The Radiology Report of the Future

The radiology report, now entering its 2nd century of existence, is the major product of our specialty. Like all products, it must change and evolve over time. I foresee two major changes, both of which should benefit radiology, medicine, and patients. Most importantly, our reports, or the information in them, will become more patient centered: increasingly directed toward and transmitted to our patients. This is in keeping with the trend toward patient empowerment throughout medicine and the recognition that patients are our primary customers and the ultimate payers for our services. This change will better recognize and emphasize our responsibilities as the patient’s doctor, in addition to our more traditional role as the doctor’s doctor. The second change in radiology reports will be a more structured organization and standardized language. This will facilitate data mining, offer a more quantitative approach to quality control, be more uniform and user friendly for clinicians reading the reports, and, hopefully, reduce errors by interpreting radiologists. Breast image reporting has been in the vanguard of both of these changes, with standards for patient communication mandated by the 1992 Mammography Quality Standards Act (MQSA) and more standardized reports resulting from use of the Breast Imaging Reporting and Data System (BI-RADS) reporting format and lexicon (1,2).

Greater sharing of information with patients is one of the major changes in the doctor-patient relationship that I have witnessed during my 5-decade professional career. Patient-centered care, patient partnership in decision making, and patient-doctor transparency are new buzzwords in medicine. These sociologic changes are reflected in the federal Health Insurance Portability and Accountability Act (HIPAA) of 1996, which requires that patients be able to see and obtain copies of their medical records; in state-sponsored lists of complication rates of hospitals and surgeons; in medical society-sponsored listings of medical-legal suits against individual physicians; in Internet sites and patient blogs featuring comments about physicians; and, in the case of my own medical center, a blog by our chief executive officer that discusses a wide range of institutional matters, including errors in patient care. Dellmanco (3) and Slack (4) have emphasized that patients are perhaps the largest and least-used resource in medicine and need to be viewed more as physician colleagues or even coauthors of their medical records. This new patient-physician relationship includes shared information, shared decision making, and even shared responsibility. As pointed out by Slack (4), “Perhaps the more we welcome our patients as colleagues, and the more they participate in medical decisions, the more they will share with us the responsibility from these decisions, and the more physicians will be free of the inappropriate liability that accompanies medical paternalism.”

As observed by Chiaramonte (5) “A truly empowered patient is the ideal patient. Empowered patients will challenge us, yes, but they will also take their medicine and go for their tests. They will ask when they don’t understand…. And most important, they will be more likely to get well....” In radiology, this empowerment and transparency translates primarily into our facilitating patients’ access to their imaging reports or the information in those reports. An example is the potentially important incidental finding noted on an imaging study ordered by a consulting specialist or in the emergency setting. Although reported to the requesting phy-
sician, this finding may never be communicated to the primary care physician—or, perhaps, the patient has no family doctor. Lack of communication of such a finding is a quality assurance and medical-legal issue that has long plagued medicine. The patient, or his or her designated surrogate who has been given access to the report, has a singular interest in this information, which may help in preventing such information from falling through the cracks of our often labyrinthine health care system.

Of course, most medical records are legally available to patients through HIPAA, but, unless a hospital has a specific Web site for this purpose, the records are rarely accessed by patients in a timely fashion because of the relatively costly and time-consuming process of having them located and copied. My own medical center was one of the first to address this situation through the creation of a secure patient Web site. I am periodically reminded of this when a patient writes, phones, or e-mails regarding a recent radiology report, pointing out some error in the history, questioning a finding, or, most often, thanking me for discovering something on their screening mammogram.

Another example of patient empowerment is the personally controlled health record (PCHR), which has been recently introduced by Dossia, a non-profit consortium of employers, as well as by Google (Mountain View, Calif) and Microsoft (Redmond, Wash) (6,7). These free sites allow patients to store, manage, and organize their medical information, often collected from multiple locations. My own medical center has recently been linked to one of these consumer medical record services, allowing patients to securely download their health care information, which can then be selectively shared with persons or institutions outside our system, such as a remote emergency room, a walk-in clinic, a pharmacy, a specialist’s office, a researcher, or a relative. These records include all radiology reports and in the future will probably contain selected digital images that are part of those reports. The PCHR is particularly applicable to well-educated, computer-savvy outpatients, who represent an increasing proportion of the imaging customer base. They could be increasingly important in the United States because of our decentralized health care system, decline in the number of primary care physicians (8,9), and the avowed support of electronic medical records by the Obama administration. Of course, stewardship of one’s own health care data raises many issues, including security and the fact that these third-party sites are not currently protected by HIPAA (6,7).

The medical profession has increasingly become a business, and, as noted above, in the business model the major product of radiology is our report. Some will object to this emphasis on reports, believing that this leads to the commoditization of our specialty, but the fact is that with the advent of teleradiology, our reports, rather than our direct communications with referring clinicians, are more important than ever. Obviously, radiologists need to periodically review their reports and the satisfaction of the customers to whom this information is directed. Who are these customers, and who owns our reports and pays for them? Referring physicians? Third-party payers? Patients? As outlined above, I believe that patients will, and should, gradually assume greater importance for radiologists, with insurance providers and even referring doctors being viewed a bit more as middlepersons, crucially important but nonetheless intermediaries from the viewpoint of overall health care. Unlike the consultations of almost all other specialists, including those of clinicians who perform and interpret imaging studies in their offices, the report of the radiologist is, customarily, exclusively directed toward other physicians. The patient can too easily become an outsider in this process, rarely in communication with the radiologist. In fact, some patients are not aware of our existence, much less our contributions to their health care. Even the language of our report, including its medical jargon, is geared toward other physicians. In summary, if radiologists wish to be viewed and treated as consulting specialists, then our reports need to be more directed toward our patients.

The radiology community is certainly aware of the need for better communication with patients. The past president of the American College of Radiology (ACR), Dr Borgstede, emphasized the need for radiologists to “embrace the perspective of patient primacy” (10), and for several years the Radiological Society of North America (RSNA) has offered a refresher course at its annual meeting entitled “Patient-centered Radiology: Use It or Lose It.” One model for radiologist-patient interaction is that used by breast imagers. All women undergoing screening mammography in the United States receive their reports by mail, albeit through form letters rather than actual reports, and the results of all diagnostic mammographic and ultrasonographic (US) examinations are discussed directly with these women prior to their leaving the department or office. The implementation of these MQSA mandates has almost eliminated failure of communication in medical malpractice lawsuits involving mammography (11). This federal law was originally developed in part because mammographic screening was being performed in self-referred women without a requesting physician or primary care contact, a scenario that could become more common with the diminution of the number of primary care physicians in the United States (8,9). It seems unfortunate, and perhaps even inappropriate, to me as a breast imager that most of my radiologist colleagues rarely convey results directly or indirectly to their patients, even when those patients are being evaluated for a known or potentially serious condition. Almost no other medical specialist “sees” a patient in consultation but does not communicate with that individual. The ACR Practice Guidelines recognize the responsibilities of radiologists to directly communicate with patients, but only in certain circumstances: “regardless of the source of the referral, the diagnostic imager has an ethical responsibility to ensure communication of unsuspected or serious findings to the patient” (11,12). This subject has been sagely summarized in an article by Berlin (11): “should radiologists communicate the findings of all radiologic examinations directly to patients? The courts have for many years espoused such action, the federal government has mandated it for mammography,
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Various professional organizations including but not limited to the ACR have encouraged it under certain circumstances... and last but not least the public seems to demand it.” A more recent article, also by Berlin (13), reviews recent court decisions and more emphatically concludes that radiologists have a medical-legal duty to directly communicate with patients.

I believe that any patients who specify their wish to receive their radiology reports and who have signed off on this desire with their physician(s) should have this information, in some form, conveyed directly to them rather than simply be available on request. There are many obstacles to this proposal, but most of these have already been addressed and resolved during the implementation of the MQSA mandates. Initially, such a policy would probably be put into practice by individual hospitals, but eventually it might be mandated on a state or federal level. These requirements would presumably be applicable to imaging studies performed and interpreted by nonradiologists. Conveying reports directly to patients might be less applicable to inpatients but could include patient surrogates. As is the case with screening mammographic letters, there would be an appropriate delay to allow the ordering physician or other health care worker time for review. An expeditious way for radiologists to convey this information to appropriate patients might be to send it through an automatically generated e-mail linked to a secure institutional Web site. An advantage of e-mail communication is that it creates an auditible trail, but it might also be less secure. Reports might contain a standardized statement that this information was being made available to the patient as well as to the referring physician. Perhaps only the impression would be made available to the patient, with radiologists tempering this portion of the report with less medical jargon. However, it is naive to think that those patients requesting this information would not be able to rationally assimilate it, as has been the experience in my own institution during the many years that reports have been directly available to patients (4,14).

In the past, referring physicians have sometimes objected to radiologists relating more directly to patients. I vividly recall performing obstetric US examinations a generation ago when a few paternalistic obstetricians vehemently objected to radiologists discussing results with their patients, even when it was manifestly clear to the patient at the time of the examination that the fetus was in trouble. However, times have changed, and virtually all physicians now welcome consulting specialists, including radiologists, discussing their findings, good or bad, with patients. Over the past decade, I am unaware of a single referring clinician objecting to my doing this in breast imaging.

The second major change in radiology reports will be more structured organization of content and standardized language (15). These changes have been championed by many groups, including the Structured Reporting and the RadLex Steering Committees of the RSNA, and structured software programs are constantly being developed and improved by vendors. Structured formats are distinguished by standardized templates, usually with subheadings referable to each organ system or anatomic area, as compared with the more traditional narrative or free-text sentence style. More structured reporting is the norm in breast imaging (2), obstetric US, and oncologic imaging and is used almost exclusively by cardiologists, in part because of their need to present quantitative measurements. Standardized reports can also facilitate drawing attention to critical or incidental findings, as is the norm with abnormal laboratory data, through underlining or highlighting.

Many of our clinical colleagues prefer a standardized or itemized imaging report for complicated examinations because they believe pertinent information is less apt to be omitted by the radiologist or go unappreciated by the reader when perusing a lengthy narrative report (16). Structured reports will also help radiologists meet physician performance measures being developed by the Centers for Medicare and Medicaid Services. The Physician Quality Reporting Initiative (PQRI) currently directs that imaging reports record such items as fluoroscopic times, elapsed time from hospital admission to emergent computed tomography (CT) and magnetic resonance (MR) imaging in patients with stroke, the diameter of distal internal carotid arteries at vascular imaging of the neck, the type and timing of procedure-related antibiotic prophylaxis, the number of “inappropriate” BI-RADS category 3 assessments for screening mammograms, and for CT and MR imaging examinations a specific comparison with recent similar studies. These currently voluntary pay-for-performance PQRs, now in their 3rd year of development, will eventually be required for reimbursement or incentive compensation.

There is also a growing consensus in the radiology community about the advantages of structured reports, although this comes with the important caveat that their use not result in a delay of examination throughput (17). The potential decrease in productivity with the use of structured formats results in part from radiologists not keeping their eyes on the images while assessing templates. This eye-dwell problem is particularly difficult for radiologists without integrated information systems that can facilitate voice activated “talking” templates and macros, the latter of which measure in the thousands in some departments. Unfortunately, the complicated report, for which a structured lexicon might be most useful, may currently require many hierarchical menus, keyboard commands, and mouse clicks. Increasing specialization within radiology will help to alleviate this problem by limiting the number of templates and macros with which each specialist must be familiar.

A uniform radiologic lexicon has the potential to improve patient care, data mining, audits, peer review, outcome assessments, and medical education across a wide range of medical specialties. For example, the radiology lexicon RadLex (18) can unify and supplement terms in other lexicons, including BI-RADS, the ACR index, the Systematized Nomenclature of Medicine, the Unified Medical Language System, the Fleischner Society Glossary, and Digital Imaging and Communications in Medicine (15). A simple example of a data-mining problem arising from lack of standardized lexicons is the identical meaning of the terms “renal calculi” and “kidney stones.”
The use of BI-RADS (2) in mammography is an example of the widespread implementation of both a structured report and a standardized lexicon. This immensely successful program was developed, and is periodically updated, by a multidisciplinary group of physicians. Concise and unambiguous impressions are mandated by the six standard final assessment codes. These codes have permitted the assessment and comparison of statistics from individual readers and groups both nationally and internationally. These data include screening recalls, biopsies, positive predictive values, and the impact of the introduction of computer-assisted detection programs and digital mammography. The BI-RADS system has now been adapted to breast US and breast magnetic resonance imaging and will almost certainly have a profound effect on the consistency and clarity of these reports.

I should add that although I am an advocate of more standardized reports and lexicons in radiology, it is clear that these changes will not come easily. It is difficult to mandate language and syntax, and optimal communication remains in the eye of the beholder. For instance, the simple BI-RADS final assessment “no evidence of malignancy” contains no verb, and, although many of us view this lack of “verbiage” as conveying information more expeditiously, there are others who are offended by the grammatical incorrectness. My own strongly held report prejudice includes a very short impression that never contains or repeats any description terms (19).

Of course, there will be other future changes in reporting, many expedited by computers and digitization. These include improved communication with clinicians, particularly as regards important or incidental findings, and an increased use of selected annotated images to supplement the written report. Voice recognition will improve turnaround times but should have little effect on our actual reports.

In conclusion, radiology reports in the future will be more patient directed and more structured and standardized; all of these “improvements” have been successfully introduced in breast imaging, which should serve as a model for future changes.

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References