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Radiologist Use of and Perceived Need for Patient Data Access

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Given the increasing volume of radiological exams, the decreasing frequency of direct communication with the referring provider, and the distribution of patient data over many clinical systems, radiologists often do not have adequate clinical information at the time of interpretation. We have performed a survey of radiologists to determine the need and actual utilization of patient data at the time of image interpretation. Our findings demonstrate that most radiologists want more clinical information when interpreting images and that this information would impact their report, but they are discouraged by the time it takes to access this information. In addition, current mechanisms for monitoring necessary patient follow-up are inadequate.

KEY WORDS: Workflow, Transforming the Radiological Interpretation Process (TRIP), information resources, decision making, clinical workflow, clinical information systems

INTRODUCTION

As radiologists interpret more studies and more images per study, the burden of this expanding workload ultimately rests upon the radiologist at the point of interpretation. Strategies for streamlining workload and managing large datasets have been outlined in previous Society for Imaging Informatics in Medicine—Transforming the Interpretation Process publications[1–3] and include computer-assisted detection, innovative reporting mechanisms, and customized display protocols. However, anecdotal reports indicate that the lack of pertinent clinical patient data may be one critical element that limits the accuracy of the radiologist's diagnostic decision-making process. To assess radiologists' need for additional clinical data, as well as to assist in designing digital solutions to address these shortcomings, we devised and validated a web-based survey to measure the utilization of patient data by radiologists. This questionnaire also assessed the radiologists' perceived needs for additional patient information, both at the time of interpretation and in follow-up of imaging examinations.

MATERIALS AND METHODS

A web-based survey was devised, validated, and subsequently distributed to attending radiologists, radiology fellows, and radiology residents at eight academic medical centers. The survey comprised 27 questions in multiple-choice format with options for text comments. Survey participants were solicited via email between March 2005 and March 2006. Questions assessed demographics of respondents, the type of radiology environment in which they practiced, as well as the mix of hospital- and nonhospital-based exams. The survey also assessed details of the information technology environment in which the respondent practiced, including how radiology orders were typically processed, and how images were displayed for interpretation. The remainder of the survey addressed opinions about acquisition and access to relevant clinical patient information, both at the time of the examination and in follow-up.

Table 1. Survey Results

	Number	Percent (%)
Gender		
Male	98	70.5
Female	41	29.5
Total respondents	139	
Skipped this question	0	
Age		
Mean	40.59854	
Standard deviation	11.21085	
Total respondents	139	
Skipped this question	0	
Please describe your academic career stage		
Resident	41	29.5
Fellow	23	16.5
Attending	75	54.0
Retired	0	0.0
Total respondents	139	
Skipped this question	0	
Practice type		
Academic	125	89.9
Private practice	7	5.0
Multispecialty group practice	2	1.4
Government	3	2.2
Other (please specify)	6	4.3
Total respondents	139	
Skipped this question	0	
How many attending radiologists is part of your practice? (Please exclude residents if applicable)		
1–5	5	3.8
6–10	4	3.0
11–20	13	9.8
21–50	62	47.0
>50	48	36.4
Total respondents	132	
Skipped this question	7	
What percentage of your time is spent in hospital-based practice?		
0–25%	3	2.2
25–50%	3	2.2
50–75%	7	5.0
75–100%	126	90.6
Total respondents	139	
Skipped this question	0	
Radiology orders/requests management		
Paper	32	24.1
RIS	90	67.7
HIS	41	30.8
Do not know	21	15.8
Other (please specify)	4	3.0
Total respondents	133	
Skipped this question	6	
Image display (check all that apply)		
PACS	130	97.7
Film	42	31.6
Teleradiology	63	47.4

Table 1. (continued)

	Number	Percent (%)
Do not know	1	0.8
Other (please specify)	6	4.5
Total respondents	133	
Skipped this question	6	
What percentage of studies is interpreted on digital monitors (vs on film) in your practice?		
Completely filmless	48	36.1
75–99%	78	58.6
50–75%	2	1.5
25–50%	2	1.5
1–25%	2	1.5
Completely film-based	1	0.8
Total respondents	133	
Skipped this question	6	
Which information sources do you typically use to obtain clinical information that is typically found in a patient's chart?		
Previous radiology reports	1	0.9
Outside radiology reports	70	61.9
Chemistry/microbiology/serology	2	1.8
Surgical pathology	2	1.8
Operative notes	3	2.7
Discharge summaries	1	0.9
Admission notes	37	32.7
Progress notes	57	50.4
Total respondents	113	
Skipped this question	26	
How often do you access the following clinical data when you are reading a radiology study?		
Previous radiology reports	88	77.9
Outside radiology reports	14	12.4
Chemistry/microbiology/serology	8	7.1
Surgical pathology	9	8.0
Operative notes	4	3.5
Discharge summaries	4	3.5
Admission notes	4	3.5
Progress notes	4	3.5
Total respondents	113	
Skipped this question	26	
When interpreting a radiology exam how often do you believe that you need more information than you have been given about a patient's clinical history?		
Almost always (81–100%)	38	32.2
Frequently (61–80%)	47	39.8
Sometimes (41–60%)	25	21.2
Occasionally (21–40%)	7	5.9
Rarely (0–20%)	1	0.8
Total respondents	118	
Skipped this question	21	
How important is this missing clinical information to your final interpretation?		

Table 1. (continued)

	Number	Percent (%)
Important (I would be willing to modify or change my radiological diagnosis based on additional clinical information)	100	87.0
Not important (I am confident in my radiological diagnosis and findings and am willing to leave the clinical correlation of my findings to the clinicians)	8	7.0
Other (please specify)	7	6.1
Total respondents	115	
Skipped this question	24	
If you do not currently have access to this information how important is it that you have it in the future?		
I would likely use this clinical information system in my practice if it was readily available	103	93.6
I would not use this additional information in my practice	0	0.0
Other (please specify)	7	6.4
Total respondents	110	
Skipped this question	29	
If you are not using additional clinical information systems to assist in your diagnosis what are your reasons?		
It takes too much time to look up additional clinical information	49	53.3
My institution/practice does not have this capability	14	15.2
I would rather make my diagnosis based on the radiological findings and leave the clinical correlation up to the clinician	0	0.0
Other (please specify)	29	31.5
Total respondents	92	
Skipped this question	47	
How often do you obtain clinical follow-up on cases?		
On all questionable or interesting cases	43	38.1
If it is needed for a compliance report	2	1.8
When I remember and have time	59	52.2
Rarely	9	8.0
Total respondents	113	
Skipped this question	26	
How do you obtain your clinical follow-up?		
I communicate (phone/email/etc.) with the referring clinician	65	57.5
I check follow-up images or pathology reports	86	76.1
N/A	5	4.4
Other (please specify)	9	8.0
Total respondents	113	

Table 1. (continued)

	Number	Percent (%)
Skipped this question)	26	
How do you keep track of cases that require follow-up?		
Handwritten log (personal notebook/index card/etc.)	71	62.8
On a hand-held computer (Palm)	17	15.0
Web-based database	2	1.8
Spreadsheet application on a desktop or laptop (i.e., Microsoft Excel)	7	6.2
Database on a desktop or laptop computer (i.e., Access)	11	9.7
RIS-based solution	3	2.7
PACS-based solution	8	7.1
Other (please specify)	9	8.0
Total respondents	113	
Skipped this question	26	

RESULTS

The results of the survey are listed in Table 1. Respondents had a mean age of 41 years. The majority of respondents (70%) were men. The vast majority of the radiologists were in an academic setting (90%). About half (54%) were attending radiologists and the remainder being radiology residents and fellows.

While some respondents reported use paper requests for some radiology orders, the majority utilized either a radiology information system or another health information system (HIS). Likewise, the majority utilized digital technology for image display; more than 95% of respondents stated their practice interpreted more than 75% of their studies on digital monitors.

Most radiologists (72%) reported that they frequently needed more clinical information about their patients than they received (Fig. 1). More than 87% reported that additional clinical information was important and that this information could change or modify the interpretive report (Fig. 2). Of the available sources of information, radiologists reported that outside radiology reports, admission notes and progress notes typically yielded their preferred clinical information. However, despite their desire for these information sources, they reported using them less than 15% of the time. The majority of respondents utilized previous radiology reports for their patient information yet described this source as being the most limited. Ninety-four
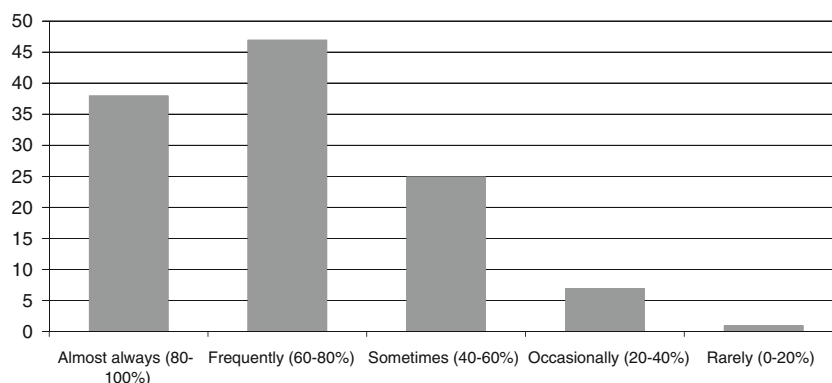
Fig 1. When interpreting a radiology exam, how often do you believe that you need more information than you have been given about a patient's clinical history?

percent reported that they would use other clinical systems if they were readily available (Fig. 3).

The most frequently cited reason for not seeking access to additional clinical information was that such efforts were too time consuming (53%; Fig. 4). More than half (52%) of radiologists obtained clinical follow-up when they "remember and have time," and 38% obtained clinical follow-up on "all questionable and/or interesting cases." The most common method of tracking follow-up was using a handwritten log (63%) or a personal data assistant (15%). Clinical follow-up information was predominantly obtained either through discussions with the referring clinician or through subsequent imaging or pathology reports.

The respondents were asked to rank information technology resources that they would use if available in their practices. The top five choices were resources that enabled viewing of images from other institutions, searching of scientific literature, consulting online textbook resources, incorporating images into reports, and tracking of clinical follow-up reminders.

DISCUSSION

Information systems have significantly enhanced the efficiency of patient care, while advances in imaging technology have likewise increased the extensive volume of radiographic studies. This
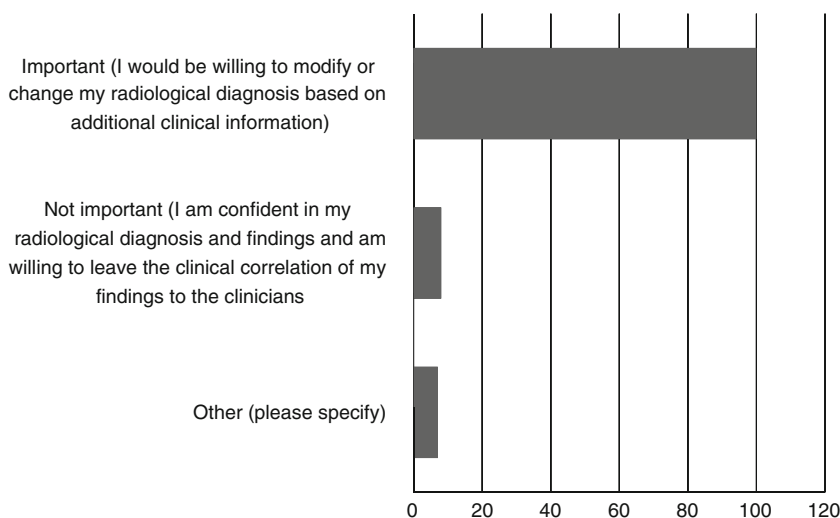

Fig 2. How important is this missing clinical information to your final interpretation?
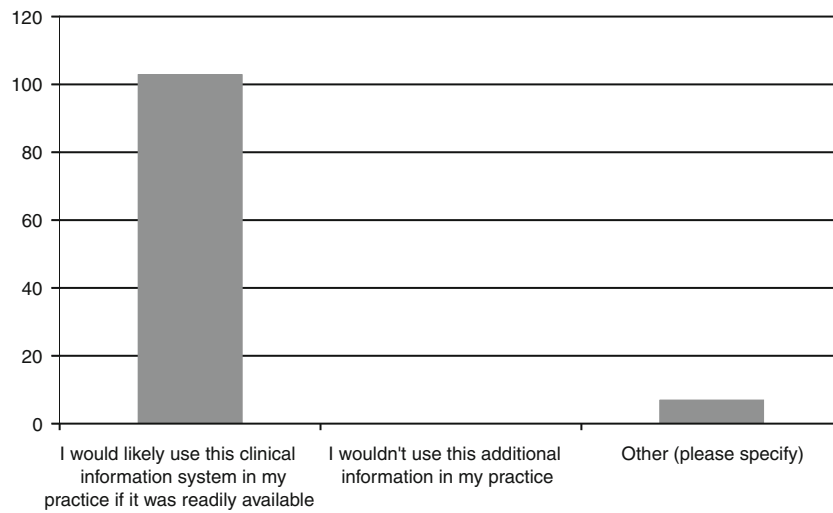
Fig 3. If you do not currently have access to this information, how important is it that you have it in the future?

combination of factors has placed a greater burden on the radiologist to deliver timely interpretations despite the growing number of image sets per study. Although many facilities now provide access to patient electronic medical records, often these systems are not readily accessible to the radiologist at the time of the exam. Even if these systems are available in the reading room, time constraints on the radiologist do not allow efficient review of clinical data. As a result, a majority of radiologists feel there is inadequate clinical data available to optimize radiographic interpretations. Furthermore,

they feel there are inadequate mechanisms in place to allow appropriate follow-up of imaging these exams.

The results of this survey raise three major issues. Firstly, academic radiologists believe that the most useful patient information exists in outside radiology reports and in admission notes and progress notes. Secondly, despite radiologists' belief in the primacy of this information, they only access these reports in a minority of cases. Thirdly, time constraints are the primary reason that radiologists do not access this information. These findings suggest that systems could be designed to retrieve and
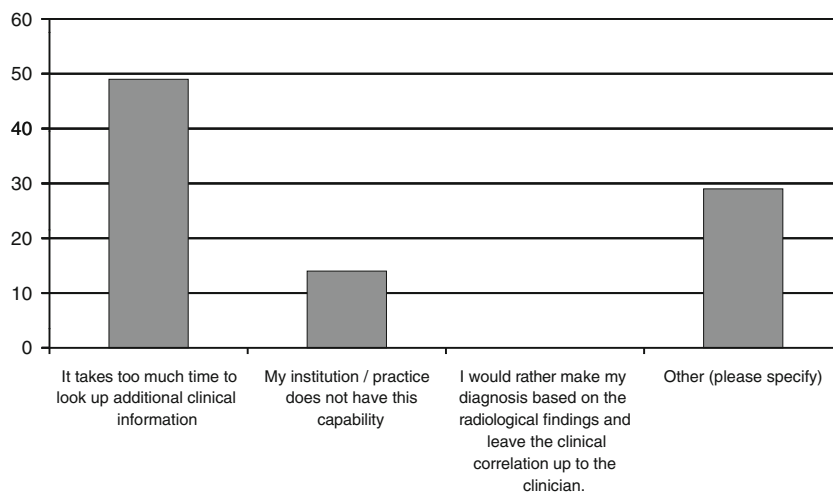

Fig 4. If you are not using additional clinical information systems to assist in your diagnosis, what are your reasons?

organize patient clinical data from other HIS and then display this information to the radiologist efficiently at the time of interpretation. For example, specific patient data could be electronically targeted for retrieval at the time of the exam and collected for the radiologist to review along with the study. Almost all radiologists indicated they would use this type of system. The majority felt it would make a significant impact in the quality of their interpretations.

Another reported deficiency in current academic radiology practice is the ability to follow-up on previously interpreted exams. Most radiologists rely on memory to do so; the majority simply keeps a handwritten log. This finding suggests that the quality of patient care could be significantly improved by a mechanism to set flags or reminders that would alert the radiologist hours, days, or weeks later that follow-up is available. In the maze of subspecialists who care for a patient, this reminder system would help provide additional safeguards that crucial follow-up is addressed.

CONCLUSION

The majority of academic radiologists are dissatisfied with their ability to access clinical patient information at the time of interpretation. Although most radiologists place a high priority on obtaining such clinical information, a number of factors discourage widespread use of this information in routine practice. In addition, current mechanisms for monitoring necessary patient follow-up are inadequate.

In many hospitals, multiple different systems are used to access clinical data, which present challenges to the radiologist such as multiple logins and user interfaces. Legacy systems may present challenges to information technology staff trying to integrate these systems due to nonstandard, proprietary interfaces. Once these challenges are met, the next obstacle is presenting large amounts of clinical data to the radiologist in a manner that is quickly digested and interpreted and requiring minimal user interaction to avoid distraction from the image interpretation process.

There is a critical need for an integrated, modular, open application for the automatic identification, selection, retrieval, and display of pertinent patient information at the time of interpretation. Likewise, there is a need to provide alerts and reminders for subsequent patient follow-up. Together, these applications would have a significant impact on the satisfaction of radiologists, the quality of radiology interpretations, and thereby on the quality of care.

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