, frustration, misunderstandings and heightened anxiety. Clinicians can foster trust and reduce patient and staff anxiety when they confront their own

emotional reaction to uncertainty, learn how to effectively communicate uncertainty to their patients, and use an effective interdisciplinary team approach [34].

Along with greater involvement in direct patient communication comes the challenge of coordinating as a team with other professionals when communicating bad news. As suggested by Fathai et al., [35] one of the challenges radiologists experience is communication with referring clinicians who are dependent upon their results. Our findings highlighted how broad this challenge is, as it includes communication and coordination with different healthcare professionals such as interpreters, referring physicians and psychosocial professionals.

If radiology as a field is to emerge successfully from the shadows and engage more directly with patients and their families, the current findings support the need for broad, problem-focused, interdisciplinary, practice-based communication and relational skills educational curricula. Over the last decade, several post-graduate training programs have been developed to enhance clinicians' communication skills in several settings [36-38]. Although most programs share an experiential pedagogy and employ simulations, programs differ with respect to training format, length, type of simulations, debriefing style, and specific learning goals and values. Interdisciplinary, simulation-based curricula such as the Program to Enhance Relational and Communication Skills (PERCS) hold promise to address pressing educational needs as identified by radiologic practitioners. After the training, radiologists reported increased sense of willingness to engage in challenging conversations and enhanced comfort [1]. The provision of realistic case scenarios to practice within safe learning environments fosters reflective practice, collaborative debriefing, and builds confidence and preparedness [18,37]. The opportunity for radiologists, technologists and nurses to learn from each other, and to share experiences is rare, and may be especially valuable given the history of relatively isolated practice and growing need for interprofessional teamwork.



Several limitations of this study warrant consideration. Only half of the workshop participants completed narratives, although demographic characteristics did not differ significantly from non-responders. Data were collected within one tertiary care pediatric academic institution and, thus, generalizability to other contexts may be limited, although participants hailed from several national programs and from a range of roles within radiology, adding to the transferability and confirmability of the findings [26]. The PERCS interprofessional educational pedagogy precluded the ability to draw more specific conclusions about particular professional subgroups. Some participants were required to attend the workshops, whereas others attended voluntarily. Member checking of our findings with study participants was not possible given that narratives were collected anonymously. The narratives were handwritten by participants and may have been more truncated in nature than had the data been collected as interviews.

#### *4.2 Conclusion*

As the field of radiology matures to become patient-centered and value driven, practitioners face growing expectations and opportunities to emerge from behind the shadows and claim their rightful place in conversations with patients and families. Radiologic practitioners face substantial communicative challenges focused on conveying serious, unexpected and uncertain findings and interprofessional teamwork amid limited educational offerings. Well designed educational curricula, based on the needs identified by radiologic practitioners themselves, hold promise to - address these challenges and build radiologic practitioners' sense of capability and confidence to accompany patients at their time of greatest need.

#### *4.3 Practice Implications*

At a time of cultural and professional change, these findings suggest that radiologic professionals should be educated and supported to directly communicate with patients. Varied learning opportunities will be necessary for radiologic practitioners to master the array of requisite skills for the full spectrum of patient-related communication. Educational curricula that incorporate relevant realistic case scenarios - conveying serious and unexpected diagnoses, managing uncertainty despite state-of-the-art radiologic procedures, and functioning as interprofessional teams- can impart essential skills that broaden radiologic practitioners' communicative and relational repertoire to best meet the needs of patients and support professional role development.

## **Acknowledgements**

The authors wish to thank the participants and actors of the “Program to Enhance Relational and Communication Skills” workshops. This work was funded in part by a grant from the Radiological Society of North America.

## References

- [1] J.N. Itri, Patient-centered radiology, *RSNA RadioGraphics*. 35 (2015) 1835-1846.
- [2] J.S. Swan, P.V. Pandharipande, G.M. Salazar, Developing a patient-centered radiology process model, *J Am Coll Radiol*. 13 (2016) 510-6.
- [3] D.D. Brown, M.L. Callahan , D.M. Browning et al., Radiology trainees' comfort with difficult conversations and attitudes about error disclosure: Effect of a communication skills workshop, *J Am Coll Radiol*. 11( 2014) 781-787.
- [4] S.D. Brown, C.D. Lehman , R.D. Truog, et al., Stepping out further from the shadows: disclosure of harmful radiologic errors to patients, *Radiology*. 262 (2012) 381-6.
- [5] L. Berlin, Communicating results of all outpatient radiologic examinations directly to patients: the time has come, *Am J Roentgenol*. 192 (2009) 571-3.
- [6] J.A. Patti, 2013 ACR presidential address: A personal view on the future of radiology. *J Am Coll Radiol*. 10 (2013) 665-71.
- [7] J.N. Smith, R.B. Gunderman, Should we inform patients of radiology results?, *Radiology*. 255 (2010) 317-21.
- [8] P. Miller, R Gunderman, J Lightburn, D Miller, Enhancing patients' experiences in radiology: through patient-radiologist interaction, *Acad Radiology*. 20 (2013) 778-81.
- [9] B.I. Reiner, Strategies for radiology reporting and communication. Part 1: challenges and heightened expectations, *J Digit Imaging*. 26 (2013) 610-3.
- [10] B.I. Reiner, Strategies for radiology reporting and communication Part 3: patient communication and education, *J Digit Imaging*. 26 (2013) 995-1000.
- [11] N. Koney, A. Roudenko, M. Ro, S. Bahl, A. Kagen, Patients want to meet with imaging experts, *J Am Coll Radiol*. 13 (2016) 465-70. doi: 10.1016/j.jacr.2015.11.011. Epub 2016 Feb 5.
- [12] D.D. Adler, M.B. Riba, S. Eggly, Breaking bad news in the breast imaging setting, *Acad Radiology*. 16 (2009) 130-5.

- [13] S. Winner, Exposed, *Ann Intern Med.* 154 (2011) 503-4.
- [14] D. Luff, S. Fernandes, A. Soman, E.C. Meyer, S.D. Brown, The influence of communication and relational education on radiologists' early posttraining practice, *J Am Coll Radiol.* 13 (2016) 445-8.
- [15] M.S. Knowles, E.F. Holton, R.A. Swanson, *The Adult Learner*, 8th Edition, Routledge, New York, 2015.
- [16] S. B. Merriam & L.L Bierema, *Adult Learning Theory: Linking Theory and Practice*, Josey-Bass, New York, 2013.
- [17] R.B. Gunderman, B.P. Brown, Teaching interpersonal and communication skills, *Acad Radiology.* 19 (2012) 1589-90.
- [18] G. Lamiani, E.C. Meyer, D. Leone, et al., Cross-cultural adaptation of an innovative approach to learning about difficult conversations in healthcare, *Med Teach.* 33(2011) e57-e64.
- [19] R.E. Boyatzis, *Transforming qualitative information: thematic analysis and code development*, Sage Publications, Los Angeles, 1998.
- [20] G. Guest, K.M. MacQueen, E.E. Namey, *Applied thematic analysis*, Sage Publications, Los Angeles, 2012.
- [21] C. Pope, S Ziebland, N Mays, Qualitative research in health care. Analysing qualitative data, *BMJ.* 320 (2000) 114-6.
- [22] J. Fereday, E. Muir-Cochrane, Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development, *Int J Qual Methods.* 5 (2006) 1-11
- [23] MJ Halsted, L. Perry, J.M.Racadio, L.S. Medina, T. LeMaster, Changing radiology resident education to meet today's and tomorrow's needs, *J Am Coll Radiol.* 1 (2004) 671-8.

- [24] D.B. Waisel, G. Lamiani, N.L. Sandroock, et al., Anesthesiology trainees face ethical, practical, and relational challenges in obtaining informed consent, *Anesthesiology*. 110 (2009) 480-6.
- [25] D. Brodsky, G. Lamiani, O. Andrade, V. Johnson, D. Luff, E.C. Meyer, Memorable conversations in neonatal intensive care: a qualitative analysis of interprofessional provider perspectives, *J Nurs Educ Pract*. 4 (2014) 38-48.
- [26] Y.S. Lincoln & E.G. Guba, *Naturalistic Inquiry*, Sage Publications, Newbury Park CA, 1985.
- [27] K.H. Vydareny, E.S. Amis, G.J. Becker, et al., Diagnostic Radiology Milestones, *J Grad Med Educ*. 5 (2013) 74-78.
- [28] S.D. Brown, The intersection of ethics and communication in prenatal imaging: challenges for the pediatric radiologist, *Pediatr Radiol*. 40 (2010) 514-7.
- [29] A.L. Hryhorczuk, K. Hanneman, R.L. Eisenberg, E.C. Meyer, S.D. Brown, Radiologic professionalism in modern health care, *Radiographics*.35 (2015) 1779-1788.
- [30] S. Jha, Communicating results directly to patients: Don't ignore the price tag of this added value, *Acad Radiol*. 19 (2012) 643-5.
- [31] M. Laurant, D. Reeves, R. Hermens, J. Braspenning, R. Grol, B. Sibbald, Substitution of doctors by nurses in primary care, *Cochrane Database Syst Rev*. 18 (2005) CD001271.
- [32] M.A. Bruno et al, The "Open Letter": Radiologists' reports in the era of patient web portals, *J Am Coll Radiol*. 11 (2014) 863-7.
- [33] J.A. Ruiz, G.M. Glazer, The state of radiology in 2006: very high spatial resolution but poor visibility. *Radiology*. 241(2006)11-16.
- [34] S. Parvez, K. Abdel-Kader, M.K. Song, M. Unruh, Conveying uncertainty in prognosis to patients with ESRD, *Blood Purif*. 39 (2015) 58-64.
- [35] N. Fatahi, F. Krupic, M. Hellström, Quality of radiologists' communication with other clinicians--As experienced by radiologists, *Patient Educ Couns*. 98 (2015) 722-7.

- [36] A.L. Back, R.M. Arnold, W.F. Baile, et al., Efficacy of communication skills training for giving bad news and discussing transitions to palliative care, *Arch Intern Med.* 12 (2007) 453-60.
- [37] E.C. Meyer, D.E. Sellers, D.M. Browning, K. McGuffie, M.Z. Solomon, R.D. Truog, Difficult conversations: improving communication skills and relational abilities in health care, *Pediatr Crit Care Med.* 10 (2009) 352-9.
- [38] J.B. Brown, M. Boles, J.P. Mullooly, W. Levinson, Effect of clinician communication skills training on patient satisfaction. A randomized, controlled trial, *Ann Intern Med.* 7 (1999) 822-9.

**Table 1. Demographic characteristics of PERCS-Radiology participants\***

<b>Demographic characteristics</b>	<b>All participants (n=182)**</b>	<b>Participants who completed narratives (n= 92)</b>	<b>Participants who did not complete narratives (n= 90)</b>
<b>Discipline</b>			
Radiologist in training	109 (61%)	55 (60%)	54 (61%)
Radiologist in practice	24 (13%)	12 (13%)	12 (14%)
Non-radiologist physician	8 (4%)	6 (7%)	2 (2%)
Technologist	19 (11%)	8 (9%)	11 (12%)
Nurse	8 (4%)	5 (6%)	3 (3%)
Medical interpreter	10 (5%)	3 (3%)	7 (8%)
Other	2 (2%)	2 (2%)	-
Valid N	180 (100%)	91 (100%)	89 (100%)
<b>Gender</b>			
Male	95 (53%)	44 (49%)	51 (57%)
Female	84 (47%)	46 (51%)	38 (43%)
Valid N	179 (100%)	90 (100%)	89 (100%)
<b>Age</b>			
Mean (SD; range)	36.89 (10.48; 25-77)	36.47 (10.19; 27-77)	37.31 (10.80; 25-71)
Valid N	180	91	89
<b>Years of experience since earning the degree</b>			
Mean (SD; range)	9.25 (10.67; 1-53)	8.78 (10.05; 1-53)	9.74 (11.32; 2-46)
Valid N	176	90	86
<b>Ethnicity</b>			
White	126 (72%)	64 (71%)	62 (72%)
Black or African American	7 (4%)	1 (1%)	6 (7%)
Asian or Pacific Islander	31 (18%)	20 (22%)	11 (13%)
Mixed racial background	6 (3%)	2 (2%)	4 (5%)
Other	6 (3%)	3 (4%)	3 (3%)
Valid N	176 (100%)	90 (100%)	86 (100%)
<b>Previous learning opportunities ♦</b>			
Practicum experience	74 (41%)	43 (47%)	31 (35%)
Coursework	86 (47%)	46 (50%)	40 (45%)
Residency	57 (31%)	26 (28%)	31 (35%)
Simulation training with actors	90 (50%)	47 (51%)	43 (48%)
Continuing education	37 (20%)	18 (20%)	19 (21%)

\* Chi-square and t-tests did not show any statistical difference between demographic characteristics of participants who did and did not complete the narratives.

\*\* of these participants, 2 did not complete the demographic information.

♦ Participants could check more than one answer