Assessment of Follow-up Completeness and Notification Preferences for Imaging Findings of Possible Cancer:

What Happens After Radiologists Submit Their Reports?

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Rationale and Objectives: To understand the reasons leading to potentially inappropriate management of imaging findings concerning for malignancy and identify optimal methods for communicating these findings to providers.

Materials and Methods: We identified all abdominal imaging examinations with findings of possible cancer performed on six randomly selected days in August to December 2013. Electronic medical records (EMR) of one patient group were reviewed 3 months after the index examination to determine whether management was appropriate (completed follow-up or documented reason for no follow-up) or potentially inappropriate (no follow-up or no documented reason). Providers of a second patient group were contacted 5–6 days after imaging examinations to determine notification preferences.

Results: Among 43 patients in the first group, five (12%) received potentially inappropriate management. Reasons included patient loss to follow-up and provider failure to review imaging results, document known imaging findings, or communicate findings to providers outside the health system. Among 16 providers caring for patients in the second group, 33% were unaware of the findings, 75% preferred to be notified of abnormal findings via e-mail or EMR, 56% wanted an embedded hyperlink enabling immediate follow-up order entry, and only 25% had a system to monitor whether patients had completed ordered testing.

Conclusions: One in eight patients did not receive potentially necessary follow-up care within 3 months of imaging findings of possible cancer. Automated notification of imaging findings and follow-up monitoring not only is desired by providers but can also address many of the reasons we found for inappropriate management.

Key Words: Follow-up; communication; continuity of patient care; physician practice patterns.

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Lack of follow-up for imaging findings of possible cancer can result in missed or delayed diagnoses and preventable patient harm [1–5]. When radiologists report imaging findings that may represent cancer and issue recommendations for follow-up, they may be unaware of whether follow-up is clinically indicated. For some patients (eg, those with diffuse metastatic disease, limited life expectancy, or guarded prognosis), it is appropriate for clinicians not to pursue further testing or interventions, even if follow-up is recommended by a radiologist. Conversely, when follow-up is clinically indicated, lack of follow-up is inappropriate and generally due to system errors (eg, provider fails to read radiology report, provider fails to order follow-up test, patient misses scheduled test) [1,2,4,5]. Patients who do not complete clinically indicated follow-up may present with advanced cancer long after follow-up should have occurred, often resulting in medical malpractice suits [1–4]. Therefore, to improve

patient safety and reduce medicolegal risk, it is critical for providers and health systems to monitor follow-up of imaging findings of possible cancer and ensure that indicated follow-up actually occurs.

Automated systems have decreased provider notification time for abnormal laboratory and pathology results, increased rates of completed laboratory and pathology follow-up, and improved provider and patient satisfaction regarding communication of these test results (5–15). Because imaging findings of possible cancer generally require delayed follow-up, sometimes up to 12 months after initial detection, automated systems are ideally suited to provide notification and monitoring of these findings. However, the effect of these systems in radiology remains relatively unexplored compared to other areas of medicine (5,16,17). In addition, optimal methods for communicating nonemergent radiology findings to physicians are poorly understood.

To better understand the reasons leading to inappropriate lack of follow-up after imaging findings of possible cancer and to determine the best methods for communicating these findings, we conducted a pilot study of provider follow-up patterns and communication preferences.

MATERIALS AND METHODS

In July 2013, our Department of Radiology implemented a standardized ordinal lexicon for reporting focal lesions on all magnetic resonance imaging (MRI), computed tomography (CT) scan, and ultrasound examinations of the liver, pancreas, kidneys, and adrenal glands. Similar to the Breast Imaging Reporting and Data System, lesions are categorized by global assessment codes indicating normal, benign, indeterminate for malignancy, suspicious for malignancy, known malignancy, or treated malignancy (18,19). We identified all examinations with imaging findings of possible cancer, defined as findings indeterminate or suspicious for malignancy, that were performed on six randomly selected days in 2013: August 15, August 16, September 10, September 11, November 21, and December 6.

At our institution, all documentations are recorded in an electronic medical record (EMR). We reviewed medical records to categorize patients as outpatients, emergency department patients, or inpatients at the time of the imaging study. Patients with any known history of cancer were stratified into active cancer (chemotherapy, radiation therapy, or surgery for cancer within the past year) and inactive cancer, as it is likely that providers follow patients with active cancer more closely.

To understand clinician follow-up patterns, we conducted a manual review of the medical records of all patients whose imaging examinations were performed on August 15–16 and September 10–11, 2013. We reviewed medical records 3 months after initial detection of imaging findings of possible cancer for documentation of planned/completed relevant follow-up imaging, pathology, or therapy (Table 1). Appro-

TABLE 1. Chart Review and Telephone Survey for Determining Patient Follow-up Patterns

1. Admission status when imaging examination was performed (ambulatory, Emergency Department, inpatient)
2. Was the imaging finding of possible cancer acknowledged in the patient chart?
   If yes, proceed to question 3; if no, skip to question 4
3. Days between date of imaging examination and acknowledgement of finding(s)
4. Did the provider order/plan to order any follow-up for the imaging finding of possible cancer?
   If yes, proceed to question 5; if no, skip to question 6
5. What type of follow-up did the provider order/plan to order?
6. If no follow-up was planned/ordered, was a reason found in the patient chart?
   If yes, proceed to question 7; if no, skip to question 8
7. What reason for lack of planned/ordered follow-up was given in the chart?
8. What reason for lack of planned/ordered follow-up was given by the provider (via telephone or email)? *Chart is complete*
9. Did the patient receive planned follow-up?
   If yes, chart is complete; if no, proceed to question 10
10. Was a reason for lack of follow-up found in the patient chart?
    If yes, proceed to question 11; if no, skip to question 12
11. What reason for lack of follow-up was given in the patient chart?
12. What reason for lack of follow-up was given by the provider (via telephone or email)?

priate management was defined as 1) completion of ordered follow-up testing or treatment, or 2) documented reason for lack of follow-up. Potentially inappropriate management was defined as lack of follow-up without a documented reason (eg, provider did not order follow-up that was clinically indicated, patient missed ordered follow-up). When no reason could be found in the medical record for why follow-up was not ordered or completed, the ordering provider was contacted to determine if this lack of follow-up constituted appropriate or potentially inappropriate management.

To understand provider communication preferences regarding imaging findings of possible cancer, we contacted the ordering provider listed on the radiology report for patients whose examinations were performed on November 21 and December 6, 2013. Providers were contacted 5–6 days after the index imaging studies and were asked several questions, including whether they had ordered the imaging studies, their notification preferences for imaging findings of possible cancer, and their methods for monitoring patient completion of ordered examinations (Table 2). Initially, we contacted providers by telephone at their clinics or academic offices. When there was no answer, they were paged and/or contacted via mobile phone. If they were unavailable or preferred not to communicate by telephone, they were contacted by e-mail. If there was still no answer, their office was called again at least twice.