Online social networking has become a cultural phenomenon in recent years. Although people have socially networked since prehistoric times, the recognition of this as a distinct activity (ie, sometimes mediated by computers and the Internet) is relatively new. Social networking service has been defined as “a platform to build social networks or social relations among people who, for example, share interests, activities, backgrounds, or real-life connections” (1). Social networking is the process of using such services to build and/or maintain social networks.

Many busy doctors may read about the latest advances in social networking and think that this is a hobby for people with more free time on their hands than a busy physician. This is understandable as it is hard to keep track of all the latest advances in online social networking, let alone find time to use them. Although physicians may find themselves with limited free time at their disposal, online social networking should be a key part of every physician’s professional practice.

There are several reasons why online social networking has become an important part of being a successful physician. Online social networking is an important aspect of networking for employment and allows radiologists to network with other physicians for clinical- and research-related interests. Online social networking may also be useful for radiologists to network with patients. As radiologists have less face-to-face contact with patients than physicians of many other specialties, online social networking platforms offer the potential for radiologists to present a virtual “Face of Radiology” for patients.

This article has several goals. The first is to review the role of online social networking and why it matters or should matter to radiologists. Next, this article will present the latest technical developments in online social networking and how they may be used by radiologists and discuss some barriers to implementation with suggested ways to overcome these barriers. Finally, a few simple steps radiologists can take to increase their involvement in online social networking will be presented.

ONLINE SOCIAL NETWORKING AND WHY IT MATTERS (OR SHOULD MATTER) TO RADIOLOGISTS

Online social networking has become an increasingly common means by which people interact. As healthcare systems become ever larger, face-to-face conversations with colleagues are becoming fewer and further between. Online social networking offers an opportunity for the busy radiologist to stay socially connected even if one is networking with physicians across several different hospitals. To better understand why online social networking may play such a valuable role in contemporary professional networking, it is worthwhile to consider the role it plays in our society as a whole.

Social networking may be thought of as a relational structure between multiple participants: either individual...
people or organizations. Online social networks (OSNs) such as Twitter, LinkedIn, and Facebook have been rapidly adopted by people of all ages, enabling the unprecedented ease of communication of ideas to a mass audience (2). The rise in popularity of these networks has been dramatic. Facebook boasts 701 million active users and Google Plus boasts 359 million active users, recently surpassing Twitter which has 297 million active users (3). The ubiquity of OSNs is especially evident among Internet users aged 18–24 years, of whom 75% reported having a social profile in 2008 (4). However, like many Internet trends, social networking is a frontier which is only beginning to be explored by researchers and policy makers. As this technology becomes more prevalent with increases in broadband access and digital literacy in general, it would be prudent to understand its implications in both personal and professional life (2).

Electronic communication tools have permeated our environment in ways that have changed our social behaviors and daily life. Online social networking is just one of many consumer technologies such as blogs, SMS, and Wikis that have become common in the corporate world (5). The presence of medically related topics in these spaces is becoming more prevalent with up to 46% of physicians reporting interactions through blogging or other social media on a weekly basis (6).

Networks exclusively targeting medical professionals have emerged, such as QuantiaMD, Sermo, and Medscape's Physician Connect, which each boast greater than 100,000 members. However, a more effective measure of an OSN’s strength may be user activity, which is less transparent to external observers (5).

Although Internet tools and most online social networking data are not specific to radiologists, most radiologists use the Internet with regularity. For example, in a 2007 survey, 97% of radiologists reported using the Internet for education with 42% using it daily. In particular, 84% of survey respondents claimed that their usage of the Internet for gathering radiology information had increased in the past 3 years (7). Many new educational and professional resources are now available online and not in a traditional paper format. For example, Radiopaedia.org is a radiology-specific Web-based reference tool that contains both cases and articles contributed by a community of members.

Providers and their patients have increasingly higher expectations of medical information systems, shaped by their experiences in other technological domains. The market will demand seamless quick access from anywhere and at any time. The emergence of new and more flexible communication paradigms such as OSNs is influencing the evolution of the health care experience. Many current social networking paradigms are based on communication, which are not in real time. However, some feel that real-time and continuous communication will likely become the norm rather than the exception in the medical professional community (5). The online social networking tools discussed in this article apply to both forms of information exchange.

### SOCIAL NATURE OF MEDICINE AND INTERPERSONAL INTERACTIONS IN THE SETTING OF NEW TECHNOLOGY

#### Social Networking Theory

Social scientists have taken a formal approach to defining and investigating the ties that form between us called Social Network Analysis. These scholars define a social network as a set of relationships between entities (also called nodes). These entities or nodes usually represent individual people but can also represent groups of people, such as hospitals, organizations such as patient interest groups, or professional societies (8). The types of relationships (or links) that exist between nodes can vary; for example, radiologists might be connected to one another because they work at the same institution or a group of hospitals might be part of the same social network because they are all affiliated with the same university.

The relationship between two nodes is also characterized by flow—the passage of things or ideas from one node to another. Money, information, friendship, physical objects, and even disease are all examples of what can pass between nodes in a social network. Flow can be unidirectional or bidirectional and is often not symmetric. For example, it is common for some members of the radiology chat forums to contribute regularly, whereas others tend to “lurk” or consume information posted by others although not actively posting themselves. An example of a relationship between two nodes with bidirectional flow is shown in Figure 1a.

Another important characteristic of a social network is the density of that network or the number of direct connections or ties between nodes. Density is calculated by dividing the number of potential links between nodes by the number of actual links. Multiplexity, in contrast, reflects how two nodes can be connected by several different relationships. For example, two radiologists can be coworkers, friends, neighbors, and belong to the same religious group. An example of multiplexity is shown in Figure 1b. A high degree of density and multiplexity, often found in smaller social networks, is associated with increased social support, cohesive communities, and increased transmission of information such as ideas and rumors (9). Consequently, members of a relatively small social network such as an online forum catering to radiologists interested in pediatric neuroimaging might provide more professional support and information sharing than a much larger network in which ties between members are less dense and have low multiplexity (as might be seen in a network for radiologists in general).

Distance is another aspect of social networks, which is important to consider. Distance refers to the number of links that must be traversed to get from one node to another. For example, radiologist A and radiologist B might be part of the same social network because they are both radiologists; however, they do not know each other but instead have a mutual acquaintance, radiologist C, Figure 1c. Thus, radiologists A and B are indirectly rather than directly linked. For information to reach radiologist B from Radiologist A,
it must flow through radiologist C. Nodes that link distant parts of a network (in this example, radiologist C) are known as *bridges* and frequently play an important role in spreading new ideas. As sociologist Charles Kadushin points out, “to break out of a dense set of relationships, to get new ideas or new jobs not available in one’s immediate social environment, requires connections with others one does not know very well, does not see often, or is not bound by many dense relations. Through two or three steps, one can encounter worlds that one might not otherwise know” (9). Radiologists who bridge and tie together many different social networks can help introduce new ideas that pave the way for innovation.

**Applications of Social Networking Theory to Radiology and Medicine**

As medicine has shifted toward a team-based approach requiring that multiple specialties work together, using social networking has become increasingly important. Notions such as flow, density, multiplexity, and distance are all important when considering what kinds of relationships and networks foster the development of trust and friendship, access to new information, the ability to acquire resources, or innovation.

Studies by social network analysts indicate that small social networks with a high density of relationships and little distance between nodes tend to foster the development of trust and sharing of resources and information. In contrast, larger social networks with low density and high distance may have a lower degree of trust and support but may offer increased opportunities to access information from new sources and may foster innovation. This is the so-called “strength of weak ties” made popular by Granovetter (10). Consequently, being part of multiple social networks with both strong and weak ties is important for radiologists to maximize what social scientists call “social capital,” the resources accessible through interacting with others (11). One example of this may be networking between radiology and surgery groups to optimize imaging protocols and radiology reporting. Although the link between these two different groups may be weaker than the links within groups, greater opportunity for productive collaboration exists.

It is also important to recognize that technology can significantly impact social networks by mediating and transforming relationships between people. In radiology, picture archiving and communication systems (PACS) is one of the most prominent examples of how the acceptance of a novel technology can restructure social networks, changing how, when, and why radiologists and referring physicians interact with one another. One of the well-known impacts of widespread PACS adoption was the decrease in visits to the reading room by referring providers (12). Suddenly, referring providers were no longer integral members of many radiologists’ social networks, causing a decrease in the flow of clinical information to radiologists. In addition, reduced social interaction among radiologists and referring providers decreased the density and multiplexity of relationships and increased the distance in these social networks, resulting in a decline in interprofessional trust (13).

However, technology can also be used to augment existing social networks and create opportunities to form new relationships. Many new online social networks and network platforms have developed and flourished in the past few years. Person-to-person interaction remains important for helping radiologists increase their visibility. However, online social networks can provide radiologists with an opportunity to reach beyond the reading room and interact online with referring providers, other radiologists, and even patients to improve clinical care and advance scientific research.

Finally, although online social networking may help radiologists to engage with others, improve visibility, and gain access to certain resources, there are potential pitfalls of social networking that should be kept in mind. The informal nature of many social networking sites can blur the lines between professional and personal contact, creating opportunities for unwanted or inappropriate sharing of protected health information. In addition, social networks also tend to form among people with similar characteristics, a phenomenon called *homophily*. In the case of online social networking, it is important to recognize that certain people may be excluded from participation, particularly those with reduced literacy or poor access to digital resources. Despite efforts to increase Internet access among medically underserved communities, the so-called “digital divide” remains a formidable issue. Radiologists should be aware that relying solely on social media to educate or share information about the importance of screening mammography or radiation safety, for example, may not reach a significant portion of the population.

Although the theory of social networking may seem somewhat far afield from the day-to-day workflow of a radiologist, an understanding of these basic ideas of social networking is important if one wants to maximize the usefulness of any given social networking mechanism. This may be especially important on more of an organizational
level, where groups of individuals can pool resources to optimize the utility of a given social networking platform.

For example, consider a scenario where one wants to improve relations between the radiology and medicine departments. It would be helpful to realize that increased density and multiplexity of ties with bidirectional flow would likely be conducive to a mutually beneficial relationship. One could then specifically consider how to make this possible and increase the likelihood of mutual gain.

**RADIOLOGISTS IN TRAINING AND POSTTRAINING**

*Education and Continuing Medical Education*

Social media offer many opportunities for education in radiology, both for trainees and for practicing radiologists. The educational opportunities that could thrive with social networking are extensive. Online password-protected vehicles serve as an excellent platform for building robust teaching files, such as the Medical Imaging Resource Center (MIRC) developed by the Radiological Society of North America (RSNA). Educational opportunities have even migrated to sites such as Facebook with case presentations presented in contest format such as the Society of Abdominal Radiology's “Gettable case of the week.”

A recent article in the Journal of the American College of Radiology (JACR) highlighted the use of the Twitter microblogging platform, which increased by at least 30% between the 2011 and 2012 RSNA annual meetings by all identifiable meaningful metrics. Microblogging has been shown to improve engagement and collaborative thinking among meeting attendees (14). Such a platform may be useful for online or Internet conferences, to facilitate engagement and learning.

Online communities, such as Radiolopolis and RadRounds, are being used more frequently in radiology clinical practice. Radiolopolis is an online community specializing in education through lectures and cases but also fostering communication between members through forums. There is a forum for various communication topics, a case of the day feature, links to research-related material, and educational tools that can be used to provide formative evaluation of one’s skills. RadRounds is an online community specializing in education through cases and videos but also fostering communication between members through forums. This Web site is a social networking tool for the radiology community allowing members to communicate with each other and meet new people in the field on the basis of common interests. Users are able to build their own professional profiles and can also connect this Web site to other social tools, such as Twitter and Facebook.

**Professional Networking**

Just as online social networking sites have made it more convenient to keep in regular communication with a larger network of friends, these sites serve residents as an essential tool in growing and maintaining a professional network. Connections made with other trainees or potential mentors at regional and national meetings can more easily be extended after the meeting with a simple follow or connection. Several academic radiology training programs have started alumni groups on sites like Facebook or LinkedIn to share important program updates, facilitate connections between current and past trainees, and share leads on potential job openings. Professional networks are critical for career development and the eventual job search. However, these connections could also prove useful during the training years themselves. A resident could query their network when searching for alternative solutions to common issues in areas such as resident education or clinical quality improvement. For instance, a group of residents who may have never physically met could compare their residency programs' strategies for preparing for the new ABR competency examination. These discussions could take the form of individual e-mails, posts on a group discussion forum, or even an appointed twitter chat (a set aside time when users tweet about a specific topic or a question using a designated hashtag to allow participants and listeners to follow along).

**SOCIAL NETWORKING BETWEEN RADIOLOGISTS AND CLINICIANS**

Online social networking between radiologists and clinicians can serve many roles. Social networking can act as an interactive information repository for a department or group. Although the department Web site and newsletter are important ways to advertise the services offered, they usually have limited capacity for dialog. Therefore, spectrum of services offered by a group may be underrepresented on a conventional Web site given the rather static nature of content. Online social networking can facilitate communication and interaction between the radiologist and the referring clinician by allowing a forum for inquiries, answers, and elaboration of the material contained within the Web site. For example, general practitioners may wish to consult the radiologist to determine the optimal imaging examination or to inquire about the patient's preparation or contraindications for an examination. Although departmental Web sites may contain some general background information, they cannot be tailored to each patient's unique needs. A busy referring clinician may not have the time to visit the reading room or personnel support to place a phone call for each patient referred for imaging, but online social networking can provide an efficient communication portal for physician to radiologist interaction. Such a platform may be analogous to an online “chat” with a company representative, not an uncommon way of obtaining information in non–health care-related industries.

Second, online social networking can expand the digital diagnostic reach of a radiology department or group. Online social networking can provide a more fluid two-way communication between the radiologist and the referring
Leadership Institute of the American College of Radiology, achieved through national programs, such as the Radiology to have greater visibility to the public. This may be partly
with patients. Online social networking allows radiologists
AND THE GENERAL PUBLIC

Online social networking has been proposed as a tool to help
radiologists become reintegrated into the clinical team and
workflow. Social networking's ability to provide an online
gathering place for exchange of ideas and discussion of patient
management has the potential to enhance interaction and
collegiality between clinicians and radiologists. In addition
to optimizing relationships with local referring physicians,
the file-sharing capabilities of online social networking allow
for remote consultations on imaging performed at an outside
facility. As imaging becomes more complex and integral to
patient management, referring clinicians need access to a
subspecialized radiologist's knowledge. The use of online
social networking may allow the radiologist to add value to
a remote patient's care. Consider a referring physician with
a question about the next best study to work up an abnormal
finding on radiography. They may in principle send an instant
message analogous to a “Tweet” to their radiology group, and
any of the radiologists included on the “Tweet” may respond.
The message may even be directed to the radiologists in the
appropriate field based on analysis of the text of the message.

Consider the following clinical scenario: a high-volume
surgical oncologist is too busy to come to the reading room
to review the imaging of several patients but needs input on
imaging for treatment planning. The surgical oncologist and
radiologist can enter a physician-specific network on a closed
platform for secure discussion of the patients’ imaging.

Although e-mail could also be used, online social networking
sites are more efficient at handling multimedia files and can
better serve as a repository of information, such as providing
literature on the best practice and appropriateness guidelines.
In addition, a given question may be automatically sent to the
radiologist with expertise in the appropriate area based on the
keywords of the question asked. The question may then be
directed to the radiologist’s mobile device for rapid
notification. The rapidity of communication and ability to
provide supplemental material afforded by online social
networking allow for a more personal consultation during
which the surgical oncologist receives prompt personalized
attention.

Third, online social networking can act as an efficient
platform for research communication. Radiologists can be
informed of and participate in clinical trials through social
networking and peer-to-peer collaboration. This application
is discussed in greater detail later in this article.

SOCIAL NETWORKING BETWEEN RADIOLOGISTS
AND THE GENERAL PUBLIC

Online social networking has been proposed as a tool to help
radiologists reach beyond the hospital and engage directly
with patients. Online social networking allows radiologists
to have greater visibility to the public. This may be partly
achieved through national programs, such as the Radiology
Leadership Institute of the American College of Radiology,
which aim to increase the voice and outreach of radiologists
via online social networking. These electronically mediated
interactions help radiologists inform the public about a variety
of health-related topics, provide a forum for discussion of
imaging-related topics, and provide radiologists the
opportunity to educate the public about their profession
and provide a virtual “Face of Radiology.”

Patient Education

Online social networking sites provide a portal through which
patients can have access to radiologists for questions and
advice. Dr. Garry Choy, a radiologist at Massachusetts General
Hospital, established a message forum that encouraged
patients to ask imaging-related questions in an open and
interactive environment (15). He and his research associates
found that 45% of questions patients asked were related to
clarifying terminology used in radiology reports, whereas
15% were questions related to radiation and another 15%
were asked for imaging recommendations. Other topics
included requests for a second opinion on images and
questions about oral and intravenous contrast. In general,
Choy found that patients were very grateful for the
opportunity to ask radiologists questions and that answering
these questions did not require a large time commitment by
participating radiologists.

Consider the Following Scenario. Ms. Smith visits her primary
care physician for a routine “checkup” and health
maintenance. During the physical examination, Dr. Edwards
palpates an abnormality in her neck and tells her that he is
concerned about a possible thyroid nodule. He also tells
Ms. Smith that she will need to visit the radiology department
for further testing with ultrasound. Because of his busy office
schedule, Dr. Edwards is not able to elaborate on what she can
anticipate when she is in the radiology department but says
that his office staff will make an appointment for her.

Ms. Smith is concerned about the possible thyroid nodule
and thinks of several questions during her ride home. On
arriving at her home, she immediately logs onto her computer
and searches for “thyroid nodule” and “thyroid cancer.” Near
the top of her search is a link to a Facebook page that describes
thyroid imaging at the university medical center in her town.
On opening this page, Ms. Smith is able to read about the
various imaging modalities used to evaluate thyroid nodules.
She is able to see pictures of the ultrasound units and gamma
cameras and is able to understand that “radiation” is not used
for all examinations that take place in the radiology
department. At one point, Ms. Smith reads that a technologist
will perform her scan, whereas a radiologist will interpret her
scan and discuss the results and management recommenda-
tions with her ordering clinician. Ms. Smith is surprised to
discover that 14 years of education and training after
high school are required to become a subspecialty radiologist.
After acquiring this information, she still has some questions
about what will be involved with the procedure, “Are
X-rays involved?” Ms. Smith sends a Facebook message to
the radiology group to ask if there is any radiation involved in the test, and by the following day, she is relieved that the answer to her query is “no.” Ms. Smith feels confident that a referral to the radiology department is a critical component in her diagnostic evaluation.

Radiologists can promote outreach initiatives, including radiology awareness months and screening programs, through social media. For instance, according to a 2011 article in Health Imaging, Island Imaging in Spokane, Washington experienced a 9% increase in mammograms after launching a Facebook page that addressed women who had not been getting regular mammograms (16). Microblogging tools such as Twitter can help remind patients to schedule examinations and provide information about the importance of regular health maintenance. Social networking sites can also provide mutual benefit for radiologists and patients in the field of research by helping inform the public about opportunities presented by clinical trials while increasing recruitment of study subjects.

Consider this Clinical Scenario. An academic medical center commences an initiative to educate women about the benefits of screening mammograms. In addition to traditional billboard and newspaper notices, the medical center begins a Facebook page and develops a Web site to provide patients with the educational materials. The Facebook page and Web site also contain links for scheduling an appointment, locations of imaging centers, and the basics of how mammography is performed. One patient, Ms. Jones, takes advantage of the educational materials and the ease of scheduling and undergoes a screening mammogram. She finds the mammogram experience to be better than expected and returns to the social media sites to provide feedback regarding her experience. After a few days, Ms. Jones is notified that she is being called back for a breast ultrasound and potential biopsy. Because of her phobia of needles, Ms. Jones is reluctant to undergo this procedure. Ms. Jones again returns to the social media site and realizes that she is able to take a virtual tour of the imaging center and its procedure rooms. She is also able to use the social media site to ask a few basic questions about the procedure, to which she receives a prompt reply. She is able to read about what she can expect during the biopsy and is able to listen to testimonials of other patients who underwent breast biopsy. Finally, Ms. Jones is able to view a picture of Dr. Robinson, the subspecialty radiologist who will be performing her biopsy. Ms. Jones is also able to read about Dr. Robinson's training, licensing, and years of experience. Ms. Jones feels less anxious after obtaining this information and eventually undergoes a breast biopsy. After Ms. Jones' primary care physician informs her that she has an unusual type of breast cancer, Ms. Jones again returns to the medical center's online social networking site because she remembers that there is a link to the comprehensive breast center and information about potential clinical trials.

Despite the potential advantages of engaging with patients via online social networking, it is important to keep several key points in mind. First of all, it must be stressed that online social networking should not replace other methods of communication but should supplement a broad and diverse communication strategy that can include e-mail, newsletters, the telephone, and face-to-face interactions. The nuances of verbal communication (tone, facial expression, posture, and so forth) are often lost when using online social networking tools, which can cause patients to misinterpret or misconstrue information. Further, Prasanna et al. (2011) (17) argue that social networking could have two very different effects on the radiologist–patient relationship. Lacking the cues that humanize social interaction, radiologists’ efforts to engage with patients might further exacerbate the perception of physicians as distant figures of authority. Trading face-to-face interaction for communication primarily via online social networking sites could also contribute to a widening distance between patient and radiologist. On the other hand, the authors note that the ability to engage with radiologists and increased access to information and other resources might help equalize the power differential that has classically existed between doctors and patients.

Marketing

Another way to engage patients with online social networking is to focus on marketing techniques that maximize exposure. The use of search engine optimization links to advertising, and site registration can all lead to increased influence. Additionally, use of video blogs and podcasts are also likely to attract patient viewers, especially when conducting research on what to expect for an upcoming procedure. Online social networking sites can also lead to patient recruitment if a scheduling link and appointment reminders are available during the patient's navigation of the site. At some point, radiology social networking sites may foster communities of patients who can provide testimonials of their experience during a radiologic procedure or after a specific diagnosis. This can then be integrated into social networking sites for other departments within the institution to facilitate referral and management.

Presenting the “Face of Radiology” to the Public

Radiologists may also use social media as a mechanism to develop broader connections with patients, which were not possible previously. A recent study indicated that only about half of patients know that radiologists are physicians and that the most patients have little or no understanding of how radiologists contribute to their health care (18). Consequently, any information that radiologists can disseminate to the public to advocate for the value of our specialty would be helpful, especially as we transition to “value-based” reimbursement for medical care. To address the public's suboptimal knowledge about radiology, the American College of Radiology launched its “Face of Radiology” campaign to help radiologists educate the public about our specialty. Online social networking offers useful tools for presenting a virtual “Face of Radiology” to the public.
Through social media, radiologists may educate the public about the specialty and articulate their central role in health. Additionally, these types of online social networks provide an opportunity for radiologists to address and inform patients about common sources of anxiety and/or confusion, including radiation doses, risks and benefits, and what to expect for specific imaging procedures. Because of the variability of physicians’ use of social media, projects such as MDigitaLife have been developed to better understand how physicians can use social media to improve the lives of their patients (mdigitalife.com).

**SOCIAL NETWORKING FOR RESEARCH**

**Historic Model of Research Networking**

Correspondence for research in science and medicine has evolved over the ages. It likely started with verbal discussions between small groups of individuals. For researchers with greater geographic separation, letters would have been the only way to communicate ideas and results short of direct and in-person discussion. As travel became easier, small groups of individuals would have gathered to meet and discuss ideas. Letters and meetings between individuals were the major mechanism for dispersion of scientific ideas until circa 1450, when Johannes Gutenberg invented the printing press. It was now possible for individuals to mass produce their writings for a larger audience. In 1665, the world’s first known academic journal of Europe was published in France, entitled “Journal Des Scavans” (19). While telegraph, telephone, and television doubtlessly influenced the development of science and research, printed journals and in-person meeting were still the dominant mode of information exchange for many years.

The modes for exchange of scientific ideas were rather static until the development of the Internet. With the advent of the Internet, it became faster and easier for multiple people to share ideas. Specifically, the introduction of e-mail and instant messaging has allowed for more efficient communication and collaboration. This has had a profound impact on research in medicine and radiology. Some of the ways in which radiology may capitalize on the current technology and potential future advances in research are discussed here.

**Research Interest Groups**

Until fairly recently, the dominant mechanism of dissemination of information was at scientific meetings and through research journals printed on paper. Historically, researchers interested in particular topics would form dedicated societies and host/attend meetings directed toward their shared interest. However, online research networking may be an attractive alternative for several reasons, including more frequent interactions and lower cost when compared to traditional annual in-person meetings. There are currently many online resources available for researchers in science and medicine, such as ResearchGate. Founded in 2008 by two physicians and a computer scientist to facilitate exchange of information and collaboration, it has gained over 3 million members, over 600,000 of whom work in a medical-related field (20).

**Networking Between Physicians**

Mechanisms for online social networking between radiologists and other physicians are becoming increasingly important. Since the advent of PACS, radiologists have had less interaction with their clinical colleagues. Physicians in specialties other than radiology still have a significant amount of interpersonal interaction either in person or over the telephone and view their images on computer consoles outside the radiology department. In distinction, radiologists find themselves dealing with growing image case volumes and may find it increasingly difficult to even attend interdisciplinary conferences. For this reason, an online forum for radiologists to share ideas and expertise is becoming necessary for the radiologist who intends to pursue clinically relevant research.

Online social networking offers unique opportunities for both intra- and inter-departmental research collaboration. For radiologists in training and medical students interested in imaging research, networking provides a forum for recruiting motivated trainees with similar interests. For example, a dedicated site such as a SharePoint could display a list of projects in need of trainees to provide data collection or manuscript preparation. Indeed, many universities already have online resources for medical trainees interested in being matched with a suitable mentor and/or project. A similar mechanism could be used within a hospital system to search for subspecialty clinicians who could provide their clinical expertise in producing a well-rounded article. Furthermore, physicians at smaller community-based hospitals with limited resources could seek guidance or assistance from radiologists at large university programs through a dedicated online social networking platform. It should be noted that many tools to accomplish these goals already exist but are not in widespread use in the radiology community at present.

**Networking Between Physicians and Scientists/Engineers**

One of the very tangible benefits of professional social networking for radiologists is connecting to nonphysician colleagues with research interests. Online research consortia may also be helpful for networking between researchers who each have a skill needed to conduct a specific research project, for example, collaboration between a thoracic radiologist and a biomedical engineer specializing in medical image processing.

Additionally, radiologists could benefit from social networking through interactions with key personnel such as statisticians and research coordinators. In lieu of face-to-face meetings, radiologists could exchange ideas and solicit help from statisticians during the process of protocol design and data
analysis. Research coordinators could more efficiently gather specific patient populations and collect appropriate personnel if provided with dynamic online social networking platforms. Such efficient networking could expedite the logistical aspects of research that are normally rate-limiting steps.

**BARRIERS AND STRATEGIES FOR SUCCESS**

Although social networking offers many opportunities for radiologists looking to optimize their careers, there are several potential barriers to the successful use of this technology. Several of the major barriers and mechanisms to overcome these barriers are discussed here.

**Familiarity with Computers, the Internet, and Online Social Networking**

As with any technical advancement, there will always be the initial barrier of learning about the technology. Online social networking is fairly new, and professional online social networking is newer still. Many radiologists were trained in an era before PACS and before the widespread use of today’s modern Internet. For these individuals, there may be some reluctance to invest the time to learn about this new technology, given demands of work and family.

The first step to access today’s modern professional social networking is having the appropriate technology in place. Fortunately, modern computing hardware and high-speed Internet access, both of which are essentially mandatory for participation in social networking, are readily accessible to the radiologists.

The time required and ease of establishing an account may be a concern. However, many of the career-focused or physician-only networking Web sites require only a few minutes of time to register basic information, such as one’s name, e-mail address, and demographics. The creation of a full profile—the online profile that will become accessible to colleagues, industry representatives, and potential employers alike—often requires only an additional 10–20 minutes of time. One may use the profile as an online curriculum vitae (CV) and include professional contact information, training and credentials, publications, and professional interests. Certain sites, such as LinkedIn, allow users to upload their full CV, which then automatically populates the majority of the user’s online profile. Because the user will likely use the same photo, contact information, and CV to establish accounts across all desired online social networking Web sites, each account created will require incrementally less effort. Furthermore, for inexperienced users who wish to expand their profiles and access more advanced features of the Web sites, there are often tutorials, online videos which offer explanations, or online forums in which one can seek advice.

**Protection of Personal Privacy**

By the very nature of online social networking, the benefits afforded by an open and accessible online profile can threaten the privacy of user. To create a virtual persona of oneself is to allow access to increasing degrees of personal information. As such, radiologists who are taking their first steps into the world of online social networking may have valid concerns about just how much personal information is required for active participation.

Fortunately, there are many approaches to minimizing the intrusion into one’s personal life. One such approach is to limit one’s involvement to sites that are secure (LinkedIn), physician-only (Sermo, Doximity), or even limited to radiologists (RadRound) (15). These online social networking sites often require a more extensive registration process, including requiring an academic e-mail address and verifying medical credentials, before allowing access. These particular Web sites also offer a multitude of privacy settings that allow users to specify exactly who may or may not view their profiles. Often, the user can even tailor the parts of the online profile, which are visible to different groups of viewers. For example, a user could set his or her preferences such that only physicians who have registered through the Web site are able to view the user’s more private information.

An alternative approach for radiologists looking to interface with online social networking Web sites, but for whom privacy is of the utmost importance, is to create two separate online personas, one for professional information and another for personal information (17). By completely dissociating the user’s online presence into separate personal and professional domains, radiologists can enjoy the benefits of both personal and professional online social networking. For example, a user could have a personal account on Facebook and Twitter (eg, “Jon Smith”), which they use to connect with friends and family without the fear of needing to censor their thoughts for an audience of patients and professional colleagues. The same user could also have a separate professional profile on Doximity, Sermo, and LinkedIn (eg, “Jonathan A. Smith, MD”), and could display their medical credentials, their office contact information, and other professional data. This theoretical user could choose to make no reference to their professional lives within the contents of their personal profile, to solidify the separation.

**Protection of Patient Privacy**

Maintaining patient confidentiality must be a priority in the medical use of online social networking, yet Prasanna et al. note that ensuring privacy for patients is an open issue in medical social networking (17). Online social networking sites that are used periodically may eventually aggregate sufficient information to result in an inadvertent violation of patient health privacy. By sharing some personal information, it may be possible to identify an individual person. For example, it has been shown that up to 87% of the US population can be uniquely identified by zip code, age, and gender (21). Sharing personal data should be guided by appropriate caution, and permission settings should be reviewed before using online social networks (22). Such risks
may also be reduced establishing and following departmental policies on appropriate content for Web pages.

Legal Obligations and Pitfalls

When new computer or communication technologies are introduced into the hospital or clinic setting, preexisting information technology policies may need to be reviewed for compatibility with professional online social networking. The activities that constitute authorized conduct on the hospital network may need to be reviewed, especially with respect to using social networking for promotional, collaboration, or clinical consultation. The techniques for maintaining an appropriate doctor–patient relationship should be reviewed on an institutional level to establish uniform practices. Physicians should maintain an appropriate professional distance and meet the standards of professional conduct (23,24). Establishing a social networking profile for a hospital, department, or practice may help to diffuse personal relationships and help make clear to patients that physicians contribute to these pages as a group in a professional role.

The potential legal review of online social networking should be carefully considered before engaging in social networking as a radiologist. Decisions or expedience or convenience may be reconsidered under courtroom cross-examination. Ensuring a studious and professional demeanor can help to establish and maintain credibility, which could be undermined by publication of photographs or information from casual settings (eg photographs taken at a party and later uploaded to Facebook). A physician who regularly makes responsible choices could be undermined by activities that might be seen as unprofessional during a legal proceeding, published to an online social network or through the unwise judgment of the physician’s social networking associations. Social media interaction between patients and their physicians raises the issue of legal liabilities of medical communication. If a patient sends a chat communication to a physician, which may have implications for medical treatment, the physician may have legal duties.

SO NOW THAT I AM INTERESTED IN ONLINE SOCIAL NETWORKING, HOW DO I GET INVOLVED?

The authors hope that readers are now in agreement that online social networking is an important activity for radiologists looking to maximize their career potential. The question many readers may now have is “How do I get involved in online social networking?” Presented here is a short list of steps the interested reader can take to become involved and a subset of the more common online social networking services that may be of interest to radiologists.

Step 1: Get involved! Explore some of the sites listed in the following or any other reputable sites that interest you. Be aware that different sites may cater to audiences with different interests. Take care to select the site(s) that are best for you.

Explore the site and its participants and the general content of dialog. Once you find a site that is a good fit, create an account. When creating your account, you will likely be asked to enter your personal profile. When creating a profile, upload the information that you want the world to know about you. This may include your current practice, skills, awards, training, and research interests. You can think of the information you upload as somewhat of an electronic business card.

When creating your account, be sure to read the site’s user guide and policies such that you are aware of what data will be made available to the public in general, what will be available to select colleagues, and what will remain private. Be aware that even data marked private may accidentally be made public by inadvertently changing access settings. As with any other Internet site, be mindful of the information that you upload.

After creating your profile, you can begin to network with others. If you are new to online social networking, start slow. Try joining one network and work with that network for a week or two to determine if it meets your needs (and to better establish what your needs may be).

Online Social Networking Services for Medicine and Radiology

Given in the following is a small subset of online social networking sites that may be of interest to physicians. Note that this list is by no means complete but gives a helpful subset of potentially useful social networking sites.

LinkedIn. LinkedIn (www.linkedin.com) provides hosting for both member- and public-facing versions of user profiles that list interests and summarize highlights of a curriculum vitae. To help users manage an online virtual contact database, requests to establish a connection require an existing relationship or a mutually trusted contact (Choy 2009). Although there is no charge to become a member, a premium membership option provides additional access to contacts and search information (Choy 2009).

As one of the premier professional online social networking Web sites, for both medical and nonmedical professionals, LinkedIn offers some of the most well-established and high-quality clinical interest groups. Per the company’s Web site, LinkedIn Groups “….connect the world’s professionals to make them more productive and successful.” (25). All members can apply to join various LinkedIn Groups, and although some require consent by the Group, many can be joined instantaneously.

While some of the LinkedIn Groups are broad in scope (including national and international radiology organizations such as: the Radiological Society of North America, American College of Radiology, and Association of University Radiologists), subspecialty societies often have their own Groups as well. Individual hospitals or health care conglomerates (eg, Partners Healthcare) will often have their own Groups in which current, past, or even prospective employees may participate. Other Groups are specific to
medical device companies (eg, General Electric) and often will link to educational discussion boards and conference schedules. Beyond groups that have already been established, users of LinkedIn are also able to start their own interest groups at no cost. This allows more advanced users to create their own niche of professional networking, while at the same time expanding the networking opportunities available to all LinkedIn users.

Sermo. Sermo (www.sermo.com) is an online social network exclusively for licensed US physicians, which allows discussion on member forums. An initial authentication process occurs before profile creation. Doctors are able to pose questions or offer their expertise to solve questions asked by others (22). The network identifies discussions based on a user’s specialty, opportunities for continuing medical education or applicable events. Sermo has opportunities for honoraria for performing services such as leading a discussion (17). Within the Sermo network, users have the option to use a default pseudonym, with only their medical specialty provided. (22) The Sermo network sells forum access to third parties, such as companies in the health care and financial services sectors.

Doximity. Doximity (www.doximity.com) is an online professional network for US physicians founded by Jeff Tangney, cofounder of Epocrates, launched in October 2010, with over 200,000 verified members as of August 2013. At the time of Doximity’s launch, Tangney noted that only 2% of US physicians were LinkedIn members. Doximity maintains a searchable directory of over 700,000 US physicians. Members can build personal pages in minutes with minimal data entry (eg, directing a PubMed search to find publications) that can serve as an online resume or a list of research interests. Medical news and journal articles can be reviewed with an electronic continuing medical education system, and members can use Health Insurance Portability and Accountability Act (HIPAA)-secure collaboration through Internet chat or fax features. Doctors can also locate nearby pharmacies, imaging centers, hospitals, and laboratories. For frequently called numbers, members can access a colleagues’ protected back office line and privately share direct numbers in return.

Ozmosis. Ozmosis (www.ozmosis.com) is an online social networking platform directed at all physicians and allows for physician networking and exchange of information. Ozmosis has a variety of additional useful tools including a secure platform for sharing information and organizing meetings, as well as an application for accessing the network from a mobile device.

RadRounds. RadRounds (www.radrounds.com) is an online social networking site created for radiologists, allowing networking, group formation, private group discussion, and image storage, with multiple security levels for group discussions and online images/ files (17). Members begin by creating a profile and building a connected network of colleagues. A search function allows users to locate new connections based on a member’s affiliation, specialties, or clinical interest. Within a RadRounds group, images may be stored and organized by folders. Members can engage in private case discussions, and lists of useful links can be shared.

Radiolopolis. Radiolopolis (http://radiolopolis.com) is an international online social networking site for radiology. This site offers networking, educational opportunities, and employment networking for radiologists. The community offers subspecialty specific networking for interests including Body imaging and Pediatric Radiology.

ResearchGate. ResearchGate (www.researchgate.net) is an online social networking site designed to facilitate research networking and collaboration. Although ResearchGate is not specific to radiology or medicine, it is a very helpful site for networking in research. Physical scientists, social scientists, engineers, physicians, and others use this site as a forum for discussion of research ideas. This site may be useful for finding a collaborator for one of your projects or for working with another established researcher on their project.

CONCLUSIONS

In conclusion, online social networking has become a common and important means for communication in our society. Although many online social networking platforms are of a recreational nature, several sites offer services which are more professionally oriented and are relevant to health care practitioners seeking professional networking opportunities. In particular, there are several services which now cater to radiologists and offer tools for radiologists to stay at the top of their profession. Online social networking platforms coupled with mobile devices make it possible to stay connected while on the move and away from one’s desktop computer. A goal of this article was to illustrate that even a busy radiologist needs to make time to social network. The alternative is that a radiologist becomes less connected compared to their colleagues, a dangerous situation in the current competitive health care environment. Consequently, online social networking services are a vital aspect of a radiologist’s career and may be readily incorporated into one’s daily practice.

REFERENCES


