Ways to Improve Radiologists’ Adherence to Fleischner Society Guidelines for Management of Pulmonary Nodules

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Purpose: The aim of this study was to assess one institution’s experience with radiologists’ adherence to the Fleischner Society guidelines for managing pulmonary nodules incidentally detected on CT, which anecdotally was substantially higher than in a recent report.

Methods: All chest and abdominal CT scans in the electronic messaging system for communicating unexpected abnormal imaging findings to referring physicians were searched for the terms “lung” or “pulmonary” and “nodule” or “mass.” Data were collected regarding patient age, nodule size, and whether the patient was at high risk for malignancy (primarily smoking history) or had evidence of prior or concurrent malignancy. Radiologists’ recommendations were then correlated with the Fleischner guidelines for nodule size and patient history.

Results: Of the study cohort of 1,412 patients who underwent chest and abdominal CT scans, 420 had new pulmonary nodules. Of these, 205 (48.8%) were excluded because of prior or concurrent malignancies, nodules initially seen on prior CT examinations, ground-glass appearance, or age <40 years. In the remaining 215 patients, the radiologists’ recommendations were consistent with the Fleischner guidelines in 82.8%.

Conclusions: Radiologists’ recommendations for the management of pulmonary nodules incidentally detected on CT adhered to the Fleischner guidelines in 82.8% of cases, more than twice that in a recent report. This difference may reflect various practical departmental attempts to emphasize the importance of the Fleischner guidelines in reducing patient radiation and health care costs.

Key Words: Pulmonary nodules, guidelines, clinical practice

INTRODUCTION
The unexpected identification of a pulmonary nodule is a frequent occurrence on CT scans of adult patients and presents a management dilemma for many radiologists [1]. Until recently, the standard recommendation was to closely follow such incidentally detected nodules at frequent intervals for a period of 2 years, requiring significant health care resources and resulting in substantial radiation exposure [2]. On the basis of collective evidence suggesting that >99% of such nodules are benign [3-5], the Fleischner Society issued a set of practical guidelines in 2005 for the management of small pulmonary nodules that are incidentally detected during the course of CT examinations performed for purposes other than lung cancer screening. Originally titled “Guidelines for Management of Small Pulmonary Nodules Detected on CT Scans: A Statement From the Fleischner Society,” the document is generally known as the Fleischner guidelines [6].

A recent publication [7] related that recommendations for the follow-up of pulmonary nodules in radiology reports were consistent with the Fleischner guidelines in only 34% of cases. Because this seemed substantially different from our anecdotal experience, a study was conducted at our institution to assess the compliance of radiologists’ recommendations with the Fleischner guidelines.

METHODS
The institutional review board deemed this proposal a quality improvement project not requiring formal IRB approval.

Our institution has an electronic messaging system in which unexpected abnormal imaging findings are com-
municated to referring physicians. All CT scans in this database using the terms “lung” or “pulmonary” and “nodule” or “mass” formed the study cohort. Data were collected regarding patient age, nodule size, and whether the patient was at high risk for malignancy (primarily smoking history) or had evidence of prior or concurrent malignancy. According to the Fleischner guidelines, nodules were classified into 4 categories on the basis of size: (1) ≤4 mm, (2) >4 to 6 mm, (3) >6 to 8 mm, and (4) >8 mm. If there were multiple nodules, the largest was used to determine whether the radiologist’s recommendation was consistent with the Fleischner guidelines.

RESULTS

Of the 1,412 patients who underwent chest and abdominal CT scans in the electronic messaging system for whom unexpected imaging findings were communicated over a 3-year period to referring physicians, 420 had pulmonary nodules newly detected on a variety of CT examinations (Table 1). Of these, 205 (48.8%) were excluded. There were 95 patients with prior or concurrent malignancies and 12 in whom the CT findings were so characteristic of lung cancer that the radiologists recommended immediate biopsy or PET/CT. In 43 patients, the nodules had been initially seen on prior CT examinations. There were 26 nodules with ground-glass appearance or that were interpreted as reflecting infectious or inflammatory disease. Four patients were <40 years of age, the minimum age for applicability of the Fleischner guidelines. Finally, there were 19 nodules detected on CT torso examinations for which the interpreting radiologists recommended dedicated chest CT studies.

In the remaining 215 patients, the radiologists’ recommendations were consistent with the Fleischner guidelines 82.8% of the time. This high compliance rate was consistent among the 3 types of CT examinations of the chest (including CT pulmonary angiography and CT of the trachea) and the 2 types of CT examinations of the abdomen (including CT of the torso). Regarding nodule size, there was compliance with the Fleischner guidelines in only 68.5% of nodules ≤4 mm, but at least 86.2% in all nodules >4 mm (Table 2).

<table>
<thead>
<tr>
<th>Type of Study</th>
<th>Total Examinations</th>
<th>Excluded</th>
<th>Adherent With Fleischner Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT angiography</td>
<td>43</td>
<td>15</td>
<td>78.6% (22/28)</td>
</tr>
<tr>
<td>Chest CT</td>
<td>238</td>
<td>106</td>
<td>83.3% (110/132)</td>
</tr>
<tr>
<td>CT trachea</td>
<td>7</td>
<td>4</td>
<td>100% (3/3)</td>
</tr>
<tr>
<td>CT abdomen</td>
<td>76</td>
<td>35</td>
<td>82.9% (34/41)</td>
</tr>
<tr>
<td>CT torso</td>
<td>56</td>
<td>45</td>
<td>81.8% (9/11)</td>
</tr>
<tr>
<td>Total</td>
<td>420</td>
<td>205</td>
<td>82.8% (178/215)</td>
</tr>
</tbody>
</table>

Table 2. Adherence to the Fleischner Society guidelines by size of nodule

<table>
<thead>
<tr>
<th>Size of Nodule (mm)</th>
<th>Number</th>
<th>Error</th>
<th>Adherence Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤4</td>
<td>54</td>
<td>17</td>
<td>68.5% (37/54)</td>
</tr>
<tr>
<td>&gt;4-6</td>
<td>94</td>
<td>13</td>
<td>86.2% (81/94)</td>
</tr>
<tr>
<td>&gt;6-8</td>
<td>24</td>
<td>3</td>
<td>87.5% (21/24)</td>
</tr>
<tr>
<td>&gt;8</td>
<td>43</td>
<td>4</td>
<td>90.7% (39/43)</td>
</tr>
</tbody>
</table>

DISCUSSION

After excluding patients who had concurrent or previous malignancies, nodules with morphologic findings highly suggestive of malignancy or inflammation or infection, nodules detected on abdominal CT for which dedicated chest CT was recommended, and nodules in patients aged <40 years, compliance with the Fleischer guidelines among the radiology report recommendations at our academic tertiary hospital was 82.8%. This compares with compliance rates of only 34% in a recent report [7] and 57% in a report from a large community hospital [8]. There are several potential explanations for this substantial discrepancy. First, the previous report notes that “no formal policy within the hospital requires use of [the Fleischner guidelines] or any other guidelines for managing pulmonary nodules.” Nevertheless, it acknowledges that “radiologists are able to cut and paste pre-specified text containing the [Fleischner guidelines] in their reports, as they deem necessary.” However, it then states that 85% of reports did not make use of this option. Instead, “most radiologists make specific recommendations using their own words.” Related to this, the previous article cites another source [9] that stresses difficulty in remembering specific recommendations as being a key factor in poor guideline adherence.

Our department emphasizes adherence to the Fleischner guidelines because of their ability to reduce both patient radiation exposure and healthcare costs. Therefore, we have taken the simple step of having the Fleischner guidelines printed on small laminated cards that are either attached to the dictating machines or prominently displayed at every PACS station at which chest and abdominal CT examinations are interpreted. Application of the Fleischner guidelines is stressed to residents throughout their training, both in daily readouts and at case conferences.

The results of this study demonstrate higher compliance with the Fleischner guidelines than a previous questionnaire [10] sent to a large sample of American radiologists to assess their application of the guidelines in 3 hypothetical clinical case scenarios. The 34.7% rate of conformance for one of these scenarios is nearly identical to that in the recent retrospective study [7]. This is further indication of the importance of departmental stress on applying the Fleischner guidelines, which the current study demonstrates can result in achieving high rates of compliance.

One limitation of this study is that cases were taken from the electronic messaging system rather than retriev-
ing radiology reports from all chest and abdominal CT examinations performed at this institution. In the absence of an automated retrieval toolkit similar to that described in a prior study [7], use of the electronic messaging system would seem to be a reasonable approach, especially given that departmental policy is that all unexpected imaging findings (such as pulmonary nodules incidentally detected on CT) must be entered into the system, and both residents and attending radiologists seem to be in high compliance with this requirement. Another limitation is that this study was confined to a single institution and may not be representative of practices at other facilities. However, the purpose of performing this review was simply to indicate that good compliance with the Fleischner guidelines can be achieved, as long as this practice is stressed in the radiology department.

REFERENCES


