

What the Patient Wants: An Analysis of Radiology-Related Inquiries from a Web-Based Patient Portal

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Background

In 2009, the Health Information Technology for Economic and Clinical Health (HITECH) Act was passed, introducing the concept of “meaningful use” of electronic medical records (EMR) as a method of achieving national goals for healthcare in the United States¹⁻². To meet meaningful use requirements, healthcare systems have been constructing patient-centered electronic medical record messaging systems (“patient portals”) that allow patients to access their healthcare information^{1,3}. Through these portals, patients may view finalized radiology reports without visiting their physician, and communicate electronically with healthcare providers. Although intended to promote patient empowerment, patient portals also create vast stores of patient-centered data that can be used to improve our practice.

The purpose of our study was to better understand radiology-specific patient desires through an analysis of patient-initiated messages submitted through an online electronic medical record system.

Evaluation

IRB approval was obtained and informed consent waived for this HIPAA-compliant retrospective cross-sectional study. No external funding was utilized.

Patient Population

A query of all patient-initiated messages submitted to an electronic medical record system at a large academic health center between October 1, 2014 and December 11, 2014 was performed. A total of 49,298 patient-initiated messages were sent during this time period. Relevant messages containing one or more case-insensitive radiology-specific keywords (“x-ray,” “xray,” “xr,” “ct,” “cat,” “mri,” “scan,” “ultrasound,” “image,” and “radiology”) were identified. This search yielded 3,248 messages (6.6% [3,248/49,298]) sent from a patient to provider during this time period. Multiple unique messages sent by the same patient were included. The full text of each message was obtained along with the date and time of message submission, patient age, patient sex, and patient race.

A resident-level co-author (BMM) reviewed the 3,248 messages to determine eligibility. 1,651 messages were excluded due to one or more of the following reasons: only incidental mention of a radiology-specific key term (e.g., a patient asking whether to get their labs drawn prior to undergoing a CT); mention of a key term in a nested message falling outside of the date range of this study; erroneous matching of a key term (e.g., an address including ‘CT’ [Connecticut]); or messages for which the key term was unable to be identified. A sample (6.1% [100/1,651]) of the excluded data was evaluated by an attending-level radiologist co-author with 4 years of experience (MSD) to determine whether these data were appropriately excluded; the discrepancy rate with the original assignment was 0% (n = 0).

The final study group consisted of 1,597 unique, radiology-relevant messages from 1,489 patients (946 females [64%], 543 males [36%], mean age: 52 years).

During the study period, the following studies were performed at our institution: 54,497 radiographs (55% of all studies), 14,216 ultrasounds (14%), 19,032 CTs (19%), and 11,152 MRIs (11%).

Message Coding

The 1,597 messages that contained at least one radiology-specific keyword and met all inclusion and exclusion criteria were further analyzed by a single resident-level co-author (BMM). Messages were coded by content, with multiple identifier codes permitted per message (Table 1). A sample (6.3% [100/1,597]) of this data was validated by an attending-level co-author with 4 years of experience (MSD) to determine whether this data was appropriately coded; the discrepancy rate was 2% (2/100).

Table 1 – Patient Inquiries via the Patient Portal

Inquiry	N	%
What are my imaging results?	521	33.0%
What is the next best step for (finding)?	192	12.0%
What does (finding) mean (in my report)?	167	11.0%
I want a (CT/MRI/US/XR)	152	10.0%
Do I need imaging for (symptom)?	125	8.0%
Can I have a copy of my report/images?	88	6.0%
Will you take a second look at my study?	62	4.0%
Insurance question / preauthorization	58	4.0%
Scheduling question	55	3.0%
I need a prescription for:	48	3.0%
A sedative (before MRI)	38	2.0%
A steroid prep (for contrast allergy)	11	1.0%
I want my study done sooner	26	2.0%
I do not want this study at all	25	2.0%
What location can I get this study at?	36	2.0%
General anxiety or concerns	38	2.0%
Is (device name) MRI compatible?	13	1.0%
What is the purpose of this study?	23	1.0%
I want to know more about (CT/MRI/US/XR)	19	1.0%
Complaint about the Radiology department	13	0.8%
I want to postpone my study	11	0.7%
Other perceived error (in radiology report)	9	0.6%
Inquiry about IV contrast	9	0.6%
Can I have an open MRI?	6	0.4%
I need driving/location directions	4	0.3%
Can I get a study given my (lab result)?	4	0.3%
There is a typo in my report	3	0.2%
Can I see the images?	2	0.1%
Wrong side (in radiology report)	1	0.1%
Can I eat before this study?	2	0.1%
How much radiation does this study have?	2	0.1%
Will I get oral contrast?	1	0.1%
Wrong gender (in radiology report)	0	0.0%
Wrong age (in radiology report)	0	0.0%
Where can I park?	0	0.0%

For messages requesting radiology results, additional information was obtained: whether the study was performed at our institution (“inside study”) or another institution (“outside study”), the date and time the images were finalized in the Radiology Information System (RIS), the date and time the radiology dictation was finalized, and the date and time the ordering provider viewed the results.

Turnaround Times and Delays

Turnaround times (TAT) and other delays were calculated for patient messages requesting results. This was done to determine the variable contribution of the radiologist and referring provider to the delay. At our institution, there is a 14-day hold on any radiology result submitted to the patient portal. This is intended to prevent patients from prematurely viewing sensitive results, and give the referring provider time to contact the patient. This hold can be manually released by a referring provider in the electronic medical record. If they do not manually release the result, it will become visible automatically after 14 days.

Turnaround times (TAT) and other intervals were calculated (also detailed graphically in Figure 1):

- 1) Interval to Patient Message:
(time of patient inquiry) – (time study completed in RIS)
- 2) Radiology TAT:
(time dictation finalized) – (time study completed in RIS)
- 3) Provider Dissemination Delay and Shortfall vs. Patient Expectation:
(time of patient inquiry) – (time dictation finalized)
- When the result was positive, this was considered a Provider Dissemination Delay. When negative, this was considered a Shortfall vs. Patient Expectation.
- 4) Provider Viewing Delay:
(time provider viewed dictation) – (time dictation finalized)

Figure 1

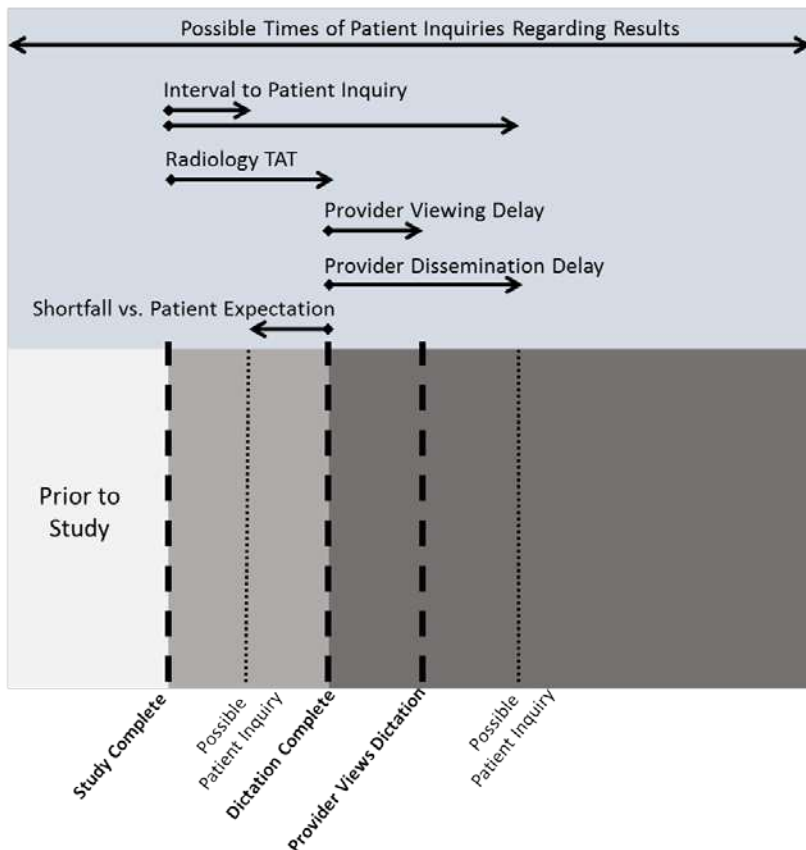


Figure 1: Calculation of Turnaround Times (TAT), Delays, and Intervals for patients who inquired regarding imaging results. Arrows and definitions (upper half of image) represent the period of time between events listed on the timeline (lower half of image). Light grey on the timeline is considered the period in which Radiology delays occur, and dark grey on the timeline is considered the period in which Provider delays occur.

Delays attributable to the radiology department included the Radiology TAT. Delays attributable to the provider include the provider viewing delay and the provider dissemination delay.

Data Analysis

Continuous measures were summarized with means and standard deviations. Categorical measures were summarized with counts and percentages. Modality-specific patient message volumes were compared to modality-specific imaging volumes with Chi Square tests to determine whether certain imaging modalities generated a disproportionate number of inquiries. The proportion of messages sent by males and females was also compared with Chi Square test. Provider- and radiology-specific turnaround times were compared with Student's t-test.

Results

Patient-initiated messages containing ≥ 1 radiology specific keywords were significantly more likely to originate from females than males (64% [946/1,489] vs 36% [543/1,489], $p < 0.0001$).

Patient interest was significantly discrepant ($p < 0.001$) from actual scan volume for MRI, CT, and plain radiography (MRI messages: 38% [607/1,609] vs. MRI performed: 11% [11,152/98,897]; CT messages: 25% [400/1,609] vs. CT performed: 19% [19,032/98,897]; plain radiography messages: 23% [368/1,609] vs. plain radiography performed: 55% [54,497/98,897]). Patient interest was similar to the scan volume for ultrasound (US messages: 14% [234/1,609] vs. US performed: 14% [14,216/98,897]). Advanced imaging studies (CT, MRI) received the greatest attention, representing the subject of 63% of all portal messages. The most common inquiry was for imaging results (33% [521/1,597], $p < 0.001$); such messages were submitted a median of 5 days (interquartile range (IQR) 2 – 9 days) from the time of imaging. Other common requests included questions about management (12% [191/1,597]), questions about medical jargon (11% [168/1,597]), a desire for a radiologic study (10% [151/1,597]), and clarification about the need for a radiologic study (8% [124/1,597]). Less common reasons for inquiry included asking for a copy of a report or images (6% [88/1,597]), asking the provider to take a “second look” at a study (4% [62/1,597]), rescheduling a study (2% [37/1,597]), or asking for a sedative prior to a study (2% [38/1,597]). Patient-initiated comments about report structure (e.g., typographical errors) or the radiology department in general were rare (1% [13/1,597], and 1% [13/1,597], respectively). A detailed summary is included in Table 1.

For messages requesting imaging results, the median radiology TAT was 5 hours for inside studies (IQR 2 – 21 hours; $n = 480$), 127 hours for outside studies (IQR 96 – 331 hours; $n = 12$), and 5 hours overall (IQR 2 – 21; $n = 492$). The median provider dissemination delay was 102 hours (IQR 43 – 210 hours; $n = 422$). The median shortfall vs. patient expectation was -19 hours (IQR -4 to -46 hours; $n = 49$). The median provider viewing delay was 70 hours (IQR 17 – 215 hours). Twenty-nine index studies did not have available electronic time stamps for TAT calculations. A graphical analysis of these TATs and delays is included in Figure 2.

Figure 2

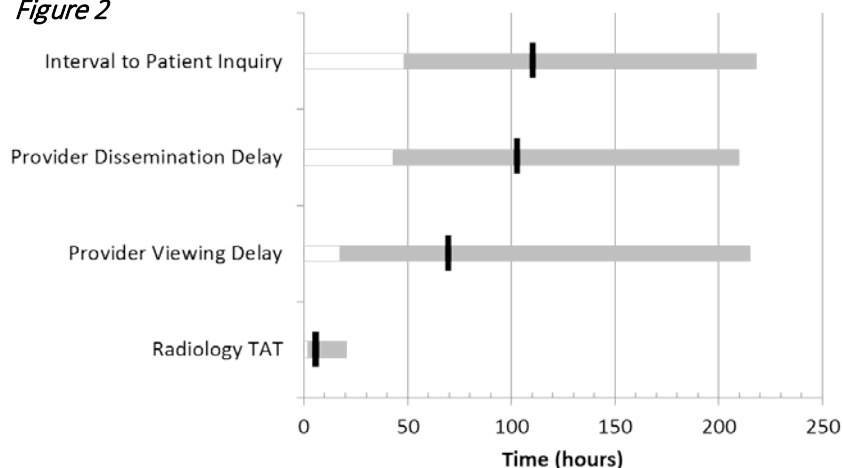


Figure 2: Radiology Turn Around Time, Delays, and Patient Inquiry Time. Interval to Patient Inquiry equals the time between study completion and patient inquiry. Provider Dissemination Delay equals the time between dictation finalization and patient inquiry (when a positive value). Provider Viewing Delay equals the time between dictation finalization and the provider viewing this report. Radiology TAT equals the time between study completion and dictation finalization. The median is represented by the vertically oriented black bar, with grey bars extending to the first and third quartiles.

Discussion

We find that patients are most interested in timely receipt of imaging results, with 33% (521/1,597) of all radiology-relevant patient messages asking for results of a recent study. This suggests that despite high efficiency in radiology departments, there is still a patient-perceived delay in obtaining radiology results in our health system. There were also many patients who did not fully understand their report and desired an explanation of a specific finding (11% [167/1,597]); understood their report but wanted to know the “next best step,” (12% [192/1,597]); asked for a specific imaging study (10% [152/1,597]), or asked whether a study was needed (8% [125/1,597]). Our data provides strong indirect evidence that patients value radiologic imaging procedures, believe the results of radiology studies matter to their health, and strong direct evidence that patients want results as soon as possible.

We performed a deeper analysis of TAT for messages questioning availability of results because that was the most represented type of message in our dataset. The overall median radiology TAT was significantly shorter than the median provider viewing delay and provider dissemination delay (5 hours vs. 70 hours and 101 hours). In other words, while patients waited a median of 5 days before writing to their provider, the radiology report was ready for the vast majority of this time.

Several limitations of this study exist. First, although we sought to include as many radiology-specific keywords as possible, some radiology-related messages may have been left out. A second limitation was our decision not to include mammography as a keyword. Although mammography could be the source of many patient messages given that our cohort was female-predominant, this modality is distinct from other imaging workflows in that the Department of Health and Human Services has released regulations on delivery of results in the Mammography Quality Standards Act. Nonetheless, further investigation into mammography as compared to other modalities could provide a topic for future research.

Conclusion

We demonstrate that patients in our healthcare system have successfully engaged the patient portal and use it routinely to communicate with their care providers regarding radiology studies. Analysis of data extracted from this system has identified the priorities patients place on receiving and understanding radiology-based data.

References

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Keywords

Patient Portal, Informatics, Patient-Centered Care