Incidental Findings at Chest CT:

A Needs Assessment Survey of Radiologists' Knowledge

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Rationale and Objectives: To assess practice patterns in evaluating incidental findings at chest computed tomography (CT) to determine the need for further education.

Materials and Methods: A survey was given to 1600 radiologists, presenting four clinical case questions regarding the evaluation/significance of the following incidental findings at chest CT: thyroid lesion; enlarged mediastinal lymph nodes; asymptomatic, small pulmonary embolus; and small lung nodule. The respondents' answers were compared with "truth," as defined by the best evidence available in the medical literature. Additional questions elicited the respondents' demographics and comfort levels in addressing the findings. Analysis of variance models with a Tukey correction for post hoc comparisons and chi-square tests were used to determine if any demographic factors or comfort levels were predictive of higher correct response rates.

Results: The overall survey response rate was 28% (445/1600). Correct case response rates ranged from 26% (115/442) to 79% (343/445). Only 6% (28/438) of respondents chose the correct answers for all cases. Up to 80% (353/440) of respondents felt comfortable in addressing findings, and only 57% (252/443) of respondents felt that they needed more training in this area. Fellowship training in cardiothoracic radiology, working in a teaching practice, and subspecialization in abdominal or cardiothoracic radiology were predictive of higher correct response rates. Except for one case question, the comfort level was not predictive of correct response rate.

Conclusions: There was considerable variability among radiologists and substantial deviation from best medical practice with regard to the interpretation/evaluation of incidental findings at chest CT, signifying a significant need for further education.

Key Words: Incidental findings; chest CT; needs assessment.

Chest computed tomography (CT) scans have been employed with increasing frequency over the past two decades, both in patients with known diseases as well as in screening situations (eg, for lung cancer and coronary artery disease), leading to an explosion in the use of the modality. Approximately 3%–24% of chest CT exams show potentially significant incidental findings that require further evaluation or follow-up (1–5). The evaluation of such a large number of findings presents a huge potential burden on the health care system. The purpose of this survey-style study was to gain information about current practice patterns in the interpretation and evaluation of incidental chest CT findings, and to compare these patterns with the best available medical evidence, to assess the need for in-training and continuing medical education in this area.

METHODS

An electronic survey was given to three groups of radiologists, as follows:

- Group 1: 118 radiologists at the authors' institution, including 17 cardiothoracic radiologists, 29 abdominal radiologists, 27 radiology fellows, and 45 radiology residents
- Group 2: 635 members of the Department of Radiology alumni society at the authors' institution
- Group 3: 658 members of the Society of Computed Body Tomography and Magnetic Resonance

In addition, an otherwise identical paper version of the survey was administered to two additional groups, as follows:

- Group 4: 98 radiologists participating in a 5-day general radiology continuing medical education course February 14–18, 2011
- Group 5: 91 radiologists participating in a different 5-day general radiology continuing medical education course March 7–11, 2011

The survey (see Appendix) included four clinical case questions that addressed the evaluation and/or significance of the following incidental findings seen at chest CT in specific clinical settings: thyroid lesion; enlarged mediastinal lymph nodes; asymptomatic, small, peripheral pulmonary embolus; and

Acad Radiol 2011; 18:1500–1506

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doi:10.1016/j.acra.2011.08.009

small lung nodule. In addition, there were questions regarding the respondents' demographics, comfort level in making recommendations for further evaluation of incidental findings, and self-assessment of their own need for further education in this area. The respondents' answers to the clinical case questions were compared with "truth," as defined by the best medical evidence currently available in the medical literature.

Case 1 illustrated a 23-year-old patient with an incidental thyroid nodule. Although most thyroid lesions are benign, malignant correlates include age <35 or older than 70, size >2.5 cm, history of previous neck radiation, cervical lymph node enlargement, nodule growth, multiple endocrine neoplasia syndromes, and family history of thyroid cancer (6,7). Several sources have suggested that thyroid nodules larger than 1 cm in diameter should be further evaluated using ultrasonography, particularly in patients with clinical or imaging features that are associated with malignancy (6–9). Therefore, the best answer for case 1 would be "recommend ultrasound evaluation."

Case 2 illustrated a patient with moderately severe interstitial lung disease and incidental, enlarged mediastinal lymph nodes. Published studies have shown that one-half to two-thirds of patients with interstitial lung disease of many different types show mediastinal lymph node enlargement at CT (10–12). Furthermore, the prevalence and extent of mediastinal lymph node enlargement correlates with the degree of interstitial lung disease (10,12). Therefore, the best answer for case 2 would be "indicate lymph nodes are likely benign, without recommendation."

Case 3 illustrated a patient with an incidental, asymptomatic, solitary, segmental level pulmonary embolus. Treatment of asymptomatic pulmonary emboli may or may not be indicated, depending on the clinical situation. An excellent review of the issues involved may be found in a recent article by Goodman (13). The best answer for case 3 would be "evaluation for deep venous thrombosis may be helpful in determining the need for anticoagulation."

Case 4 illustrated an incidental 4-mm noncalcified lung nodule in a healthy, nonsmoking 57-year-old male. Management of a small, solid pulmonary nodule should generally follow the Fleischner society guidelines, and the best answer would be "indicate lesion is likely benign, without recommendation" (14,15).

Statistical Analysis

For each response to the four questions about incidental findings, a value of correct or incorrect was assigned. The number of questions each respondent answered correctly was calculated as a count for each respondent. Each radiologist was assigned to a category (trainees, general radiologists, abdominal radiologists, cardiothoracic radiologists, and others) based on his or her responses. Comparisons were made between the categories of radiologists based on the number and percentage of "correct" responses using chi square tests for the dichotomous outcomes and a Wilcoxon rank sum test for the counts.

TABLE 1. Demographic Data for 445 Survey Respondents

Variable	Number of Responses (%)
Job description*	
Trainee (resident or fellow)	46 (10.4)
General practice radiologist	227 (51.4)
Abdominal radiology specialist	96 (21.7)
Cardiothoracic radiology specialist	39 (8.8)
Other	34 (7.7)
Number of years in practice*	
<1	51 (11.5)
1–5	69 (15.6)
6–10	65 (14.7)
11–15	58 (13.1)
16–20	62 (14.0)
>20	137 (31.0)
Type of practice†	
In training	46 (10.4)
University/teaching	133 (30.2)
Nonteaching	262 (59.4)
Fellowship training in cardiothoracic radiology (nontrainees only)	
Yes (personal)‡	38 (9.6)
Yes (member of group)§	161 (40.6)

Note: some respondents omitted certain responses regarding demographics, as follows:

*Percentage was based on 442 because of missing data.

†Percentage was based on 441 because of missing data.

‡Percentage was based on 396 because of missing data.

§Percentage was based on 397 because of missing data.

An analysis of variance model was used to look at the categories with Tukey's procedure used for post hoc tests for comparisons between the categories. In addition, comparisons were made between radiologists with and without cardiothoracic fellowship training (either personal training or within the practice group); among radiologists with different numbers of years in practice, after training; and between nontrainee radiologists in a teaching or university practice and radiologists in a nonteaching practice. Each question was evaluated separately as well as using an aggregate of the responses to all questions.

The data were also analyzed to determine 1) if the comfort level reported by the respondents was related to the likelihood of choosing the correct clinical case answer for each individual clinical scenario and 2) if there was an association between the percentage of "correct" clinical case answers and the respondents' overall self-assessment of need for further education in dealing with incidental findings. Comfort level was grouped into a dichotomous variable of either comfortable or not comfortable. The comparison between comfort level correctness was done using a chi-square test. The count of correct responses was tested using a Kruskal-Wallis model.

The institutional review board granted this study "not regulated" status.