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Authors

Cabarrus, M
Naeger, DM
Rybkin, A
et al.

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Patients Prefer Results From the Ordering Provider and Access to Their Radiology Reports

Miguel Cabarrus, MD^a, David M. Naeger, MD^a, Alexander Rybkin, MD^a, Aliya Qayyum, MBBS^b

Abstract

Purpose: Imaging results are generally communicated to patients by referring providers. Directly communicating results has been suggested as a way for radiologists to add value, though few studies have investigated patients' preferences in this regard. The aim of this study was to determine patients' preferences for receiving their imaging results.

Methods: In this institutional review board-approved study, adult outpatients undergoing CT or MRI at an academic medical center and an affiliated county hospital over a 4-week period ($n = 2,483$) were surveyed. The survey assessed patients' preferred delivery method for radiology results and their understanding of radiologists' education and role.

Results: A total of 617 surveys (25% response rate) were completed, 475 (77%) and 142 (23%) by academic medical center and county hospital patients, respectively. Among all respondents, the majority of patients (387 of 617 [63%]) preferred models of results delivery centered on the referring physician as opposed to the radiologist. Regardless of who verbally relayed the results, 64% of all respondents (398 of 617) wanted the option to receive a copy of the report, and 522 of 614 (85%) wanted to see their images. Among patients wanting copies of their reports, academic medical center patients expressed equal interest in mail, e-mail, and online portal options (33%, 31%, and 36%, respectively), and county hospital patients preferred mail (55%, 28%, and 17%, respectively) ($P < .001$).

Conclusions: Patients prefer receiving their imaging results through their referring providers. Many patients would also like to view their images and receive copies of their reports, potential avenues through which radiologists could add value.

Key Words: Patient preferences, reporting, communication

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INTRODUCTION

Accurate image interpretation is pivotal to the delivery of modern medical care, yet despite being responsible for this task, radiologists remain relatively invisible and removed from direct patient contact [1]. Traditionally, radiologists have interacted with referring physicians more than patients, consulting on the appropriate use of imaging and relaying the results after the study. Referring physicians, in turn, have been the primary conduit for delivering the results to patients.

In an era of value-focused care, some authors have called on radiologists to increase their direct communication with patients in an effort to improve visibility and create value [2-6]. Improved visibility helps radiologists demonstrate the value they already currently provide [1,7]. Additional "value" through direct communication could result from a reduced number of intermediary communication errors, decreased delays in patient management, reduced patient stress and anxiety, and improved patient adherence to follow-up recommendations [8-10].

A shift toward greater radiologist-patient interaction would almost certainly come at a cost. First, communicating with patients can be time consuming, thereby pulling radiologists away from reading studies. Second, making the organizational change toward direct communication could be labor intensive and/or unpopular; increased coordination with ordering providers

^aDepartment of Radiology and Biomedical Imaging, University of California, San Francisco, San Francisco, California.

^bDepartment of Diagnostic Radiology, The University of Texas MD Anderson Cancer Center, Houston, Texas.

Corresponding author and reprints: David M. Naeger, MD, University of California, San Francisco, Department of Radiology and Biomedical Imaging, 505 Parnassus Avenue, M-391, Box 0628, San Francisco, CA 94143-0628; e-mail: david.naeger@ucsf.edu.

would likely be needed to ensure that cohesive information is provided to patients, or in the absence of such coordination, such a change could lead to provider complaints. Additionally, if patient access to reports resulted in “patient-tailored” or “patient-friendly” reports or letters, additional time would be required to create multiple drafts of reports.

Because the true benefits and costs of shifting to a direct communication model are still unknown, many questions must be answered before the field embarks on such a sea change. First among these unknowns are the preferences of patients. Few studies have examined patients’ preferences, and those that have, have yielded conflicting results [8-13]. Additionally, most previously published studies involved surveys of outpatients at single institutions, resulting in narrowly selected groups of patients. We therefore surveyed a broad range of patients presenting to diverse institutions to build upon this prior research. We elected to present patients with a hypothetical choice among multiple realistic scenarios for receiving their results in an attempt to determine patients’ preferences among feasible options. We hypothesized that patients would prefer communication methods involving direct communication with radiologists. Furthermore, we hypothesized that patients would want to access to their reports and would want to see their images when the results were relayed.

METHODS

The study was approved by the institutional review board and was HIPAA compliant. Over a 4-week period, 2,483 anonymous, voluntary surveys were administered by front desk staff members to all English-speaking adult patients undergoing outpatient CT or MRI at a tertiary care academic medical center and at an affiliated county hospital. Outpatients presenting to the tertiary care academic medical center were scanned at the main hospital or at 1 of 3 outpatient imaging centers, depending on patient preference and scanner availability. Before their examinations, patients were asked to complete the survey alongside the standard paperwork and screening forms usually administered. Study staff members were available to answer questions if needed, though they were not present in person, to ensure privacy and prevent undue influence. Patients were informed that participation in the survey, which was clearly identified as separate from the required paperwork, was voluntary and anonymous and that their responses would not affect the results of their examinations or how the results were delivered.

The survey questions are listed in their entirety in [Tables 1 to 3](#), clustered into 3 categories: patient demographic information, preferred means of receiving results, and understanding of the training and role of a radiologist.

The primary question in the section assessing patients’ preferences for receiving results asked patients to select from 5 scenarios for results communication. Surveys without this question answered were excluded. In that same section, patients were also asked from whom they would want to hear their imaging results: an “expert in treatment and with whom you are familiar” or an “expert in interpreting scans with whom you are not familiar.”

Data analysis was performed using Stata version 10.0 (StataCorp LP, College Station, Texas). Differences were assessed with the Fisher exact or χ^2 test, with a *P* value < .05 considered to indicate statistical significance.

RESULTS

Demographic Information

A total of 617 of 2,468 surveys were completed (25% response rate), 475 (77%) from patients at the academic medical center facilities and 142 (23%) from patients at the university-affiliated county hospital. The respondents consisted of 279 men (47%) and 318 women (53%), with a mean age of 52 years (range, 18–88 years); all demographic information collected is presented in [Table 1](#).

Patients’ Preferences for Receiving Results

Among all respondents from both medical centers, 63% of the respondents (387 of 617; 95% confidence interval, 58%–67%) selected models of communication resembling the predominant, current practice of imaging results’ being channeled through referring physicians (options 1, 2, and 4, summarized in [Table 2](#)).

The remaining respondents, 37% of those surveyed (230 of 617; 95% confidence interval, 33%–41%), selected models involving direct communication between the patient and the radiologist, either via the phone (option 3) or in person (option 5); calling was preferred by 129 of the 230 patients (56%) wanting to learn their results from radiologists, presumably to avoid waiting in the department while the study is reviewed (which was stated as a limitation to selecting an in-person conversation). Speaking in person was preferred by 101 of the 230 patients (44%) wanting to learn their results from radiologists, presumably because of the improved

Table 1. Survey respondent demographics

Question	Answer Choices	Academic Medical Center (n = 475)	County Hospital, University Affiliated (n = 142)	All Patients (n = 617)	P Value for Differences Between Hospitals
Age (y) (mean ± SD)	Free response	52.3 ± 15.1	49.2 ± 11.6	51.5 ± 14.2	.03*
Sex	Male	197 (43%)	82 (59%)	279 (47%)	.001†
	Female	261 (57%)	57 (41%)	318 (53%)	
Ethnicity	Caucasian	313 (70%)	54 (39%)	367 (63%)	<.001‡
	Asian/Pacific Islander	34 (8%)	11 (8%)	45 (8%)	
	South Asian	9 (2%)	4 (3%)	13 (3%)	
	African American	25 (6%)	43 (31%)	68 (12%)	
	Hispanic	38 (9%)	12 (9%)	50 (9%)	
	Other	29 (7%)	14 (10%)	43 (7%)	
	What is your level of education?	Up to high school	80 (18%)	48 (35%)	
	College/university	250 (55%)	85 (62%)	335 (56%)	
	Master's or doctorate	125 (27%)	5 (4%)	130 (22%)	
Commute time to imaging center	<30 min	138 (30%)	86 (62%)	224 (38%)	<.001‡
	30–60 min	127 (28%)	45 (32%)	172 (29%)	
	1–3 h	134 (29%)	8 (6%)	142 (24%)	
	>3 h	59 (13%)	0 (0%)	59 (10%)	
Number of visits to doctor's each year	0–1	47 (10%)	11 (8%)	58 (10%)	.76†
	2–4	156 (34%)	51 (37%)	207 (35%)	
	5–8	106 (23%)	34 (25%)	140 (24%)	
	9–12	77 (17%)	27 (19%)	104 (17%)	
	13–18	26 (6%)	7 (5%)	33 (6%)	
	>18	44 (10%)	9 (7%)	53 (9%)	

*Student t test.

†Chi-square test.

‡Fisher exact test.

communication and ability to establish a face-to-face rapport.

Although there were differences in patient demographics, there was no statistical difference in the preferences of county versus academic medical center patients in selecting a preferred model ($P = .10$).

Consistent with these results, when given a binary choice of hearing results from an “expert in treatment and with whom you are familiar” or an “expert in interpreting scans with whom you are not familiar,” 82% (504 of 615) selected the former.

Among all respondents from both medical centers, 64% (398 of 617) selected models that included the option to receive copies of their reports (options 2–5, which included models with direct radiologist communication and models with referring provider communication). Only 219 of 617 (36%) expressed no interest in receiving their reports, relying only on communication with referring providers to learn their results.

For patients wishing to be provided with their imaging reports, academic medical center patients expressed equal interest in mail, e-mail, and online portal options

(33%, 31%, and 36%, respectively), though the county hospital patients preferred mail (55%, 28%, and 17%, respectively), results that differed between the 2 populations ($P < .001$).

Of 614 respondents, 522 (85%) expressed a desire to view their images when receiving their results.

Patients' Knowledge of the Education and Role of Radiologists

Of 616 respondents from both hospitals, 543 (88%) indicated that they “know what a radiologist is and what they do,” though only 56% identified radiologists as medical doctors (Table 3). Patients on average estimated that 6.8 years of post-high school training was required to become a radiologist (the actual answer is a median and mode of 13 years, not including fellowship training). Forty-three percent believed that radiologists operate CT and MRI scanners, and 32% (183 of 574) identified that radiologists do biopsies and minimally invasive procedures. Seventy-nine percent of patients (468 of 596) correctly answered that radiologists interpret imaging studies.

Table 2. Summary of patients' preferences for receiving examination results

Question	Answer Choices	County			P Value for Differences Between Hospitals
		Academic Medical Center, (n = 475)	Hospital, University Affiliated (n = 142)	All Patients (n = 617)	
Typically, the results from radiology tests get communicated directly to the doctors who order them. If it were up to you, how would you prefer your exam report to be communicated to you?	Option 1: Leave immediately after the scan and have the report mailed to my doctor. I would speak with my doctor to learn the results.	162 (34%)	57 (40%)	219 (35%)	.10*
	Option 2: Leave immediately after the scan and have the report mailed to my doctor and me.	135 (28%)	25 (18%)	160 (26%)	
	Option 3: Leave immediately after the scan and have a Radiologist from this department call me with the results in 1-3 hours. I could also have a copy of the report mailed to me.	93 (20%)	36 (25%)	129 (21%)	
	Option 4: Wait an hour then have the written report given to me by the radiology front desk.	6 (1%)	2 (1%)	8 (1%)	
	Option 5: Wait an hour then have the results explained to me in person by a Radiologist in this department. I could also get a copy of the report.	79 (17%)	22 (16%)	101 (16%)	
In general would you prefer receiving radiology results from a physician who is:	An expert in treatment and with whom you are familiar	388 (82%)	116 (82%)	504 (82%)	.92 [†]
	An expert in interpreting scans with whom you are not familiar	85 (18%)	26 (18%)	111 (18%)	
If you were to receive written results in some form, which form do you prefer most?	Mailed paper report	157 (33%)	78 (55%)	235 (38%)	<.001 [†]
	Emailed report	148 (31%)	39 (28%)	187 (30%)	
	An online report accessible from a website (through which you could also access lab results, communicate with your provider, view or change office visits, etc.)	168 (36%)	24 (17%)	192 (31%)	
If you were to receive the results of your study verbally, would you want to see the images as part of the conversation?	Yes	400 (85%)	122 (86%)	522 (85%)	.73 [†]
	No	72 (15%)	20 (14%)	92 (15%)	

*Fisher exact test.

[†]Chi-square test.

The preferred model of results delivery was reanalyzed in the subset of patients who accurately identified radiologists as physicians who interpret medical images, not the operators of the scanners (n = 226). As in the overall cohort, only a minority of this subgroup preferred to hear their results from radiologists (42%), though more wished to than in the group of 356 respondents who answered 1 or more of the questions about radiologists incorrectly (37%) (P = .048).

DISCUSSION

In the emerging era of value-focused care, many in the radiology community have suggested that radiologists “step out of the dark” by providing more services directly to patients, most prominently the communication of radiologic results. Although the benefits and costs of direct communication have been extensively debated, few studies have examined the preferences of patients regarding the delivery of their results. In our survey of

Table 3. Patients' understanding of the education and role of radiologists

Question	Answer Choices	Academic Medical Center (n = 475)	County Hospital, University-Affiliated (n = 142)	All Patients (n = 617)	P Value for Differences Between Hospitals
Overall, do you feel you know what a radiologist is and what they do?	Yes	426 (90%)	117 (82%)	543 (88%)	.02*
	No	48 (10%)	25 (18%)	73 (12%)	
Is a radiologist a medical doctor?	Yes	279 (59%)	66 (47%)	345 (56%)	<.001*
	No	194 (41%)	76 (53%)	270 (44%)	
Do radiologists position you on the CT or MRI scanner and operate the scanner?	Yes	125 (32%)	104 (75%)	229 (43%)	<.001*
	No	263 (68%)	35 (25%)	298 (57%)	
Do radiologists interpret the images from the CT or MRI scanner?	Yes	382 (83%)	86 (63%)	468 (79%)	<.001*
	No	78 (17%)	50 (37%)	128 (21%)	
After high school about how many years of schooling/training does it take to become a radiologist?	Free response	7.3 y	5.2 y	6.8 y	<.001†
Do radiologists perform minimally invasive procedures such as biopsies or certain cancer treatments?	Yes	143 (32%)	40 (31%)	183 (32%)	.81*
	No	302 (68%)	89 (69%)	391 (68%)	

*Chi-square test.

†Student t test.

617 patients, we found that most patients (63%) selected a model of results delivery involving the ordering provider. When given a binary choice to receive their results from treating physicians with whom they are familiar or experts in image interpretation with whom they are not familiar, they again selected the ordering provider. These findings do not support our initial hypothesis, which was that patients would prefer receiving their imaging results from imaging experts. To our knowledge, this is the only patient-preferences survey indicating a patient preference for the status quo.

We also surveyed our respondents regarding their knowledge of radiologists. In agreement with previous studies [11,13,14], there was a general lack of knowledge among patients regarding the education and role of radiologists. It is possible that this misunderstanding is a contributor to patients' disinterest in hearing results from radiologists, as suggested by our subanalysis showing slightly more interest in radiologist-centric communication models among patients most familiar with radiologists' role. Clearly there is room to improve the public's knowledge of radiologists; a study by Miller et al [15] demonstrated that an interaction as brief as 3 to 4 minutes with a radiologist improved patients' understanding of radiologists' roles, with more than half of patients reporting the interaction as a positive experience that enhanced their care [15]. Improved recognition of radiologists' roles may need to precede any substantial shift

in patients' preferences to hear results from image interpreters.

Although our study shows that patients preferred the current model of provider-centric communication, many other studies have shown preferences for direct communication. A recent study demonstrated that patients valued the timeliness of communication most, more than who delivered their results, with only 20% to 40% of patients stating they want their results only from the ordering physicians, regardless of the delay [8,9]. Other studies have indicated that rapid communication of results reduces stress [16]. In our presentation of 5 realistic models, patients did not prefer the models with the most rapid results, including a model in which the results could be provided in person within an hour. This could be due to a sense among the patients that the delays of the current system are not large and are generally worth the wait to hear results from physicians who are familiar with them and who can discuss their plans of care.

Although our survey and prior surveys asked patients to choose among discrete communication models, hybrid or "in-between" models may ultimately be the most desired. For example, radiologists could be available for communication with patients if desired after their results are initially relayed by ordering providers. Only a subset of patients would want such a service, likely those who would value it the most. Additionally, one "model" not officially listed in our survey or others is simply the

current system, but with the time for results reporting reduced, thereby allowing ordering providers to communicate results in a more timely manner. Almost certainly, such a system would be desired over a slower moving system [17] and would also be a way for radiologists to add value.

Regardless of who communicated their results, a majority of patients did indicate that they would like copies of their reports, which was in support of our secondary hypothesis. The preferred medium for report delivery varied between academic medical center and county hospital patients, but both subsets preferred access of some sort. This finding is concordance with those of several other studies [8,9,13,18]. After our survey closed, the academic medical center began releasing imaging results through an online patient portal, probably the most predominant method of directly providing reports to patients today [19]. Across the country, concerns have been raised about the downsides of direct access to full radiology reports. Unedited reports tend to contain copious medical jargon and are generally devoid of discussions of management; if relayed too soon before a doctor visit or without sufficient support, releasing results could actually worsen patient anxiety [14,20]. Should the medical field continue to increase direct access of medical reports to patients, issues regarding timing (before or after meeting with a physician) and content (tailored vs unedited reports) must be addressed. Nonetheless, this is a trend that is continuing. Regardless of the model of communication used, available reports with radiologists' signatures at the bottom likely would improve radiologists' visibility and may further the understanding of our profession.

An overwhelming majority of our patients expressed a strong interest in viewing their images as part of any discussion of radiologic results, regardless of who was doing the discussing. First, this argues for easy access to images across the health care enterprise to all physicians; with commonplace web-based PACS portals, this is already occurring [21]. Second, this may represent a long-term avenue to improve radiologists' visibility. Discussion with a radiologist may be more desired if a quick and accurate review of the images is part of the process and is superior to the experience patients receive when reviewing their images with ordering providers.

This is the first study of patient preferences, to our knowledge, to include county hospital patients. For the primary study question, preferences did not significantly differ between outpatients being imaged at an academic medical center and those at the county hospital. The only

substantial difference in answers between the 2 groups was with regard to how patients preferred to receive copies of their reports (most county hospital patients preferred paper mail) and their familiarity with the education and role of radiologists.

Our study had a number of limitations. We did not make a distinction among the preferred methods of delivery when the results were normal versus abnormal, as done by Basu et al [8]. Patients may indeed feel more comfortable discussing abnormal results with treating physicians with whom they are familiar. Making such a distinction is challenging, however, given that knowledge of whether results are normal or abnormal cannot be known until the results are available. Additional limitations of our study lie in the distribution method of the survey. Patients were offered the survey by reception staff members, who varied in how they presented the anonymous voluntary survey alongside the required paperwork before the study. We trained all staff members in an effort to standardize how the study was presented, including the use of scripted language; we also checked in with the staff members at regular intervals throughout the study. The response rate of 25% is not ideal, though it is in line with many voluntary surveys. We ensured a large study population obtained from a variety of imaging sites, though a volunteer bias may have persisted and skewed the results.

TAKE-HOME POINTS

- We present the first patient-preferences study, to our knowledge, to survey the preferences of a county hospital patient population compared with an academic medical center population.
- Patients appear to prefer the current model of results delivery, in which ordering physicians provide results.
- Patients desire access to their reports. This may represent an avenue to heighten radiologists' visibility by readily providing reports that are clearly produced and signed by radiologists.
- Patients expressed a strong preference to review their images when receiving their imaging results; given that radiologists are in the best position to accurately review medical images, this could present an opening for radiologists to take the lead in relaying results sometime in the future.

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