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# Important nonurgent imaging findings: use of a hybrid digital and administrative support tool for facilitating clinician communication ☆

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ABSTRACT

A departmental tool that provides a digital/administrative solution for communication of important imaging findings was evaluated. The tool allows the radiologist to click a button to mark an examination for ordering physician follow-up with subsequent fax and confirmation. The tool's log was reviewed. Of 466 entries; 99.4% were successfully faxed with phone confirmation. Most common reasons for usage were lung nodule/mass (29.2%) and osseous fracture (12.4%). Subsequent clinical action was documented in 41.0% of entries. Our data show the reliability of the tool in assisting the communication of findings, as well as providing documentation of notification, with minimal workflow disruption.



## 1. Introduction

Communication between radiologists and referring physicians is a critical component of current radiology practice [1–7]. While an accurate and clear radiology report is a key component of such communication, some examinations contain findings that require further nonroutine communication. The American College of Radiology Actionable Reporting Group has defined three categories of such findings, namely those requiring communication within minutes (Category 1), hours (Category 2), and days (Category 3) [8]. Categories 1 and 2 findings pose immediate threat to the patient and generally require rapid direct communication by the radiologist. While Category 3 findings are not of immediate risk to the patient, these nonetheless are significant and do require attention and possible action.

Management of Category 3 findings presents a particular challenge. Communication of such findings by radiologists can be time and labor intensive, for instance, if the ordering physician's contact information is unknown or if the ordering physician is not immediately available [9]. The process of ensuring that such communication ultimately occurs may be disruptive to radiologists' workflow [10], particularly given the need to also devote time and attention to the direct communication of Categories 1 and 2 findings [11]. Thus, a tool to facilitate reliable and efficient communication of Category 3 findings would provide immense value to radiologists' practice.

Related to such concerns, Category 3 findings are described as presenting the greatest opportunity for information technology (IT) support [8]. A well-designed IT solution could facilitate communication and documentation of the finding, thereby reducing disruption to both the radiologist and referring physician. Such a system should be reliable, integrated into the radiologists' workflow, and allow for effective auditing [8].

To this end, we have developed a tool that provides a hybrid digital and administrative solution for communication of Category 3 findings. This tool is currently widely used throughout our department in the outpatient setting. In this study, our aim is to evaluate the usage and associated outcomes of this tool in the communication of important nonurgent imaging findings.

## 2. Methods

This retrospective HIPAA-compliant study was approved by our institutional review board with a waiver of written informed consent.

### 2.1. Implementation of the tool

The tool was developed by departmental faculty and solely uses departmentally owned and operated software and servers. A button was inserted into the user interface within the dictation software that the radiologist may click during study interpretation to initiate the notification system. Upon clicking this button, an additional text-box appears in which the radiologist may optionally record any further comments or instructions regarding the examination and its findings.

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This submission by the radiologist automatically creates an entry within the digital system, which is monitored by an administrative assistant whose primary responsibility is fulfillment of the communication tasks. Upon receiving a new entry, the administrative assistant initially faxes the report to the physician's office. The administrative assistant subsequently calls the office to speak with the office staff and verbally confirm receipt of the report as well as that the report will be presented to the ordering physician. Next, the administrative assistant records within the IT system the date and time of both report fax and phone confirmation. The administrative assistant also enters a comment containing the name and role of the individual from the physician's office providing phone confirmation. Upon completing this information, an email is sent to the interpreting radiologist, confirming the full communication [Fig. 1]. If the contact information associated with the examination is missing or incomplete, the administrative assistant attempts to identify such information through alternate means, such as through Internet searches or by contacting other physicians on file as care providers for the patient. If the administrative assistant is unable to successfully fax the report or achieve phone confirmation, then the administrative assistant records an explanation and closes the entry within the system, generating an e-mail to the radiologist of the incomplete communication. If the administrative assistant identifies that the patient is an inpatient, then no attempt is made by the administrative assistant to communicate the finding, and a corresponding e-mail is sent to the radiologist.

### 2.2. Evaluation of the tool

We reviewed 500 consecutive entries that were submitted over a 4-week period between January 1, 2013 and January 28, 2013. Of these, 10 entries were excluded due to representing duplicate entries (i.e., the radiologist clicked twice on the activation button while originally interpreting the study), and 24 entries were excluded due to representing requests for inpatient examinations. These exclusions yielded a final included cohort of 466 entries, representing 2.6% of 17,744 total outpatient diagnostic imaging examinations performed by the subspecialty sections that employed the communication tool during this time.

For included entries, we recorded: subspecialty of the interpreting radiologist; imaging modality of the examination; nature of the key imaging finding; and whether a trainee was documented as participating in the report dictation process. We also recorded whether there was documentation of report fax and of phone confirmation, along with the number of days until each of these were completed, as well as the delay in minutes until both fax and phone confirmation for entries communicated on the same business day. In addition, we recorded whether the report contained a recommendation for additional imaging and, if so, whether there was documentation of performance of the recommended examination, as well as the delay between the initial entry and the follow-up examination. Finally, for those entries in which the ordering physician was “in-network” [defined as a user of our institution's electronic medical record (EMR) for documentation of patient care activities], we searched the EMR for evidence of any action taken in response to the imaging findings, along with the nature of such action and the delay since the initial entry. Data are assessed using standard summary statistics.

## 3. Results

Among 466 included entries, the three most common subspecialties of the submitting radiologist were thoracic (42.3%), abdominal (21.7%), and musculoskeletal (20.8%) [Table 1]. The two most common imaging modalities of the examination triggering the entry were radiograph (38.6%) and computed tomography (CT) (27.9%) [Table 2]. The three most common imaging findings were a lung nodule or mass (29.2%), an osseous fracture (12.4%), or other lung parenchymal abnormality (11.8%) [Table 3]. A trainee participated in dictation of the report in 10.5% of entries.

For 465/466 (99.8%) of entries, the report was faxed, and for 463/466 (99.4%), there was successful phone confirmation. Among reports faxed, the fax occurred on the same business day in 52.6% (mean delay of 152±124 min) and within one business day in 92.1%. Among entries with phone confirmation, confirmation occurred on the same business day in 41.5% (mean delay of 175±121 min) and within one business day in 87.0%. Fax and phone confirmation occurred within a maximum of 4 days and 6 days, respectively.

In 60.7% of entries, the report included a recommendation for additional imaging. Of these, the recommended imaging study was performed in 47.0% of cases, and within a median of 21 days since the original entry.

An in-network provider ordered the imaging examination in 54.9% of entries. Of these, a subsequent action by the provider relevant to the imaging findings was documented in the EMR in 41.0%. Such actions occurred on the date of the entry in 31.4% (median delay between initial entry and subsequent documented action of 4 days) and included: an additional office visit with the patient (47.6%); an addendum to an earlier office note without an actual additional patient visit (19.0%); patient communication via phone or e-mail (17.1%); referral to another service (12.4%); hospital/emergency department admission (2.9%); or telephone communication by the provider with another service (1.0%).

## 4. Discussion

Effective communication between radiologists and ordering physicians is critical to achieving optimal patient care. Indeed, numerous organizations, including the American College of Radiology [8] and The Joint Commission [12], have guidelines or standards relating to timely and appropriate communication of test results, and communication errors contribute to a large majority of malpractice lawsuits [13]. While radiologists recognize the importance of such communication, the frequency of findings that are important yet nonurgent (Category 3 findings) as well as the time-intensive nature of locating and contacting the referring physicians for such findings, creates a challenge in daily radiology practice.

In this study, we demonstrated the effectiveness of a hybrid digital and administrative support tool for facilitating communication of important nonurgent Category 3 findings. The tool was associated with minimal radiologist workflow disruption, being activated by the radiologist by clicking on a button within the dictation software and not requiring entering patient, study, or referrer information into any separate system. Furthermore, the tool was highly effective in achieving its intended aim: in over 99% of entries, administrative support personnel successfully faxed the report to the referring physician office,

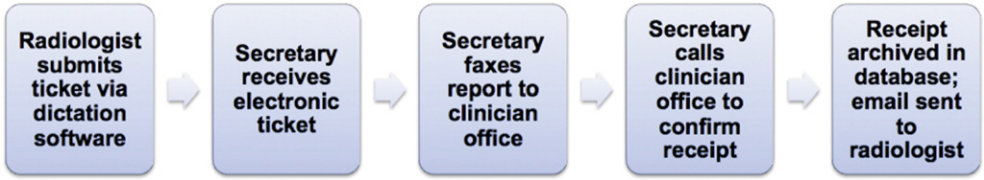


**Fig. 1.** Workflow of follow-up module.