

# Knowledge and Attitude of Doctors in Primary Care Settings Towards Thyroid Disorders: An Interventional Study

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**Abstract:** Thyroid disorders are important and growing health problems worldwide. However, considering real life, assessment of knowledge and attitudes of physicians towards thyroid diseases in primary care is lacking. The study aimed to determine the difference in knowledge and attitudes of Family physicians (FPs), General Practitioners (GPs) and internists in primary care settings of Ministry of Health and Population (MOHP) towards Hypo and hyperthyroidism before and after medical education. This study is a pre-post interventional study done in primary health care facilities on 70 physicians from the three medical disciplines. Doctors were interviewed at their work place with a questionnaire consisting of personal data of the doctor and twenty questions about knowledge and attitudes towards thyroid disorders then they were handled the ideal answers according to the guidelines and the interview was repeated after two months. This study revealed that the mean age of physicians was  $34 \pm 7.8$ , the mean duration of work was  $6.8 \pm 5$  years. The pre- interventional knowledge of internists was superior to family physicians and general practitioners. There was a highly significant change of physician knowledge (from  $4.1 \pm 1.4$  to  $8 \pm 1.6$ ) after intervention and there was a weakly significant change in attitude (from  $3.1 \pm 0.9$  to  $3.2 \pm 0.9$  and from  $3.1 \pm 1.5$  to  $3.3 \pm 1.6$  respectively) among general practitioners and family physicians after intervention. It was concluded that doctors from the three medical disciplines had a significant change in their responses to knowledge questions after intervention. So, it's a must to train doctors in primary care how-to pick-up cases of thyroid disorders and how to manage them according to the guidelines and when they need to refer these cases.

**Keywords:** Primary Care, Family Physician, Thyroid Disorders, Knowledge, Attitude

## 1. Introduction

Dysfunction of thyroid gland is one of the commonest endocrine disorders in clinical practice [1]. This condition is described as an altered serum thyroid-stimulating hormone (TSH) level with or without altered thyroid hormones, it is considered a major public health problem [2].

Many factors can affect the prevalence of thyroid disorders; most important are: age, sex, environmental factors, geographic factors, iodine intake and ethnicity. Countries with iodine deficiency have the highest prevalence. Nearly one third of the population in the world lives in areas with iodine deficiency [2, 3].

Hyperthyroidism and hypothyroidism are considered the

two most common thyroid disorders, with 1.6 billion people at risk in more than 110 countries around the world. Hypothyroidism, thyrotoxicosis, thyroiditis and iodine deficiency disorders are the most prevalent thyroid disorders In Africa [4].

In the Arab world the change in life styles has led to the emerging of double burden of diseases, including the thyroid related disorders [5]. In Egypt a previous study in 2019 reported the prevalence to be: overt hypothyroidism (20.6%) and hyperthyroidism (19.2%) [6].

The purpose of the study was to determine the difference in the level of knowledge and attitudes of Family medicine FM doctors, General Practitioners GPs and internists in primary care setting of MOHP towards Hypo and

hyperthyroidism before and after medical education.

## 2. Materials and Method

### 2.1. Study Design

Pre-post interventional study.

### 2.2. Study Setting

Fourteen primary health care centers in 10<sup>th</sup> of Ramadan city Sharquia Governorate, 46 primary health care units (family health care units) and 3 primary care centers in Zagazig city.

### 2.3. Sampling

The calculated sample size of this study is 70 physicians based on the estimated family physician knowledge about thyroid disorders was (32.7%) in a previous study in Turkey and expected outcome after intervention will be (60.2%) [7]. The sample size is measured by using Open Epi, version 3 at 80% power of test and 95% confidence level.

### 2.4. Participants

The most probable medical specialties to pick-up adults with thyroid abnormalities in daily practice in primary care are FPs, GPs and internists were included. All were selected from Ministry of health and population (MOHP). Physicians are selected randomly from the chosen primary health care units and centers and distributed as following: 33 GPs, 23 FPs and 14 internists.

Physicians were included if they are working in a primary health care facility, volunteer for the study questionnaire and respond to all questions. Sex, age, and place of origin of research subjects were not considered as eligibility criteria.

### 2.5. The Study Tool

A questionnaire was prepared composed of:

1. Age, sex of the physician, the years of practice, medical specialty.
2. 20 questions: containing 10 questions for knowledge and 10 for attitude.

All questions were prepared according to the recommendations of the American Family Physician (AFP), United States Preventive Service Task Force (USPSTF) and the quick reference guide for use of thyroid function tests in primary care. The self-administered questionnaire was performed between August and September 2020, and the post phase was between November and December 2020.

*Knowledge questions: Q (1, 2, 3, 5, 6, 7, 15, 16, 18, 20) (open ended)*

Q1: What are the common reasons for performing thyroid function testing in patients at a GP practice? (When to test): the right answers for symptoms suggestive of hypothyroidism is (weight gain, fatigue, poor concentration, depression, diffuse muscle pain, and menstrual irregularities, constipation, cold intolerance, dry skin, proximal muscle

weakness, and hair thinning or loss [8, 9]. Hyperthyroid symptoms include (heat intolerance, palpitations, anxiety, fatigue, weight loss, muscle weakness, and menstrual irregularities [9, 10]. While signs of hypothyroidism include (goiter, bradycardia, oedema, hoarseness of voice, delayed relaxation of deep tendon reflexes, slow speech, cold dry skin [8, 9], and signs of hyperthyroidism include (restlessness, tachycardia, systolic hypertension, warm, moist, smooth skin, lid lag, fine tremor and muscle weakness) [10].

Q2: What to order for diagnosis if you suspect a case: the answer should be: In hypothyroidism: measure serum thyroid-stimulating hormone (TSH) test. If the serum TSH level is elevated > 5.5 mIU/L, test free (T4). If below normal range; it is primary hypothyroidism. If normal: subclinical hypothyroidism. If above normal range: It's not primary and needs referral to endocrinology [8]. In hyperthyroidism: Some physicians first order a TSH test and then subsequently obtain total triiodothyronine (T3) and free thyroxine (T4) levels if the TSH level is low. Others order all three tests if hyperthyroidism is suspected [10].

Q3-What is the optimum TSH level: The right answer: TSH levels (between 0.4 and 4.0 milliunits per liter mU/L) [11].

Q5- Q6- Q7: According to U.S. Preventive Services Task Force Recommendation Statement [12].

Q5: How do you assess the risk for hyperthyroidism? The right answer is: Risk factors for a low TSH level include female sex, personal or family history of thyroid disease, black race, advancing age, low iodine intake, and ingestion of iodine-containing drugs such as amiodarone.

Q6: How do you assess the risk for hypothyroidism? The right answer is: Risk factors for a high (TSH) level include female sex, family history of thyroid disease, advancing age, white race, type 1 diabetes, Down syndrome, goiter, previous hyperthyroidism, and external-beam radiation in the head and neck area.

Q7: What is the screening test of choice for thyroid dysfunction? The answer is serum TSH testing.

Q15, Q 16: According to U.S. Preventive Services Task Force Recommendation Statement [12].

Q15: What is Subclinical hypothyroidism? The answer should be: An asymptomatic condition in which a patient has a high serum TSH level but a normal T4 level.

Q16: What is Subclinical hyperthyroidism? The answer should be: An asymptomatic condition in which a patient has a low serum TSH level but normal T4 and triiodothyronine (T3) levels.

Q18: In which patients do you treat subclinical hyperthyroidism? Right answer: - in adults who are 65 years or older and have TSH levels less than 0.1 mIU per L, to reduce the risk of atrial fibrillation, heart failure, and mortality and – in postmenopausal women with TSH levels less than 0.1 mIU per L and osteoporosis, to decrease the risk of further bone loss [13].

Q20: When to refer hypothyroid patient for endocrinology consultation? Right answer is: Age younger than 18 years, pregnant, cardiac patients, coexisting endocrine diseases,

suspected myxedema coma, presence of goiter, nodule, or other structural thyroid gland abnormality or unresponsive to therapy [8].

*Attitude questions: Q (4, 8, 9, 10, 11, 12, 13, 14, 17, 19) (open ended except 4, 17, 19 are closed ended questions)*

Q4, 8, 9, 10: According to U.S. Preventive Services Task Force Recommendation Statement [12]

Q4: Do you order screening tests for thyroid dysfunction in nonpregnant asymptomatic adults? The right response is: no that is not recommend.

Q8: Should you repeat TSH testing and when? The answer is: multiple tests over 3 to 6 months should be performed to confirm or rule out abnormal findings.

Q9: What should you do in persons with persistently abnormal TSH levels? Right answer is: Follow-up testing of serum T4 levels to differentiate between subclinical (normal T4 level) and "overt" (abnormal T4 level) thyroid dysfunction.

Q10: How do you start treatment of hypothyroidism (primary)? Right answer is: oral T4 monotherapy (levothyroxine). Non-pregnant patients: 1.6 mcg per kg per day initial dosage. For older adults: 25-50 mcg daily starting dosage; increase by 25 mcg every three to four weeks until normal TSH is reached) [8].

Q11, 12, and 14 According to (AAFP) [9].

Q11: How often do you check with Thyroid Function Tests (TFTs) for primary Hypothyroidism? Right answer is: Check annually in patients stabilized on long-term T4 therapy.

Q12: When to test for Thyroid Peroxidase Autoantibodies (TPO Ab)? Right answer is: Measure on one occasion for diagnosis of autoimmune thyroiditis, but not for monitoring.

Q13: How do you start treatment of hyperthyroidism? Right answer is: antithyroid medications (e.g., methimazole) or nonreversible thyroid ablation therapy (e.g., radioactive iodine or surgery). Treatment is generally recommended for patients with a TSH level that is undetectable or <0.1 mIU/L [12].

Q14: How do you monitor Neomercazole therapy? Right

answer is: Perform TFTS every 4-6 weeks after commencement and at 3 months intervals once maintenance dose is reached.

Q17: Do you treat subclinical hyperthyroidism? Right answer is: Yes [13].

Q19: Do you routinely order thyroid ultrasonography in patients with abnormal thyroid function? Right answer is: No, do not order it if there is no abnormality of the thyroid gland [9].

## 2.6. Data Management

Scoring system: for questions (1, 5, 6, 18 and 20); > 60% of the right answer is scored as 1, the rest of questions are scored as 1 for the right answer and 0 for the wrong answer. So, the total score for the knowledge questions is 10 and for attitude questions is 10. The collected data was entered and analyzed using Statistical Package of Social Science (SPSS) (version 16.0). Mc Nemar and paired t tests were used to detect significant difference. P value  $\leq 0.05$  was used as an indicator of statistical significance.

## 2.7. Ethical Clearance

Approval was obtained from Faculty of Medicine at Zagazig University, Institutional Review Board (IRB) (no 6525, 5/7/2020) and a verbal consent from each doctor before starting the interview after explaining the purpose of the study and assuring confidentiality.

## 3. Results

Table 1 shows that the mean age of physicians was  $34 \pm 7.8$  and majority of them were females. The mean duration of work was  $6.8 \pm 5$  years and 70% of them are working at family health units. About half of them are general practitioners.

**Table 1.** Distribution of physicians according to some demographic and work data.

Variables	Mean $\pm$ SD	
Age (years)	34.4 $\pm$ 7.8 (26-54)	
Duration of work (years)	6.8 $\pm$ 5 (0.5-15)	
	Frequency	%
Sex		
Male	29	41.4
Female	41	58.6
Site of work		
Primary care unit	49	70.0
Primary care center	21	30.0
Specialty		
General Practitioner (GP)	33	47.1
Family Physician (FP)	23	32.9
Internist	14	20.0

There is a significant change in response to Q1, 2, 5, 6, 18 and 20 knowledge questions and Q 4, 14, 17 of attitude questions for family physician seen in table 2.

**Table 2.** Responses to knowledge and attitude questions of family physicians before and after intervention (n=23).

Question	Pre-Intervention N (%)	Post- Intervention N (%)	COR	P
Correct response for knowledge question				
Q1	12 (52.2)	22 (95.7)	2.0	0.04*
Q2	14 (60.8)	21 (91.3)	2.3	0.02*
Q3	10 (43.5)	16 (69.6)	1.2	0.36
Q5	13 (56.5)	21 (91.3)	2.1	0.03*
Q6	12 (52.2)	21 (91.3)	2.0	0.05*
Q7	19 (82.6)	21 (91.3)	0.5	0.40
Q15	8 (34.8)	16 (69.6)	1.1	0.50
Q16	8 (34.8)	19 (82.6)	1.3	0.30
Q18	10 (43.5)	19 (82.6)	3.0	0.04*
Q20	12 (52.2)	19 (82.6)	3.0	0.04*
Correct response for attitude questions				
Q4	13 (56.5)	18 (78.2)	3.0	0.01*
Q8	12 (52.2)	14 (60.9)	1.2	0.35
Q9	10 (43.5)	17 (73.9)	1.3	0.29
Q10	8 (34.8)	11 (47.8)	0.7	0.27
Q11	7 (30.4)	13 (56.5)	0.8	0.35
Q12	11 (47.8)	15 (65.2)	1.2	0.27
Q13	12 (52.2)	13 (56.5)	1.2	0.42
Q14	14 (60.8)	18 (78.2)	2.0	0.04*
Q17	15 (65.2)	17 (73.9)	2.5	0.04*
Q19	14 (60.8)	16 (69.6)	1.8	0.08

\*Significant. NB. Mc Nemar test is used to detect significance.

Table 3 shows a significant change in response to Q1, 3, 5, 6, 15, 16 and 20 knowledge questions and Q 4, 9, 11, 12 and 13 of attitude questions for general practitioner.

**Table 3.** Responses to knowledge and attitude questions of general practitioner before and after intervention (n=33).

Questions	Pre-Intervention N (%)	Post- Intervention N (%)	COR	P
Correct responses for knowledge questions				
Q1	10 (30.0)	22 (66.7)	0.2	0.003*
Q2	30 (91.0)	31 (93.9)	0.7	0.64
Q3	4 (12.1)	19 (57.6)	0.3	0.01*
Q5	6 (18.1)	20 (60.6)	0.4	0.05*
Q6	5 (15.1)	24 (72.7)	0.1	<0.001*
Q7	27 (81.8)	31 (93.9)	0.3	0.13
Q15	17 (51.5)	25 (75.8)	0.4	0.04*
Q16	13 (39.4)	24 (72.7)	0.3	0.006*
Q18	7 (21.2)	17 (51.5)	0.7	0.08
Q20	15 (45.5)	30 (91.0)	1.7	0.04*
Correct responses for attitude questions				
Q4	18 (54.5)	29 (87.9)	1.9	0.02*
Q8	10 (30.3)	24 (72.7)	1.0	0.4
Q9	11 (33.3)	30 (90.9)	3.6	0.03*
Q10	13 (39.4)	17 (51.5)	0.8	0.1
Q11	5 (15.2)	26 (78.8)	0.9	0.02*
Q12	4 (12.1)	20 (60.6)	0.3	0.03*
Q13	17 (51.5)	27 (81.8)	2.8	0.02*
Q14	9 (27.3)	18 (54.5)	0.8	0.2
Q17	7 (21.2)	16 (48.5)	0.6	0.1
Q19	12 (36.4)	27 (81.8)	2.0	0.2

\*Significant. NB. Mc Nemar test is used to detect significance.

A significant change in response to Q1, 5, 7, 15, 16, 18 and 20 knowledge questions and Q 8, 9, 11 and 14 of attitude questions for internists is seen in table 4.

**Table 4.** Responses to knowledge and attitude questions of internist before and after intervention (n=14).

Questions	Pre-Intervention N (%)	Post-Intervention N (%)	COR	P
Correct responses for knowledge questions				
Q1	10 (71.4)	12 (85.4)	3.0	0.04*
Q2	14 (100.0)	14 (100.0)	0.4	0.72
Q3	12 (85.7)	13 (92.9)	6.5	0.01*
Q5	10 (71.2)	12 (85.4)	3.0	0.04*
Q6	8 (66.7)	11 (78.5)	1.8	0.22
Q7	12 (85.7)	13 (92.9)	6.5	0.01*
Q15	12 (85.7)	13 (92.9)	6.5	0.01*
Q16	12 (85.7)	14 (100.0)	7.0	0.01*
Q18	8 (66.7)	13 (92.9)	8.0	0.02*
Q20	9 (64.3)	14 (100.0)	2.8	0.03*
Correct responses for attitude questions				
Q4	14 (100.0)	14 (100.0)	0.4	0.7
Q8	12 (85.7)	13 (92.9)	6.5	0.01*
Q9	9 (64.3)	13 (92.9)	2.6	0.05*
Q10	14 (100.0)	14 (100.0)	0.4	0.7
Q11	10 (71.2)	14 (100.0)	3.5	0.03*
Q12	9 (64.3)	12 (85.4)	2.4	0.1
Q13	14 (100.0)	14 (100.0)	0.4	0.7
Q14	11 (78.5)	13 (92.9)	4.3	0.02*
Q17	8 (66.7)	12 (85.4)	2.0	0.1
Q19	10 (71.4)	11 (78.5)	2.8	0.1

\*Significant. NB. Mc Nemar test is used to detect significance.

Table 5 shows that there is a highly significant change of physician's knowledge after intervention and a weakly significant change in attitudes among general practitioners and family physicians after intervention.

**Table 5.** The mean and SD of total responses to knowledge and attitude questions in each specialty before and after intervention.

	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	p
Correct responses for knowledge questions			
Family Physicians	4.3±1.1	7.4±1.4	<0.001*
General practitioners	2.8±1.1	7.6±1.6	<0.001*
Internists	5.4±1.1	10±0.0	<0.001*
Correct responses for attitude questions			
Family Physicians	3.1±1.5	3.3±1.6	0.02*
General practitioners	3.1±0.9	3.2±0.9	0.04*
Internists	5.4±2.5	5.6±2.4	0.61

\*Significant NB. Paired t test is used to detect significance

Table 6 shows that there is a highly significant difference regarding the change in response to knowledge questions and weakly significant difference regarding the change in response to attitude questions.

**Table 6.** The mean and SD of total responses to knowledge and attitude questions of all physicians before and after intervention.

Correct responses to questions			P
	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	
Total Knowledge	4.1±1.4	8±1.6	<0.001*
Total Attitude	3.6±1.8	3.7±1.7	0.02*

\*Significant NB. Paired t test is used to detect significance

## 4. Discussion

In this study we evaluated the response to knowledge and attitude questions for three medical disciplines: FM, GP and internists regarding some aspects of hyper and hypothyroidism that they are exposed to in their practice in primary care before and after handling them a medical education material containing the wright answers according to the guidelines.

The study included 33 GPs, 23 FPs and 14 internists with a

mean age of 34.4±7.8 and duration of work of 6.8±5 years, they were mostly working at Family Health Units (FHU) of the MOHP as seen in table 1.

Table 2 showed a significant change in responses of family physicians in sex knowledge questions: Q1 regarding the knowledge of symptoms and signs of hyper and hypothyroidism improved from 52.2% to 95.7% after intervention. Q2 what to order for diagnosis reached 91.3% after intervention. Q5-6 regarding assessing the risk for hyper and hypothyroidism changed from (56.5%to 91.3%) and

(52.2% to 91.3%) respectively. Both Q18 (in which patients you will treat subclinical hyperthyroidism) and Q20 (when to refer hypothyroid patients both improved after intervention to 82.6% with a  $p=0.04$ ).

Also, a significant change in three attitude questions: Q 4 about ordering screening test for nonpregnant asymptomatic adults the responses improved to 78.2% after intervention with  $p=0.01$ , Q14 about monitoring the drug Neomercazole (carbimazole) changed from 60.8% to 78.2% and Q17 do you treat subclinical hyperthyroidism improved to 73.9% after intervention with a  $p=0.04$ .

General practitioner in Table 3 showed a significant change in response to seven knowledge questions Q1, 3, 5, 6, 15, 16, 20. Q1 showed highly significant improvement from 30% to 66.7% right responses with  $p=0.003$ , Q3 for the optimum TSH level changed to 57.6% after intervention. Q5, 6 changed from (18.1% to 60.6%) and from (15.1 to 72.7%) respectively with  $p < 0.001$  for Q6. Q15, 16 about the definition of subclinical hypothyroidism and hyperthyroidism improved to 75.8% and 72.7% respectively after intervention. In Q20 only 45.5% of them answered right before intervention, others responded that they refer cases of hypothyroidism from the start to endocrinology. After intervention 91% of GPs responded right to the indication of referral to endocrinology for hypothyroid patients.

Also, a significant change was noted in five attitude questions Q4, 9, 11, 12, 13. Q4 moved to 87.9%. Q9: about the right action for a persistently elevated TSH level changed from 33.3% to 90.9% right responses with  $p=0.03$ . Q 11 asking how often to check with TFTs in primary hypothyroidism improved to 78.8% after intervention. Q12 about testing for TPO Ab also, improved to 60.6% with  $p=0.03$  and Q13 how to start treatment for hyperthyroidism 81.8% responded right after intervention.

Although the pre-interventional responses of internists were all above 60% right for all knowledge and attitude questions; Table 4 showed a significant change in eight knowledge questions Q 1, 3, 5, 7, 15, 16, 18 and 20. and for attitude questions Q 8, 9, 11, 14 with  $p \leq 0.05$ .

Table 5 shows that there is a highly significant difference between pre-interventional and post-interventional responses of the three medical disciplines with  $p < 0.001$ , and a significant change in the responses to attitude questions of FPs and GPs with a  $p=0.02$  and 0.04 respectively. The total change in responses to knowledge questions (from  $4.1 \pm 1.4$  to  $8 \pm 1.6$ ) was highly significant ( $p < 0.001$ ), and for attitude questions (from  $3.6 \pm 1.8$  to  $3.7 \pm 1.7$ ) was weakly significant ( $p=0.02$ ) as seen in table 6.

Egyptian medical schools contain an undergraduate medical course consisting of a six-year program of education following the French model. After finishing this program, a Bachelor degree of Medicine and Surgery (MBBCh) is given and a year of internship program is attended by all graduates before obtaining the license to practice medicine as general practitioners GPs [14, 15]. After graduation 80% of bachelor graduates proceed to practice as a GP and only 20% go on to obtain a graduate training in a certain specialty [16].

Limited training capacity is considered a challenge facing postgraduate medical education (PGSM) in Egypt. This is aggravated by the deficient infrastructure and the lack of financial support by health care institutions, the assessment also, may be based on knowledge, the assessment of skills and professional behaviors comes later [17].

In Egypt, there is a misunderstanding in physicians' knowledge about who treats thyroid disorders in primary care, most of them thought it is a duty of internists or endocrinology doctor. While previous studies reported that: When a thyroid disease is diagnosed in a primary care setting, only 15% of GPs refer the patient without investigations to an endocrinologist, 72% share the care with the endocrinologist and 13% take the entire responsibility to manage the case with  $P < 0.0005$  [18].

The management of Hypothyroidism is generally carried out in primary care, it's a simple condition to be managed and levothyroxine is well tolerated by most patients. Up to 2014 GPs were required to maintain a register of hypothyroid patients as apart of Quality Outcome Framework (QOF) [19], the same opinion was recorded by American Thyroid Association in 2013 reporting that many people with hypothyroidism can be treated effectively by their primary care doctor. The patient might need to see an endocrinologist for a second opinion or for regular care if he/she have one of these problems: (congenital hypothyroidism, pregnant, autoimmune hypothyroidism combined with one or more other autoimmune conditions, as type 1 diabetes, Addison's disease, or premature ovarian failure, epilepsy, heart disease, or bowel disease that affects the treatment of hypothyroidism or there is a trouble establishing the right dose of thyroxine) [20].

Patients with overt hyperthyroidism should be referred to an appropriate specialist for further management unless the GP has relevant training and experience [21]. Recently Bathgate in 2018 proposed that we should offer referral to an endocrinologist for all patients with newly diagnosed hyperthyroidism for investigation of the underlying cause and recommendation of a management plan [22]. Pending referrals, if the patient is likely to wait a long time it may be appropriate for the GP to initiate treatment with anti-thyroid drugs in consultation with the endocrinologist concerned, also  $\beta$ -blocker may be prescribed to control the patient symptoms if not contraindicated as (propranolol 40 mg three times daily) [21].

The same opinion in 2018 was proposed by Bathgate: If we are going to start anti-thyroid treatment in primary care; doctors should: 1- Prescribe  $\beta$  blockers in tachycardia. 2- Offer to prescribe anti-thyroid drugs in patients who have a likely non-transient cause of hyperthyroidism, to reduce the symptoms. Before you start; Perform baseline full blood count and liver function tests, and explain the risk of agranulocytosis and hepatotoxicity (with carbimazole and propylthiouracil) associated with anti-thyroid drugs, provide written information about the need to stop treatment and attend for urgent blood tests if fever, sore throat, mouth ulcers, or jaundice develop. Before initiation, seek guidance from a local endocrinologist on dosing and monitoring if needed [22].

## 5. Conclusion and Recommendation

The pre-interventional knowledge for GPs regarding thyroid disorders in primary care was insufficient, followed by FPs. Internists (as expected) was superior to both, but all had a significant change in their responses to knowledge questions after intervention. So, whatever the medical specialty is all physicians need continuous medical education and training according to the new guidelines for every common disorder they are handling in their practice.

## Strengths and Limitations

This work is novel with no previous data assessing knowledge and attitude of physicians on primary care settings towards thyroid disease guidelines. The only limitation was in interviewing doctors in their work place during working hours.

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