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Strategies for Patient-Centered Communication in the Digital Age

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Recently, the major professional societies in Radiology have embarked upon a campaign to increase the patient-centeredness of Radiology. At the foundation of this initiative is direct communication between radiologist and patient, an area that has long been a deficiency for the field. Historically, there have been a number of barriers to effective radiologist-patient communication including logistical challenges, a negative impact on efficiency, and uncertainty of the role of the radiologist in discussing results with patients. The ubiquity of the internet and the wealth of applications that allow the safe transmission of robust information provide a number of opportunities for the radiologist. The purpose of this article is to review key web-based platforms that can improve communication, highlight unique initiatives being employed by thought leaders, and emphasize why radiologist-patient communication is paramount to the patient centered imaging experience.

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Introduction

The digital age has been characterized by the transition from an industrial economy to an information technology (IT) based economy. The personal computer, cellular telephone, and internet have allowed for the efficient transmission of large amounts of data across the world instantaneously. Nearly every industry has been transformed over the past 20 years due to the ubiquity of the internet. In many ways, healthcare is in a state of catch-up relative to other industries such as retail, real estate, travel, banking, entertainment, etc.[1]

Radiology as a discipline leveraged IT to revolutionize the field with the development of picture archiving and communication system (PACS), usage of voice recognition applications for dictation and implementation of teleradiology services to work remotely. Increasing imaging volumes interpreted by an efficient workforce led to a period of ultra-productivity and compensatory financial rewards.[2] However, in the more recent era of declining reimbursements and declining imaging volumes,[3] complacency could lead to further commoditization of imaging services. Concurrently, there has been a trend toward increasing patient consumerism, as patients are often now paying the first dollar for healthcare services given the rise of high deductible health plans and/or health savings accounts.[4] With patients taking increasingly active roles in their own healthcare, it is imperative for radiologists to adopt a patient-centered approach to their practice. This means that radiologists should consider the patient experience holistically, and look for opportunities to exceed patient expectations at each step along the way.[5–7]

Information is the main currency of Radiology.[8] It is what underlies the entire value chain of Radiology. As radiologists, we acquire, interpret and communicate medical imaging information. We do this for a variety of reasons: diagnosing disease, excluding disease, stratifying risk, contributing to prognosis, assessing response to therapy, etc. In the process of image interpretation, the radiologist consults the electronic health record, reviewing a patient's medical history, current symptoms and laboratory data in conjunction with the imaging findings to determine a diagnosis or likely diagnoses. As such, the radiologist possesses a wealth of relevant information that may uniquely position them to directly interact with the patient.

Historically, the radiologist has relied upon their printed report as the primary medium of communication and care delivery.[8–10] Informal in-person or telephone consultations with referring physicians have supplemented the communication process in specific instances. In general however, there has been very little meaningful communication between radiologist and patient directly.[8–10] There are a number of potential benefits that can be derived through direct radiologist-patient communication, such as reduced number of errors, decreased patient-care delays, enhanced patient compliance with recommendations, and potentially improved patient satisfaction.[8–10] This article will focus on the radiologists' role as a communicator, particularly the opportunities that are available with strategic use of IT resources to increase the "patient centeredness" of our profession through improved radiologist-patient communication.

The Patient Experience

The steps involved in a patient's experience with imaging include a physician or self-referral for an imaging study to answer a clinical question, scheduling of the study, day of study (waiting room and acquisition of images), billing, patient and/or referring physician access to radiologists' report, and treatment decision based on imaging findings.[8]

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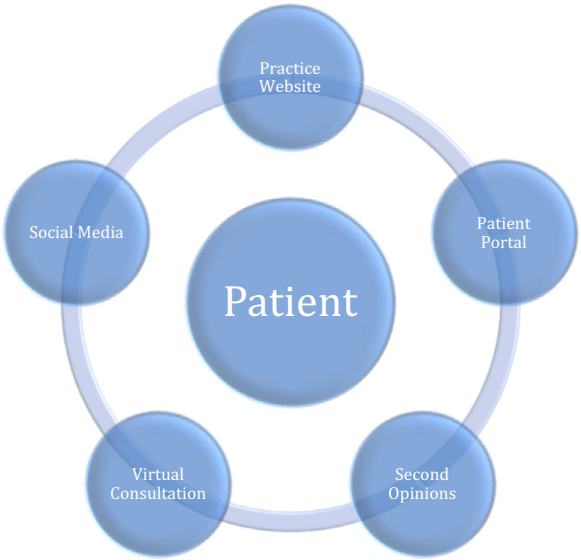

FIG 1. Complementary mechanisms to help facilitate direct radiologist-patient communication in the digital age.

Radiologist and radiologist-surrogate interaction with patients should strive to be comprehensive, with opportunities to connect at all steps of the aforementioned work flow.[7] Prior to delving into IT based strategies to communicate with patients, it is important to recognize that effective digital communication with patients and providers does not supersede the traditional encounter that occurs when radiology service is delivered. Specifically, every member of an imaging care delivery team such as a patient scheduler, receptionist, radiology technologist, radiology nurse should be invested in the patient centered service delivery model. While outside the scope of this particular article, a number of prior papers have emphasized the importance of these interactions in overall patient perception of the imaging experience.[11] The physical delivery of the service and the information component conveyed in person and in the digital world are increasingly interdependent. The information component truly wraps around the physical component of the service being delivered.[7]

A number of prior studies have demonstrated that patients indicate a preference to be able to communicate directly with imaging experts.[12–16] In some subspecialties of Radiology, such as breast imaging, it is relatively common for radiologist to directly convey results and address concerns with patients.[5] Unfortunately, in most care settings outside of breast imaging, this dialogue is uncommon.[5] While there are a variety of modes of communication that could take place between patient and radiologist, perhaps the most logistically feasible mechanisms take place via digital platforms. The ability of practices to strategically harness these available resources will dictate in part the success or failure of Radiology's transition to patient-centered imaging (Fig 1).

The Practice Website

Interaction with patients online should be considered as part of the radiology service encounter.[7] A practice's website is often a first point of contact between patient and practice. A well-designed website should contain reliable information written in clear language that is comprehensible to the general public, provide useful tools to the patient, and enhance the overall imaging experience.[7, 17, 18] Prior to scheduling an imaging exam, patient may visit multiple practice websites seeking information. There are a number of key components of a successful radiology practice website that have been previously identified and are summarized in Table 1.[18]

Johnson et al. found that majority of the largest practices in the country are deficient in many of these areas.[18] Specifically, less than 20% of practice groups provided patients with the ability to: schedule appointments, access reports, access images, review patient satisfaction scores, estimate imaging costs or view the webpage in languages other than English.[18]

Certain elements of a successful radiology practice website may be beyond the scale of small groups with limited resources. Fortunately, there are some publicly available resources that radiology practices can link to, in order to provide their patients with the information they seek. Specifically, RadiologyInfo.Org, a joint endeavor by the Radiological Society of North America and the American College of Radiology provides patient-tailored expert information in a multimedia format.[19] There are easy to understand relative-radiation charts for different types of studies, benefits and risks of specific procedures, detailed descriptions of how to prepare and what to expect on the day of imaging, and a large library of patient-focused videos pertaining to symptoms, imaging tests, and disease processes. The safety section of this website may be particularly relevant to patients worried about radiation dose, Nuclear Medicine or Interventional procedures, contrast safety, special considerations in the setting of pregnancy, and pediatric considerations. Rather than attempting to recreate some of this information, embedded links to Radiologyinfo.org, can serve as an effective way to meet patients' needs without requiring a large time or capital expenditure.

Along the same lines, the University of Texas at Houston, Department of Diagnostic and Interventional Imaging maintains a robust public forum, which allows patients to ask general or specific imaging related questions to radiologists.[20] Subspecialty trained radiologists answer these questions under their tab "Ask an Imaging Expert."

TABLE 1
Key features of practice websites and social media presence

Practice website	Facebook	Twitter
Provide robust information regarding radiologists' qualifications	Allows a radiology practice to control their brand	Efficient mechanism for high volume brief communication
Display pertinent information related to specific imaging examinations including radiation dose related information	Platform for marketing services and patient specific targeted advertising	Provide links or embedded photos, videos or direct traffic to relevant articles
Interactive tools to schedule appointments	Forum for interacting with patients	Large medically oriented audience
Ability to download and/or submit necessary forms	Raise public awareness about services and improve visibility of group	Allows groups to interact with one another and other medical colleagues
Offer mechanism for online bill-pay	Allows patients to interact with one another	Made for mobile access
Provide tools to estimate patients' costs	Provides possibly greater reach than a group's website	Allows groups to listen to patient's needs, engage with patient advocates
Opportunity for patients to provide feedback and/or ask questions	Mechanism for on-going patient engagement via organized campaigns	Mechanism for on-going patient engagement via organized campaigns
Display patient satisfaction scores	Display patient satisfaction scores	Highlight new research or community service
Link to patient portal	Highlight new research or community service	Hashtags allow for cataloguing of information
Link to social media	Link to practice's website	Link to practice's website or Facebook page

While this model may not be feasible for smaller radiology practices, similar platforms either via public or private feedback mechanisms could be instituted by larger private or academic groups.

Social Media Presence

Social media presence in healthcare is rapidly becoming the norm rather than the exception. Patients are increasingly searching for their physicians on Google, patient rating sites, and social media platforms.[21, 22] Social media presents an opportunity for organizations, professional societies and individual radiologists to achieve the functions summarized in Table 1.

Facebook is now part of the patient experience and is a multidirectional mode of rich communication.[21, 23, 24] As of 2018, Facebook has the largest user base of all social media platforms.[25] A group's Facebook page complements a practice website, and can be used to drive traffic to the website or vice versa. Perhaps the central benefit of a Facebook presence is the opportunity to efficiently disseminate robust multimedia content to a large user base on a regular basis. This allows a group to stay in touch with their patients, listen and/or respond to patient concerns and/or complaints and engage patients in meaningful discussion. Additionally, a practice can demonstrate value to specific groups of patients by interacting directly with patient advocacy forums and/or groups to clarify misconceptions and potentially reach patients who could benefit from diagnostic and/or interventional services. Along the same lines, groups can undertake campaigns to encourage indicated screening exams to a targeted audience (ie, breast cancer awareness, low dose chest computed tomography, potential roles in virtual colonography, prostate magnetic resonance imaging, etc.). Patients also have the opportunity to share their experiences with each other and ask and/or answer questions related to topics of common interest.

There are a number of opportunities for radiology groups to utilize the capabilities of Twitter[21] also summarized in Table 1. Twitter offers groups an opportunity to disseminate information to a large medically oriented audience. By engaging with referring providers, patients, patient advocacy groups and professional societies, groups can stay on the cutting edge, as well as keep their patients and referrers up to date with advances in the field. Twitter offers a platform that can be complimentary to a group's website and Facebook page, by embedding links and multimedia into Twitter posts.

Patient Portal and Radiology Reporting

A patient portal is defined as an encrypted online platform that patients can use to access their personal medical information.[26] Within the field of Radiology, the implementation of a patient portal would provide patients secure access to their images and reports remotely. Recently, the Medicare and Chip Reauthorization Act has provided a mechanism for financial incentive for patient access to electronic portals with opportunity for feedback from patients.[26] Multiple prior studies demonstrate a clear patient preference for access to their images and reports in a timely fashion.[26–31] There is more variability regarding the optimal way to communicate results to patients, as some studies have demonstrated patient preference for a traditional model of referring physician's providing results to patients, while others demonstrate patient preference to discuss imaging results with imaging experts. The role of the radiologist in directly communicating imaging results with patients remains up for debate, and referring physician preference is variable across studies.[29–32] One thing is clearly demonstrable; patients are increasingly accessing their reports directly via online portals.[33] Specifically, per the most recent study on this topic, 51% of patients who were offered access to a portal reviewed their radiology reports online, and the 25-39 age group was most likely group to access reports online.[33]

Patient portals provide a variety of opportunities for radiology groups to meet the evolving needs of their patient base. For instance, automated portal based reminders can be instituted for patient specific screening and/or preventative services such as screening mammograms, low dose chest computed tomography, etc., and compliance with follow up imaging as recommended in prior reports. These reminders can be conveyed via secure emails, text messages or in-application processes, and helps engage a patient with their own care. This process may provide an added safety net to insure a specific patient does not fall through the cracks, and in prior studies has been shown to improve compliance and utilization.[34] Similarly, patients accessing and reading their radiology reports may result in a positive impact on radiology report quality, as prior studies have demonstrated that Radiologists who are aware that patients may be reading their reports are more likely to take extra care in report detail and accuracy.[31] Furthermore, patients reviewing their own reports may help identify potential errors sooner and result in clarification.[35]

Multiple electronic medical record software developers have created patient portal platforms that integrate with their proprietary systems. For larger hospital based groups, access to imaging and radiology reports will likely be as part of a more comprehensive portal system. For outpatient imaging center based groups, radiology-specific portal platforms are available as well. The details of the patient portal should be adapted to meet the needs of a group's patient base and should also take into account referring physician preferences. There is no one-size fits all solution for the implementation of a portal, and the capabilities of a portal are likely to significantly evolve in the years to come.

As patients increasingly view their radiology reports independently, the content and structure of the report itself may take on an additional layer of importance. Radiology reports have traditionally been geared towards a highly sophisticated medical audience of referring providers and other radiologists. The routine addition of a brief patient-focused summary may be an important supplemental element of radiology reporting in the patient portal era. A prototypical system developed at the University of Pennsylvania, called Patient Oriented Radiology Reporter demonstrates the feasibility of automated patient-focused reporting.[36] The developers of this system created a lay-language glossary of commonly encountered terms in radiology reports and embedded hyperlinks to open source images of the term being defined. The text of radiology reports are uploaded into this system and cross-referenced with the glossary. A web-based user interface allows patients access to the annotated report, with definitions and images of common terms available by hovering over highlighted text. As systems like this are expanded, and artificial intelligence domains such as natural language processing continue to evolve, patients may be able to derive a significantly greater level of understanding and thereby involvement in their imaging experience.

In Person and Virtual Patient Consultations

There are multiple mechanisms by which to conduct patient consultations in Radiology. Three main models are: in-person diagnostic radiology consultation clinic, embedded reading room within a physician practice, or virtual consultation via a web-based platform.

A study published in 2015 by Mangano et al. describes the creation of an in-person diagnostic radiology consultation clinic at Massachusetts General Hospital.[13] A pilot program was developed, which allowed primary care physicians to offer referrals to adult patients with recent imaging findings demonstrating any of 3 common diagnoses: hepatic steatosis, emphysema, or atherosclerosis. On the day of their primary care clinic visit, patients meeting inclusion criteria could receive an in-person consultation with the diagnostic radiologist covering the service that day. If interested, the patient would be escorted to a dedicated radiology department consultation room, where a radiologist would discuss the role of the radiologist, the

purpose of the imaging study, explain and demonstrate the patient's imaging findings, compare with normal or extreme cases of such conditions, discuss potential modifiers and answer any questions within their scope of practice.[13]

An alternative to this mechanism is the embedded reading room model, in which a radiology practice is physically located within a physician group's practice. This model allows for on-going real time communication between referring physicians and interpreting radiologists, and permits direct radiologist-patient consultation on a case-by-case basis. A prototype for this system has been implemented by Emory University through collaboration of the Head and Neck Radiology section and Department of Head and Neck Surgery.[15] The workflow for this model allows Head and Neck surgeons to identify suitable patients for direct radiologist consultation, confirm radiologist availability, and proceed with a joint consultation which occurs in the clinic at a patient's normally scheduled appointment. The embedded reading room lends itself to this form of consultation and may only be feasible in very specific settings. The initial results from this model are very encouraging, with the two-thirds of patients indicating improved understanding of the role of the radiologist after consultation, nearly 100% of patients finding the consultation useful, and expressing desire to continue meeting with radiologists at future appointments.[15]

A third and potentially more logistically feasible option is virtual consultation. Telemedicine applications for direct radiologist-patient communication is in its infancy relative to other fields of medicine. A pilot program developed and implemented at New York University Langone Medical Center allowed for real time virtual consultation between radiologist and referring physician.[37] The Radiology IT department in concert with Primordial (Primordial Inc., St. Paul, Minneapolis, MN) developed a virtual consult system that leveraged existing technologies already in use within the department, integrating features of the EMR-EPIC (Epic, Verona, Wisconsin), picture archiving and communication system—Philips Isite (Philips Medical Systems, Andover, MA), and screen sharing software—Cisco Webex (Cisco Milpitas, CA). This system allows the radiologist or referring physician to send an instant message to one another regarding a specific case, and provides a link embedded in the message to automatically open the study in question for the other party. At this point, an instant message chat session could ensue regarding the case if only brief communication would suffice, or a screen-sharing session could be undertaken. The screen-sharing session in this interaction may hold significant potential for expanding this virtual consultation process that included only referring physicians and radiologists in the study, to involve patients and occur at the point of care. Theoretically, referring physicians could employ similar technology to allow a radiologist to discuss the pertinent imaging findings at a patient's clinic visit and answer any radiology-related questions. While there are logistical challenges that would need to be addressed to insure the success of this type of system, the initial experience at New York University appears promising and demonstrates the feasibility of such a system to be integrated into a hospital system.

Second Opinion Interpretations and Concierge Radiology

Currently, many radiologists in private practice settings interpret over 100 cases per day, many of which may be outside of their subspecialty; a heavy emphasis is placed on efficiency. Unfortunately, this can mean that radiologists working in such settings are prone to reporting errors, recommend un-indicated follow-up imaging or intervention, or provide inconclusive impressions.[38] As such, there is increasing demand for high quality subspecialty second opinion interpretations, particularly in patients with complex imaging findings, or in those who reside in geographic locations without ready access to subspecialists. Second opinion reads can be efficiently and securely managed virtually. There are secure online mechanisms to allow patients to upload their prior imaging Digital Imaging and Communications in Medicine (DICOM) files directly to a group's website for second opinion review. Imaging studies can then be interpreted by appropriate subspecialists and a high quality second opinion report can be transmitted to a patient, referring physician, insurance company, lawyer or other interested party with a quick turnaround time. Currently, there are a variety of competitors operating in this space, predominately teleradiology companies with a few notable large academic medical centers including Johns Hopkins and Massachusetts General Hospital.[38]

Along the same lines, the concept of “Concierge Radiology” is emerging. In this system, a patient pays an annual membership fee, which is collected in addition to traditional fee for service payments for specific imaging examinations. Groups that offer this service may provide 24 hour dedicated access to subspecialty radiologists, priority and same-day scheduling, expedited visits and guaranteed turn around times. In both the second opinion and concierge setting, groups may provide “enhanced reporting” including annotated representative image screen captures, patient-focused explanations, and personal contact information. Both of these service lines have the potential to increase prestige of a radiology practice, perceived quality, patient satisfaction, and serve as potential drivers of downstream profit within the larger health care system. The market leaders who eventually emerge in these segments may serve as useful benchmarks with which to compare the standard of care. By analyzing the groups that most successfully exceed patient expectations in these areas, radiologists may be able to adapt portions of the white-glove approach to their daily clinical practice thereby improving the patient experience.

Potential Challenges and/or Disadvantages of Direct Patient Communication

There are a number of barriers to routine direct radiologist-patient communication, perhaps the largest of which is the time required to review imaging results with patients. As patient consultations are not specifically reimbursable, many radiologists would view time spent with patients as having a negative impact on their productivity, as they are pulled away from relative value unit generating activities.[9, 27] There are limited data available to assess the potential cost implications of routine radiologist-patient discussion of imaging results. One cost identification model created for screening mammography in 2000 calculated between roughly 10 and 30 dollars of additional cost per study if the radiologist were to immediately discuss results with each patient after their examination.[27] Further cost-benefit analysis of routine radiologist-patient communication in a variety of practice types is warranted. In many practices, there is also a physical barrier, with radiologists commonly interpreting images obtained at remote imaging centers. In this case, a patient would have to make a separate visit to meet a radiologist at a predetermined time for consultation. To be sure, the infrastructure required to significantly improve direct radiologist-patient communication whether over the digital platforms described herein or in person is substantial, and requires a commitment of significant time, energy and resources by a radiology group.

Another potential obstacle to improving direct radiologist-patient communication is that many radiologists may be unequipped to properly answer patient questions about their imaging results. The previous literature related to patient and referrer preference regarding radiologists conveying imaging results directly to patients has been varied, and these preferences may be in a state of evolution. Questions related to prognosis, treatment options and next steps may be challenging for radiologists to answer, and could have the potential of providing patients with inconsistent information that may differ from their referring provider.[10] Along the same lines, radiologists may not be adept at carefully delivering bad news, which could have

potential negative impacts on patient satisfaction, increase anxiety and negatively impact outcomes.[39] This represents a specific area for improvement, beginning at the training program level and extending through continuing medical education offerings.

There are a number of important considerations that radiologists must keep in mind when interacting with patients on websites and particularly social media platforms. First and foremost, social media is inherently public, and while there are some mechanisms available to limit audiences, any post on social media can be widely shared.[23] As such, it is critical that patient privacy is protected and the Health Insurance Portability and Accountability Act regulations are followed diligently. Additionally, as information can be widely disseminated quickly, radiologists must thoughtfully consider and verify the accuracy of any general information that they share via these platforms. When interacting with patients, patient advocates or other physicians on social media, care must be taken to quickly transition any conversations pertaining to patient information or sensitive topics to secure communication mediums such as in-office consults, telephone conversation or encrypted email.[23,24]

Finally, any mechanism of direct radiologist-patient communication, whether it be in person, online, on social media, via access to imaging reports on a patient portal or via virtual consultation could have the potential of increasing patient anxiety. The process of a patient visiting their doctor, being referring for an exam, undergoing an imaging examination, discussing results with a radiologist, and then seeing their referring physician for follow up is rife with anxiety provoking events.[40] In a multicenter prospective study assessing anxiety related to wait times, 26% of the study population reported a history of depression, and 28% reported a history of generalized anxiety disorder, demonstrating the relatively high prevalence of these diagnoses in patients undergoing imaging examinations.[40] In the field of Social Psychology, a recent study demonstrated that individuals with different baseline dispositions differ significantly in temporal trends of anxiety, hope, uncertainty, and discomfort during a waiting period for test results.[41] A patient's baseline psychological profile and possibility of underlying diagnoses is out of the scope of practice for most radiologists. Furthermore, radiologists would not be expected to identify patients who may experience particularly difficult waiting periods or significantly higher levels of anxiety related to discussing imaging results. The complexities of this unique doctor-patient relationship highlight the importance of coordination with local referring physicians and preserving the flexibility to adapt any communication strategy to specific patients on an individualized basis.

Takeaway Points

Information and effective communication underlie the foundation of Radiology.

Communication is more complex than simply transmitting a report to the referring physician. It is multidirectional with many opportunities for the radiologist to meaningfully interact with the patient, referring provider and general public.

Digital communication platforms complement and can augment the in-person patient experience in Radiology.

There are a variety of platforms through which radiologists can reach patients directly.

Practice website and social media accounts may be initial point of contact and significantly impact a patient's first impression.

Patients prefer access to their imaging and reports via online patient portals.

Efforts should be made to improve the patient-centeredness of radiology reporting.

Virtual consultation with patients and providers is feasible via existing technology, can be a viable mechanism for the radiologist to strengthen radiologist-patient communication, and can serve to better integrate Radiology into clinical practice.

There is an increasing demand for high quality second opinion subspecialty interpretations and white-glove imaging service. Emerging market leaders in these segments should be benchmarked to identify best practices.

Radiology groups should develop a comprehensive patient-centered strategy for augmenting direct radiologist- patient communication through a variety of mechanisms that leverage existing and emerging IT solutions.

There are a number of potential challenges that must be considered when developing a direct radiologist-patient communication strategy.

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1067/j.cpradiol.2018.05.004.

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