

RESEARCH ARTICLE

Initial evaluation of thyroid nodules by primary care physicians and internal medicine residents

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Objective: The article studied the knowledge and practice patterns of primary care providers and internal medicine residents in their initial evaluation of thyroid nodules and determined whether their practice is in accordance with published guidelines by the American Thyroid Association and American Association of Clinical Endocrinologists.

Method: A survey was distributed to primary care physicians (PCPs) and internal medicine residents at a community hospital in Baltimore and a chart review was conducted at the Diabetes and Endocrine Center in the same hospital.

Results: A total of 47 physicians (70%) responded to the survey, 16 PCPs and 33 residents. Most responders (96%) will always obtain a TSH, and of these, 21% of PCP and 25% of residents will obtain a TSH without any other laboratory work-up. Fifty percent of the physicians (PCP, 75%; resident, 39%) will always obtain a thyroid ultrasound ($p = 0.043$). Most physicians (97%) will refer for a fine-needle aspiration (FNA) biopsy of a nodule > 1 cm. Sixty-two percent of the physicians will not put a euthyroid patient on levothyroxine suppression therapy. Many physicians (48%) are not aware of the AACE and ATA thyroid nodule guidelines. Most physicians (65%) have not read the guidelines. Of the 113 charts reviewed, TSH was obtained alone in 40% and with other laboratory tests in 74%. Thyroid ultrasound was done in 67%. Only one patient was on levothyroxine for levothyroxine suppression therapy.

Discussion: Although many physicians were not aware of the guidelines, and a small number of physicians have read them, many PCP and residents responded in concordance with the guidelines in obtaining TSH, an ultrasound, performing FNA biopsy, and not providing levothyroxine suppressive therapy in euthyroid patients. No differences were found between the responses of PCP and residents except for obtaining an ultrasound. Chart review data also showed that majority of tests ordered for non-toxic thyroid nodule evaluation were in agreement with the guidelines. Limitations include low survey response rate among PCPs and that results are from one community hospital.

Conclusion: Our findings from the survey and chart review conclude that majority of primary care physicians were initiating the appropriate work up of thyroid nodules prior to referral to a specialist.

Keywords: *thyroid nodule evaluation; thyroid nodule; thyroid nodule work-up; thyroid nodule guideline*

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Thyroid nodules are common, and their frequency is increased in women, the elderly, and those exposed to radiation or living in iodine-deficient areas (1). The prevalence of nodules depends on the method of detection and is estimated to be 4–7% by palpation (2, 3), 19–35% (67%) by ultrasound (3, 4), and 8–65% with autopsy (3) in the US adult population. Although most thyroid nodules are benign, malignancy needs to be excluded. There has been an increase in the incidence of thyroid cancer, which has been attributed to increased detection of small papillary cancers (5, 6).

Evaluation of thyroid nodules can be a challenge for primary care physicians (PCPs). Clinical practice guide-

lines provide framework and consistency. Utilizing guidelines can optimize management of thyroid nodules (7). Caplan and colleagues showed that efficient evaluation of thyroid nodules using guidelines resulted in reduced health care costs (8).

The American Thyroid Association (ATA) and American Association of Clinical Endocrinologists (AACE) have guidelines on thyroid nodule management. We studied the knowledge and practice patterns of primary care providers and internal medicine residents in evaluating thyroid nodules and determined whether their practices were in accordance with the published guidelines. The aim of this study was to determine how well PCPs and residents in training

follow well-established guidelines on thyroid nodule management because, as specialists, we perceived that many patients were referred to us after having unnecessary tests (e.g., thyroid scan or thyroid panel rather than just a TSH).

Methods

We conducted a survey by paper on the initial evaluation of thyroid nodules to primary care providers and internal medicine residents at Medstar Union Memorial Hospital, which is a 238-bed general medical and surgical community hospital in Baltimore, MD, starting in September 2011. They were given a chance to respond until December 2011. The internal medicine residency training program consists of 33 categorical residents and 8 preliminary interns. The questionnaire consisted of multiple choice questions on thyroid nodule management and the awareness of either of the guidelines. The surveys to residents were administered at the start of resident conferences. We went to the PCPs' offices to administer the survey to them.

We reviewed medical records of patients referred to the Diabetes and Endocrine Center, Baltimore, MD, between January and December 2010 for thyroid nodule evaluation by their PCP. Specifically, we tabulated what was ordered: TSH, thyroid panel, thyroid ultrasound, and/or thyroid scan. The list of medical records of patients was generated using the International Classification of Diseases 9 (ICD-9) codes from billing.

Data were tabulated in Microsoft Excel. Results were reported in frequencies and Fisher's exact test was used to compare results between internal medicine residents and primary care providers. The purpose of doing the chart review was to look at the actual data of what was ordered (e.g., TSH, thyroid panel, thyroid ultrasound, thyroid scan) by the provider in the work up of thyroid nodules in order to compare this to the perception of the PCPs and residents reported in the survey. The patients referred to in the survey were unique to the PCP or resident. The PCPs that completed the survey were private attendings and were not staffing the residents in their clinic at the time of survey completion.

Results

In total, 67 surveys were distributed to 34 primary care providers and 33 internal medicine residents. The total response rate was 70%, 47% for the PCPs and 93% for the residents.

Eight of the 33 residents and 1 of the 16 PCPs have not seen a patient with a thyroid nodule. The majority of responders will obtain a TSH, 100% of the PCPs and 94% of the residents. Among these responders, 21% of the PCPs and 25% of the residents will obtain TSH alone without any other laboratory work-up. Fifty percent of the physicians (PCP, 75%; resident, 39%) will always obtain a thyroid ultrasound ($p = 0.043$). Ninety-seven percent of the physicians will refer for a fine-needle aspiration biopsy

Table 1. Frequencies of laboratory tests ordered

Test	Frequency
TSH + other lab test	84/113
TSH alone	45
Free T4	24
Total T4	12
Total T3	3
Free T3	3
T3 resin uptake	1
Thyroglobulin	2
Thyroid peroxidase antibody	5
Thyroid panel	2
No data	27

of a nodule > 1 cm. Seventy-six percent of the physicians will refer for ultrasound-guided fine-needle aspiration biopsy, and a small number (20%) will refer for fine-needle aspiration by palpation. Sixty-two percent of the physicians will not put a euthyroid patient on levothyroxine suppression therapy. Forty-eight percent of the physicians are not aware of the AACE and ATA thyroid nodule guidelines. Sixty-five percent of physicians have not read the guidelines. We compared results of PCPs and residents expecting that we might find a difference; however, this was not the case.

One hundred and thirteen medical records of patients with thyroid nodules referred to the Diabetes and Endocrine Center were included in the analysis. The mean age of the patients was 55 years and the majority were female (98%). TSH alone was obtained in 40% of charts reviewed and in conjunction with other laboratory tests in 74% of the charts. The frequencies of other laboratory tests ordered are shown in Table 1. Only two charts reviewed showed that a thyroid panel was obtained. Twenty-seven charts had no data on the patient's laboratory test obtained by the PCP. The frequencies of the imaging studies of the patients are shown in Table 2. The majority of patients had a thyroid ultrasound (76/113; 67%) and of these, 10 patients also had a thyroid uptake and scan and two had a cervical CT scan. Sixty-four patients had a thyroid ultrasound alone. Two patients had a thyroid uptake and scan alone, and one patient had a cervical x-ray. The majority of the patients did not receive

Table 2. Imaging studies

Imaging studies	Frequency
Thyroid ultrasound alone	64/113
Thyroid ultrasound + radionuclide scan	10
Thyroid ultrasound + neck CT scan	2
Thyroid uptake and scan alone	2
Cervical x-ray	1

levothyroxine therapy as only 12 patients (11%) were on levothyroxine, and only one was on suppression therapy for thyroid nodule, whereas the rest were taking levothyroxine for hypothyroidism.

Discussion

Guidelines in general aid the busy PCP in practicing evidence-based medicine in a cost-effective manner. In particular, the ATA and AACE guidelines provide an algorithm to thyroid nodule management in an evidence-based and cost-effective approach. Although many physicians were not aware of the guidelines, and only a small number of physicians have read them, many primary care providers and residents responded in concordance with the guidelines in obtaining TSH, a thyroid ultrasound, performing fine-needle aspiration biopsy, and not placing euthyroid patients on levothyroxine suppressive therapy. No differences were found between the responses of primary care providers and residents except for obtaining an ultrasound. More PCPs were in agreement with the guidelines than the residents. We surmise that the PCPs are acting in accordance with the guidelines, even though they have not read them, based on CME-related activities and their reading of relevant articles on thyroid nodule management. Chart review data showed that the majority of tests ordered for non-toxic thyroid nodule evaluation by referring physicians were in agreement with guidelines. In both the survey and chart review data, many frequently obtained TSH along with other thyroid laboratory tests. TSH is a sensitive test and obtaining it as part of the initial evaluation is recommended. There were unnecessary imaging tests ordered, but a majority would obtain a thyroid ultrasound. The recommendation in the initial evaluation of a thyroid nodule is TSH measurement and thyroid ultrasound, and only if the TSH is low, to obtain a radionuclide scan (ATA). Routine suppression therapy is not recommended; the majority of physicians responded in agreement to this guideline and chart review data showed that only one patient received suppression therapy. The expected clinical outcome of more PCPs and trainees following the thyroid nodule guidelines is a more cost-effective evidence-based approach for the management of patients with thyroid nodules.

The study has significant limitations. There was a low response rate among primary care providers in the survey.

The results of the survey and chart review are from one community hospital, and may not apply to other patient populations.

Conclusions

Based on this survey and chart review, many physicians in this community hospital are not aware of the thyroid nodule management guidelines; however, most responded in agreement with the AACE and ATA guidelines. In general, PCP responses were in concordance with the guidelines more than internal medicine resident responses. As subspecialists, we need to communicate better with residents in training to improve the initial work up of thyroid nodules prior to referral. Our findings lead us to conclude that the majority of PCPs are initiating the appropriate work up of thyroid nodules prior to referral to a specialist.

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References

1. Tan GH, Gharib H. Thyroid incidentalomas: management approaches to nonpalpable nodules discovered incidentally on thyroid imaging. *Ann Intern Med* 1997; 126: 226–31.
2. Hegedüs L. The thyroid nodule. *N Eng J Med* 2004; 351: 1764–71.
3. Dean DS, Gharib H. Epidemiology of thyroid nodules. *Best Pract Res Clin Endocrinol Metab* 2008; 22: 901–11. [Abstract]
4. Cooper DS, Doherty GM, Haugen BR, Kloos RT, Lee SL, Mandel SJ, et al. Revised American thyroid association management guidelines for patients with thyroid nodules and differentiated thyroid cancer. *Thyroid* 2009; 19: 1167–214.
5. Davies L, Welch HG. Increasing incidence of thyroid cancer in the United States, 1973–2002. *JAMA* 2006; 295: 2164–7.
6. Gharib H, Papini E, Paschke R. Thyroid nodules: a review of current guidelines, practices and prospects. *Eur J Endocrinol* 2008; 159: 493–505.
7. Carpi A, Mechanick JI, Nicolini A, Rubello D, Iervasi G, Bonazzi V, et al. Thyroid nodule evaluation: what have we really learned from recent clinical guidelines? *Biomed Pharmacother* 2006; 60: 393–5.
8. Caplan RH, Wester SM, Lambert PJ, Rooney BL. Efficient evaluation of thyroid nodules by primary care providers and thyroid specialists. *Am J Manag Care* 2000; 6: 1134–40.