PACS/Dictation-Integrated System for Tracking Incidental Pulmonary Nodules in Order to Improve Follow-up and Early Diagnosis of Lung Cancer

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BACKGROUND

• Incidental pulmonary nodules are routinely encountered on CT examinations ordered at our institution by a diverse population of healthcare providers.

• Some of these incidental nodules may represent early lung cancer.

• A small number of patients are lost to follow-up only to later present with advanced disease with:
  - Limited life expectancy
  - Increased treatment costs
  - Potential litigation issues
BACKGROUND

- Our department lacked an effective system of documenting and tracking patients with incidental pulmonary nodules to ensure that appropriate and timely follow-up was obtained.

- Our project involved the implementation of a communication system for:
  - Documentation
  - Notification
  - Tracking

PURPOSE

- To improve the management of pulmonary nodules found incidentally on imaging studies through the implementation of a PACS/Dictation-Integrated system.

- This system would document and monitor patients for appropriate and timely follow-up.
METHODS - OVERVIEW

1. **Creation of a notification system.** A pulmonary nodule notification system was created to document incidental pulmonary nodules and to initiate a closed-loop communication.

1. **Departmental policy.** A departmental-wide policy was instituted on how and when to use the pulmonary nodule communication system.

1. **Outcome coordinators.** Clinical outcome coordinators within radiology then monitor the sent messages and ensure that appropriate and timely follow-up is obtained.

1. **Pulmonary nodule clinic.** A pulmonary nodule clinic was also started on the same timeframe by the pulmonologists to provide a referral option for the providers and patients.

METHODS - Notification System

- **With only one click or voice command,** the radiologist creates a voice message that is sent to the ordering provider. Afterwards, the provider’s name, date, and time are automatically populated into the imaging report.

- The system contacts the provider via his or her preferred contact method. They must then confirm receipt or create a reply.

- If the radiologist spoke directly to the ordering provider, an option exists to document the communication without sending a voice message (Lung Nodule Documentation).
METHODS - Notification System

- Screenshot of the Dictation-integrated Critical Communication Software with options for pulmonary nodules.

METHODS - Policy

- Following the Departmental policy on incidental pulmonary nodules, the radiologists score nodules as either:

<table>
<thead>
<tr>
<th>Lung Nodule, Needs Follow-up</th>
<th>Lung Nodule, Suspicious for neoplasm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordering provider, treatment team, and PCP all contacted:</td>
<td>Ordering provider, treatment team, and PCP all contacted:</td>
</tr>
<tr>
<td>- Notified of the finding</td>
<td>- Notified of the finding</td>
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<tr>
<td>- Informed if additional imaging needed</td>
<td>- Offered appropriate management options:</td>
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<tr>
<td>- Provide appropriate surveillance guidelines (Fleischner criteria or NCCN)</td>
<td>- Close imaging follow-up</td>
</tr>
<tr>
<td>- Offered option to refer patient to pulmonary nodule clinic</td>
<td>- PET/CT</td>
</tr>
<tr>
<td></td>
<td>- Biopsy</td>
</tr>
</tbody>
</table>
METHODS - Clinical Coordinators

- Radiology Clinical Outcome Coordinators are notified of each pulmonary nodule message.
- Coordinators monitor patients for documentation in the EMR and follow-up management.
- Escalation policy: For cases where there is a lack of documentation and follow-up in the EMR, recurrent reminders are sent to the clinicians as well as directly to the patient.
- If after 3 months, appropriate surveillance imaging is not ordered, the patient will be contacted by the Radiology Clinical Outcome Coordinators to arrange follow-up care at the pulmonary nodule clinic.

METHODS - Lung Nodule Clinic

- A lung nodule clinic was created and is staffed by a nurse and a pulmonologist.
- For each notification, the clinic nurse will contact the treatment team within 1 week to offer diagnostic guidelines and/or arrange referral to the pulmonary nodule clinic.
METHODS - Other

• **Missing providers.** If a provider is missing from the communication system database, there is an option to send a voice message to the Results Coordinator. The coordinator will then be responsible for relaying the message to the provider and updating the system with the provider’s contact information.

• **High turnover areas or shift workers.** In areas of the hospital with shift workers or high turnover of providers (ED, ICU, etc.), messages are sent to a pre-designated Clinical Outcome Coordinator representing that group of providers. The coordinator is then responsible for relaying the message to the appropriate team and confirming receipt.

RESULTS

• Since implementation in February 2014, there has been an excellent acceptance and utilization of the notification system for lung nodules by our radiologists.

• Currently, we are averaging 90 total pulmonary nodule messages per month.

• All of the messages created in the system are being followed by our clinical outcome coordinators.
RESULTS

• Several providers have created a care coordination position designating someone responsible for receiving the pulmonary nodule messages and scheduling follow-up appointments with pulmonologists or the pulmonary nodule clinic.

• Since implementation in February 2014, there has been no reported missed diagnosis of lung cancer in a patient with a previously identified lung nodule due to lost patient follow-up.
RESULTS

- Out of 1,179 Lung Nodule Messages, approximately 250 letters have been mailed to patients because appropriate follow-up had not yet been completed (21% needing follow-up).

1,179 Lung Nodule Messages

- 79% 929 Patients
- 21% 250 letters

RESULTS

Risk/Legal Cases and Communication Documentation

- 2011-2013: 10 Risk/Legal Cases, 0 Communication Documented
- 2014: 8 Risk/Legal Cases, 6 Communication Documented
- 2015: 2 Risk/Legal Cases, 2 Communication Documented

Risk/Legal Cases | Communication Documented
CONCLUSIONS

• Implementing a PACS-Integrated tracking system for documenting and following incidental pulmonary nodules can minimize communication failures and decrease the number of patients lost to follow-up.

• Additionally, closed-loop communication of pulmonary nodules and other critical imaging findings also improved significantly by simple observation, i.e. “Hawthorne effect”.

• Department-wide utilization of the system required creation of clinical outcome coordinators to manage documentation and ensure appropriate follow-up of the pulmonary nodule messages.

CONCLUSIONS

• Appropriate lung nodule follow-up guidelines and radiologist report recommendations alone do not reliably ensure adequate follow-up and management. The addition of a notification system providing closed-loop communication in conjunction with follow-up tracking by clinical outcome coordinators offered the best management and follow-up strategies in our Institution.

• The communication and follow-up tracking model presented here can easily be replicated and implemented in other hospitals and healthcare organizations.
THE FUTURE

• The next phase of our system aims to integrate the communication software directly with our electronic medical record (EMR) in order to automate the process for documentation and follow-up of pulmonary nodules as well as other incidental and critical findings.