Implications of Direct Patient Online Access to Radiology Reports Through Patient Web Portals

Christoph I. Lee, MD, MSHS\textsuperscript{a,b}, Curtis P. Langlotz, MD, PhD\textsuperscript{c}, Joann G. Elmore, MD, MPH\textsuperscript{d,e}

Abstract
In an era of increasing health information transparency and informed decision making, more patients are being provided with direct online access to their medical records, including radiology reports, via web-based portals. Although radiologists’ narrative reports have previously been the purview of referring physicians, patients are now reading these on their own. Many potential benefits may result from patients reviewing their radiology reports, including improvements in patients’ own understanding of their health, promotion of shared decision making and patient-physician communication, and, ultimately, improvements in patient outcomes. However, there may also be negative consequences, including confusion and anxiety among patients and longer patient-physician interactions. The rapid adoption of this new technology has led to major questions regarding ethics and professionalism for radiologists, including the following: Who is the intended audience of radiology reports? How should content be presented or worded? How will open access influence radiologists’ relationships with patients and referring physicians? What legal ramifications may arise from increased patient access? The authors describe the current practices and research findings associated with patient online access to medical records, including radiology reports, and discuss several implications of this growing trend for the radiology profession.

Key Words: Radiology reports, patient-centered radiology, patient web portal, electronic medical records

INTRODUCTION
Radiology reports, long considered the primary work product of radiologists, have traditionally served to convey information from radiologists to referring physicians. Although HIPAA reinforced patients’ rights to review medical records and request changes to them \[1\], very few patients have done so, likely because they are encumbered by processes and costs associated with requesting and obtaining paper copies of their records. For radiology examinations, patients have traditionally relied on referring physicians to communicate imaging findings. Because the use of electronic medical records is widespread and patients are seeking increased transparency in health care, radiology reports are now easily accessible and read in detail by patients via online web portals. This paradigm shift has been accelerated by federal mandates for its adoption. In 2009, the American Recovery and Reinvestment Act established financial incentives for the adoption and “meaningful use” of electronic medical records \[2\]. The goals of the federal meaningful-use program included improving care coordination, engaging patients and families, and improving health care quality and safety \[3\]. Meaningful-use...
provisions relevant to radiologists included standardizing electronic health data capture, implementing clinical decision support tools, providing health information exchange, enhancing patient self-management tools, and improving access to health data, including radiology reports [2]. The ACR estimated that 90% of radiologists were eligible for these CMS meaningful-use incentives at the start of the program, totaling up to $1.5 billion [4].

Many health systems have adopted or will soon adopt patient web portals to gain a market advantage as patients demand rapid access to their health information and more involvement in their care [5]. Patients can now use web portals to schedule appointments, refill prescriptions, e-mail health care professionals involved in their care, and review clinical notes, laboratory results, and radiology results [6-8]. Most portals send automated e-mail alerts to patients when new results are available for review. Although some allow patients to view reports only after finalization and approval by the referring physician, others also automatically allow direct access by patients after a delay of a few days to 2 weeks after a report is finalized.

The potential professional and ethical implications of this phenomenon for radiologists are broad. Greater patient access and use of reports might accelerate the movement toward more standardized report structures and simplified language to improve understanding and information transfer among all stakeholders [9-12]. Patients’ increasing access to radiology reports will present a unique opportunity for radiologists to engage patients directly, with the possibility for radiologists to serve as a patient resource in addition to physicians’ consultants. Overall, radiologists will have an additional audience reading and interpreting their reports and will need to reconsider whether certain content should be included or excluded and what new legal and ethical issues may arise from direct patient access [11]. In this article, we examine the current evidence regarding patient access to medical records and online radiology reports and discuss several important consequences that the radiology profession will have to address.

BACKGROUND

Much of the literature regarding online medical record access and its impact on patient care comes from the OpenNotes initiative [13]. This demonstration and evaluation project began in 2010, when the University of Washington’s Harborview Medical Center in Seattle, Beth Israel Deaconess Medical Center in Boston, and Geisinger Health System in Pennsylvania provided patients with online medical record access and then collected data about associated risks and benefits. In total, the OpenNotes project included 114 primary care physicians and 22,000 patients who read their primary care clinic notes online [14,15]. The results of the OpenNotes initiative were surprising. Overall, 99% of patients surveyed after 1 year wanted to keep their OpenNotes active, and 85% indicated that ready access would be an important factor for choosing a future provider or health care system [16]. Patients who reviewed their records as part of the OpenNotes initiative reported major benefits, including improved understanding of and involvement in their treatment and care management plans, as a result of open access to their medical records. Patients felt that notes reminded them of what happened during their visits and helped some face the reality of health issues [13].

The presumed patient risks at the beginning of the project included privacy concerns and increased anxiety from learning about diagnoses or misinterpreting unfamiliar terminology [13]. However, at the end of the 1-year project, patients expressed considerable enthusiasm with few concerns. In a survey of participants across the three institutions, only 12% to 16% were concerned about greater anxiety as a result of increased access [17]. In a nested cohort study of OpenNotes patients, there was no change in anxiety before and after gaining online access, with the same proportion of patients reporting privacy concerns at baseline and after the 1-year project period [18]. Moreover, bucking the suggestion of privacy concerns, 55% of patients who viewed at least one visit note wanted the option of granting family or friends online access to their visit notes, and 22% shared their visit notes with others during the study period [19].

At the beginning of the project, physicians were concerned that patients’ online access to their records would affect their workflow in a negative way. Specifically, physicians were concerned that open-access policies would lead to a flood of patient inquiries about their diagnoses and treatment plans. In actuality, there was very little change in the number of phone calls, e-mails, or additional office visits and little overall perceptible change in physician workflow after patients were given access to online clinical progress notes [14]. Moreover, physicians were pleasantly surprised by patients’ high levels of comprehension, and how few patients objected to what they had read [13].
IMPACT ON RADIOLOGY REPORTING

Patient Interest in Reading Radiology Reports

In the largest cross-sectional study of patient access to radiology reports to date, involving nearly 130,000 patients in a major health system, there was high patient interest in reading radiology reports online, with 51.2% of all patients with web portal access viewing available radiology reports compared with 34.3% of available clinical notes [20]. This high level of interest among patients is corroborated by earlier, smaller studies regarding patient preferences for obtaining radiology results. Among surveyed patients using web portals, 79% of patients reported preferring new portal-based methods of receiving results over historical methods, including directly from the referring physician [21]. Similarly, a patient focus group study found that most patients were dissatisfied with the traditional reporting of radiology results, citing delays leading to undue anxiety and stress and little detail when radiologic findings are relayed verbally by a referring physician [22].

With respect to radiology report format preferences, a study of 617 patients at one institution revealed that 64% of patients desired copies of their radiology reports, and 85% wanted to see their actual images, regardless of who provided radiologic results [23]. Moreover, most patients preferred detailed results in writing and wanted the option of accessing the full radiology reports [22].

In this consumer-driven health care environment, patients are asking for more access to their health information and more opportunities to direct their own care. From a medical ethics standpoint, increasing patient autonomy requires substantial knowledge and understanding to endorse one’s decisions and actions [22,24]. In a survey study of patients and their preferences for the timing of radiology results, most participants preferred ready access through an online patient portal, even when the results were seriously abnormal [21]. The question is how radiologists will respond and evolve to meet demands for more patient involvement in results reporting.

Developing Structured and Patient-Centric Radiology Reporting

Structured reporting is increasingly being adopted across multiple radiology disciplines [11]. Using BI-RADS® as a roadmap, a standardized lexicon and a small set of actionable conclusions are being developed for multiple organs [25,26]. These reporting standards, including the Prostate Imaging Reporting and Data System® and the Liver Imaging Reporting and Data System®, can provide consistent lesion characterization, reduce confusion among referring physicians about the level of suspicion for malignancy, and be integrated with electronic health records to automatically monitor patients requiring imaging follow-up [27,28]. The Code Abdomen system uses a similar method to track masses in abdominal solid organs [27]. However, structured reporting has shown mixed results, with little effect on referring physicians’ perceptions of report clarity [29]. Although a small study evaluating an older tool showed no appreciable improvements in accuracy or completeness of radiology reports [26,30], another study demonstrated that structured reporting can be more complete and more effective than unstructured reporting [31].

The implications of structured reporting on patient perceptions and satisfaction in an era of online web portal access remain uncertain. Will these standardized lexicons increase or reduce confusion among patients? Will patients demand lay-language summaries of radiology reports, and will radiologists spend additional time creating such summaries? To address these concerns, initial efforts, such as the University of Pennsylvania’s PORTER platform, aim to provide an automated lay-language translation of radiology reports. PORTER consists of three modules: a lay-language glossary of terms to annotate reports, a module to upload radiology report text to a database, and an interactive web-based user interface [32]. In addition to automated lay-language summaries, the use of embedded hyperlinks that define key terms within radiology reports may improve patient comprehension of radiology reports [21,29] (Fig. 1).

These innovations may supplement the radiology report itself, but most patients still express a desire to have access to all of their information. Some experimental systems provide patients with the ability to view images in addition to full radiology reports [33]. Novel image-processing modules within patient portals can provide an automated framework for organizing radiology results into information that can be both seen and read by patients [34]. These image processing modules can create a timeline of disease progression with representative images for solid tumors, use natural language processing to extract important radiology report findings, and use an interface that is navigable with imaging finding lists [34].

IMPACT ON COMMUNICATION AND RELATIONSHIPS

Changing Radiologist Workflow

As patients view their own radiology reports and even their images via web portals, the patient-radiologist relationship
may evolve to include patient-radiologist exchanges about imaging results and recommendations for additional imaging workup. Although radiologists may worry about being besieged with requests for minor edits or corrections or answering complex medical questions outside their areas of expertise, such interruptions to physician workflow rarely occurred after implementation of online patient web portals. Indeed, several major academic institutions have reported no appreciable slowdowns in radiologist workflow from patient communications after the implementation of online access to radiology reports [35].

Moreover, when patients review their own radiology reports, the benefits may be similar to open access to clinical notes: improvements in patients’ understanding of their health, promotion of shared decision making and patient-provider communication, and, ultimately, improvements in patient outcomes. One major innovation of the OpenNotes initiative was involving patients in the writing process of clinical notes in the hope of reducing physician workload through the OurNotes concept [36]. Patients were able to upload their data directly into some medical records, contributing detailed medical histories and medication lists.

For radiologic examinations, could patients provide their own histories and indications in specific clinical scenarios, such as personalized descriptions of their chronic abdominal pain and surgical histories before abdominopelvic CT scans? Would direct patient input lead to less searching of the medical records by radiologists for pertinent history and more clinically accurate radiology reports? After all, so much of a radiologist’s interpretation is directed by the history provided.

The most extreme version of the changing radiologist workflow in the era of patient portals is more face-to-face consultations between radiologists and patients, with a real-time review of images and discussion about major findings and imaging recommendations. This already occurs regularly in breast imaging because of regulatory incentives and interventional radiology, in which visit-based patient care is often provided, but other radiology subspecialties are increasingly offering direct consultation services in both inpatient and outpatient settings [37]. Face-to-face consultations in specific, clinically appropriate situations could increase radiologist engagement with patients and positively influence patients’ perceptions regarding radiologists’ role in their care.

**Changing Referring Physician–Radiologist Relations**

One barrier to direct patient-radiologist communication is the perceptions of referring physicians. In a focus-group study evaluating physicians’ views of direct patient access to radiologic test results, referring physicians were concerned that patients would not understand imaging findings, leading to greater anxiety and demands on the referring physicians’ time [38]. As the OpenNotes study demonstrated, however, the implementation of web portal access did not significantly change the level of patient anxiety related to test results [5]. In another study, about one-half of patients preferred rapid notification of their radiologic results, even if the results were very abnormal or indeterminate and they knew that their regular physicians were not immediately available to discuss the results with them [21].
Some referring physicians fear that radiologists and patients would be ill-equipped to discuss the full implications of imaging findings on patients’ treatment plans or that radiologists may not compassionately communicate sensitive results, such as a new cancer diagnosis. In turn, referring physicians would have to expend additional time clarifying patients’ confusion and/or concerns. However, there is little evidence suggesting that this would occur frequently. One study found that 86% of referring physicians experienced unchanged or decreased follow-up e-mails, telephone calls, and office visits related to patients having portal access to their imaging results [39]. Regardless, engaging referring physicians and addressing their concerns is key to the success of novel approaches for this new era in which radiologic results are directly available to patients.

**IMPACT ON QUALITY, SAFETY, AND MEDICOLEGAL RISKS**

**Impact on Quality and Safety**

Experience with OpenNotes suggests that direct online access to medical records may improve the quality and safety of care [40]. Increased patient access to medical records has helped identify important errors and reduce adverse events, and this transparency has engendered greater trust between health care professionals and patients [41,42]. Likewise, patient review of radiology reports can serve as an important safety net for detecting errors and inconsistencies and represents an untapped resource for improving patient safety [43]. Indeed, as radiologists experiment with novel ways to engage patients through online radiology reports, patients may serve as an “expert review” for quality from the patient perspective. For instance, will patients critique and improve the overall clarity of radiology reports? Can patient feedback on radiology reports, such as corrections of laterality of findings and symptoms, indication for imaging, or personal medical history, be measured (possibly by natural language processing) and serve as new metrics for quality assurance? More expansive scrutiny and criticism of notes and reports is already occurring, with more than one-fifth of patients sharing their medical records with others who could help clarify meaning, offer clinical insights, and give second opinions [36].

The very fact that more stakeholders will be reading radiology reports in detail may indirectly improve quality in radiology reporting. Radiologists may become less likely to report incidental findings of no consequence to prevent undue concern among patients. Mention of pertinent negative findings tends to be more important to patients than to referring physicians, so that practice may become more prevalent [44]. Online access will make poor-quality radiology reports more obvious, with the use of predetermined macros and report templates currently pervasive across practices. Some patients have even posted their medical reports on social media, exposing unfocused radiology reports to public scrutiny [36].

Although traditional radiology reporting has allowed radiologists to run through a catalog of findings, allowing an internal quality check for comprehensiveness, the actual clinical value in mentioning nonpertinent negatives or incidental findings in reports is debatable [45]. One imperative in improving the quality of care is to deliver services in ways that directly meet referring providers’ and also patients’ preferences and needs [46], including being concise and focused on the diagnostic question. Going forward, radiologists will have to adjust their reporting practices to meet this imperative. Although radiologists have expressed concern about nondisclosure of incidental findings because of malpractice concerns, failure to mention findings that are likely clinically insignificant is not sufficient to lead to medical liability [45].

**Impact on Medicolegal Risks**

In an increasingly litigious health care environment, open access to medical records and direct communication with patients about test results may actually decrease malpractice risks [42]. Malpractice risks are of high concern among radiologists because the radiology report may reveal discrepancies between imaging findings, clinical diagnoses, and management plans [47]. Also, unlike clinical notes, which convey temporary patient data, static radiology images can be revisited at any time with the benefit of hindsight. However, as patients become advocates for their own safety, identifying errors before they are acted upon can prevent adverse outcomes that confer malpractice risks [48]. Indeed, increased patient access to health information in general has been shown to facilitate earlier discovery and communication of errors, decreasing malpractice lawsuits [42].

For radiologists, patient access to online radiology reports may decrease the likelihood of failed follow-up due to a broken link in the chain of communication from radiologists to clinicians to patients [49,50]. The OpenNotes investigators believe that, ultimately, both patients and physicians will sign clinical progress notes. Their shared notes will become the foundation for
treatment planning and monitoring [36]. In a similar fashion, documentation of radiologists’ discussions of imaging findings and follow-up recommendations directly with patients could serve as the foundation for imaging-based disease management under a value-based health care model.

CONCLUSIONS

As patients are given direct access to online radiology reports and engage in open communication with radiologists about imaging findings and recommendations, radiologists can become more active partners in patient care. The published evidence to date suggests that the potential benefits likely outweigh the risks of providing patients with direct online access to their medical records, including their radiology reports. Ultimately, radiologists may have to stop thinking about the radiology report as their final product and, instead, start thinking about the report as a springboard for becoming more active health care partners.

Substantially more experience and evidence are needed to guide the development of radiology reports and communications in terms of content and format [51]. Future investigation should focus on how improvements in both online radiology reports and direct consultations can enhance the profession’s value proposition. Can more direct radiology-patient communications lead to efficiencies in care, including saving referring physicians’ valuable appointment time and preventing unnecessary tests and interventions by effectively communicating radiology results and recommendations? Can we demonstrate that more patient involvement in radiology reporting improves adherence to follow-up imaging recommendations for clinically significant findings? Ultimately, these efforts may demonstrate that radiologists, as patients’ consultants, help decrease waste in health care and provide greater value.

TAKE-HOME POINTS

Patients desire greater access to their radiologic examination results, including the ability to view their full radiology reports and images online.

Radiologists will have more opportunities for direct communications with patients through web portals and direct consultations, enhancing their role in patient care.

Radiologists should engage referring physicians to collectively address how more direct radiology reporting may be able to lead to improved efficiencies in care.

Patient review of radiology reports can serve as a safety net for detecting errors and inconsistencies, representing an untapped resource for radiology quality improvement, patient safety, and malpractice mitigation efforts.

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