Incidental Radiology Findings: Effectiveness of a Radiology–Electronic Medical Records Interface System for Improving Communication

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ABSTRACT

• **Objective:** To report on a quality assurance program to improve communication with regard to radiologic findings.

• **Methods:** Quality improvement report.

• **Results:** Incidental findings requiring follow-up are common occurrences, particularly for thoracoabdominal CT scans. We found that many of these findings do not have a follow-up plan documented in the medical record. We significantly improved the rate of documented communication using technology that recognizes text strings in the radiology report.

• **Conclusion:** An automated system of recognizing incidental findings notations in the radiology reports through an electronic medical records system that generated reports to clinicians and letters to patients improves patient safety.

INTRODUCTION

The increased use of computed tomography (CT) scanning for a variety of situations has also increased the identification of incidental findings not related to the primary indication for the study. Prior work has documented that combined thoracoabdominal scanning for trauma patients, a common practice in trauma centers, identifies incidental findings in as many as 33% of patients, with around 7% of those patients requiring additional workup [1]. Unfortunately, it has also been demonstrated that in as many as 75% of patients there is inadequate chart documentation or mention of the incidental findings in the patient’s discharge summary [2,3]. In another study, almost half of findings concerning for malignancy were not referred for follow-up [4]. These findings have led some radiology departments to develop systems involving computer communications and customer service representatives to ensure that the appropriate follow-up occurs [5].

METHODS

Setting

MetroHealth Medical Center is an urban level 1 trauma center with an active emergency department and trauma service. We are a county-owned hospital with a primarily employed medical staff. As part of our critical incident review, risk management, and quality screening processes, we identified areas for improvement in our follow-up of incidental findings identified by our radiologists. We have an electronic medical record system (EMR; EpicCare [Epic Systems, Verona, WI]) integrated through our ambulatory and inpatient systems. Our radiology department uses a GE Healthcare radiology information system and picture archiving and communication system (RIS/PACS). Radiology reports are sent by the RIS/PACS to EpicCare via an electronic interface. Once in EpicCare, the reports are incorporated into the patient’s medical record and also routed to the ordering clinician’s in-basket for review.

Discussions with clinicians indicated that the volume of radiology reports received while on certain services, such as a busy inpatient unit, were such that the reports might not receive the attention needed to recognize incidental findings noted by the radiologist. Additionally, on some services such as the emergency department, the clinicians routinely relied on the preliminary reports (“wet reads”) and did not routinely review the final radiology dictation in the EMR. The radiologists, on the other hand, expected that the clinicians were reviewing their
final dictated reports. While a manual system was in place for time critical findings, such as an aortic aneurysm, the process and criteria calling clinicians for other incidental findings varied.

Intervention

We constructed a system to flag, recognize, and classify a number of incidental findings and transmit that information to the EMR, which then sends appropriate communications to the clinicians and the patient. The flagging and recognition process works as follows.

Dictation macros, a common feature of voice recognition–enabled word processing and dictation systems, allow users to insert predefined and specific text into a report by dictating a command (for example, “insert pulmonary incidental macro”). We created a set of unique incidental findings macro text statements in our radiologist dictation module, one for each individual type of incidental finding, and educated the radiologists in their use.

The text of each individual macro statement includes a character sequence (for example, “**-I1-**”) that is both unique as well as specific to the macro and thus to its associated incidental finding. The presence of this unique character sequence in the radiology report text serves to identify a report as one that contains the associated and specific incidental finding. An EMR (and any other system that has electronic access to the radiology report) can then simply search the text of every radiology report it receives to see if it contains any of these finding-specific unique character sequences. If one of these predefined character sequences is found in the report, the report is then identified as containing the associated incidental finding and is “flagged” for special handling. In our case, special handling triggered a routing mechanism in our EMR that automatically generated special and specific notifications related to the incidental finding for both the clinician(s) and patient.

The ordering clinician, attending physician (if different), and the primary care physician received an in-basket notification, separate from the radiology report. The message notified them that the patient had an abnormality on their radiographic study, the date, and nature of the study. The patient is sent a letter to their last known address, specifying that their radiology study had an abnormality requiring follow-up and emphasizing that contacting their doctor would be important. These letters print from the quality office and are mailed from there. We made a determination that we would not include additional information from the report regarding the nature of the incidental findings due to the difficulty in programming the system to search out and capture text that was specific to the finding. We also limited any description that was inserted into the report via the macro due to concerns it might detract from the detailed findings in the report or the need for a clinician to read the entire report.

In our original design, there was a separate macro for different types of incidental findings (Table). As we developed the macro set, we found that many organizations were struggling with these definitions and a comprehensive list was not readily available. The table
was created and implemented after querying various sources, including members of quality assurance listservs.

During the course of our implementation, we determined that when an incidental finding was not flagged by the radiologist, it was usually because the radiologist could not fit it into the available list/schemata of incidental findings (Table). As a result, we educated the radiologists to use a single macro for all types of findings. As a further simplification, an incidental finding was defined as any finding not directly related to the stated indication for the examination for which the radiologist recommended a follow-up study. Under this definition, for example, a lung mass identified in a patient sent for a chest CT as part of a malignancy workup would not trigger the macro, but a lung nodule in a patient sent for a pulmonary embolism workup would be considered an incidental finding.

This project was approved by our hospital’s risk manager. The chairman of radiology amended his department’s policies to require the radiologists to utilize the macro system for communicating incidental findings. This was further communicated to the radiology staff at one of their monthly departmental meetings.

This program was approved by the hospital’s medical executive committee. It was conducted as a quality assurance program and was exempt from IRB approval. It was implemented in full by January 2011.

RESULTS

To evaluate the effectiveness of our system, we reviewed 200 consecutive combined thoracoabdominal CT scans from September 2010. This type of scan was chosen as prior studies, as noted above, have identified a high percentage of incidental findings on these types of radiographs. Out of 200 CT scans, 26 (13%) had a finding for which the radiologist recommended a follow-up examination (Figure 1). We reviewed the CT scan reports and the clinician’s note in the EMR to determine if the finding was recognized and communicated to the patient or following clinician. Any evidence of either communication or appropriate follow-up examination was found for only 10 (38%) of the patients (Figure 2). As part of our quality assurance review, we sent a letter to the other 16 patients advising them of the need for further evaluation.

The program has now been validated following full implementation of our system. We examined the medical records of 200 consecutive patients undergoing thoracoabdominal CT scans during September 2011. These were reviewed for use of the incidental findings macro or other evidence of communications
to the clinicians or patient. In this review, 41 (20.5%) of patients had such a finding (Figure 2); 38 (93%) of the patients with incidental findings had documentation of use of the macro (33 of the patients) or notation in the radiology report (5 patients) that the findings were discussed with the clinician. The other 3 patients had their incidental findings identified as a change in the preliminary report. Our existing system of communicating preliminary report changes identified all of those findings, resulting again in a letter to the patient.

Lessons Learned

Our project yielded a number of lessons learned. There is incongruence between the expectations of treating clinicians and the radiologists. The radiologists expect that the clinicians review their entire report. The clinicians have an expectation that if there is something in the final report that wasn’t made clear in a preliminary report, they will be contacted. Clinicians order radiologic studies to answer specific questions. There have been concerns that they look for those answers without sufficient attention to the other details that may be in the radiology report. Given the busy nature of the practice of both radiologists and clinicians, we didn’t see a ready way to resolve this issue.

The volume of radiographs performed in our institution precluded assigning clerical or nursing personnel to review each report and send out separate communications.

Our radiologists were concerned that they would engender additional liability if they failed to utilize the incidental findings macro. Discussion at their departmental meeting revolved around the need to utilize this additional system to protect patients without absolving the clinicians of the need to review their reports.

We utilized some case reports identified through quality assurance review of patients with highly suspicious findings who were not otherwise notified by their clinicians, and presented the stories to help solidify the need for this program. In addition to generating acceptance by the radiologists, these stories helped to garner the necessary time from our busy information service to implement the programming changes.

The program was effective in leading patients to contact their primary care physicians. Some of these clinicians weren’t familiar with the follow-up

**Figure 2.** Incidental findings with documented communications using either macro code or direct call to clinician.
protocols for certain findings. They requested the radiologists to include specific recommendations for some findings which were out of the purview of the radiologist’s practice. When these concerns were raised, the clinicians were directed to contact the appropriate specialist.

**SUMMARY**

We have utilized an interface between our radiology information system and our EMR system to communicate incidental radiology findings to patients and clinicians. The system has been effective in achieving those goals. This is accomplished with a minimum of staff time now that the necessary programming changes have been implemented. The process can be easily and broadly implemented since macro generation and text search capabilities of the sort we employed are readily available.

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**REFERENCES**