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Research Article

Comparison of adult inpatient endocrine consultations between non-surgical and surgical departments in a tertıary care hospital: is there any difference?

Üçüncü basamak bir hastanede yatan hastaların endokrin konsultasyonlarının değerlendirilmesi, dahili ve cerrahi bölümler arasında fark var mı?

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Abstract

Aim: We aimed to compare the number and endocrine reasons of consultations between non-surgical departments (NSDs) and surgical departments (SDs).

Material and Methods: Adult inpatient endocrine consultations during working hours for 7 consecutive months in our center were retrospectively reviewed. Patients who were discharged before consultation, consulted by the coronavirus disease 2019 (COVID-19) service, or referred for consultation for thyroid ultrasound, biopsy, and prescription were excluded. The patients' age and gender, the consultation department (NSDs and SDs), the endocrine issue for consultation, and preoperative or other consultations were recorded. If the consultation recommends a new medication, discontinuation of a medication, or a change in medication dosage, or provides advice on the preoperative management of endocrine diseases, such as suggesting a glucose-insulin infusion protocol, the consultation was considered improvement management (IM). If the consulted physician did not make a new diagnosis or prescribe a new therapy other than to support the present plan, it was accepted as no improvement management (NIM).

Results: A total of 361 consultations were received, but data from 46 were excluded. The remaining 315 consultations and 214 patients were analysed. The rates of consultations that NIM were significantly higher in NSDs in all endocrine issues except bone and calcium metabolism. The department with the highest consultations was dermatology. The most consulted endocrine issue was diabetes in both NSDs and SDs, the second one was thyroid in NSDs and pituitary in SDs. The mean glycated hemoglobin (HbA1c) of consultations that NIM and the mean thyroid stimulating hormone (TSH) level of patients with repeated consultations were significantly low and high, respectively.

Conclusion: Since the incidence of endocrine diseases is expected to increase in the future, training to be conducted according to the related endocrine issue, especially for consultations from the NSDs, could reduce NIM consultation rates.

Keywords: inpatient, endocrine, consultations

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Öz

Amaç: Bazı yetişkin yatan hasta endokrin konsültasyon sonuçlarında, hastanın endokrin tanısı veya tedavisi aynı kalır, yani hasta yönetimini iyileştirmez. Bu konsültasyonların sayısını ve endokrin nedenlerini tıbbi ve cerrahi bölümler arasında karşılaştırmayı amaçladık.

Gereç ve Yöntemler: Merkezimizde ardışık 7 ay boyunca mesai saatleri içinde yatan yetişkin endokrin konsültasyonları retrospektif olarak incelendi. Konsültasyona cevap verilmeden taburcu edilen, COVID servisinden konsülte edilen ve tiroid ultrasonu, biyopsi ve reçete için konsülte edilen hastalar çalışmaya alınmadı.

Bulgular: Toplam 361 konsültasyon değerlendirildi, 46'sına ait veriler çalışma kriterlerini karşılamadığından çalışmaya alınmadı. Kalan 315 konsültasyon ve 214 hasta analiz edilmiştir. Hasta yönetimini iyileştirmeyen konsültasyon oranları, kemik ve kalsiyum metabolizması hariç tüm endokrin konularında dahili bölümlerde önemli ölçüde daha yüksekti. En fazla konsültasyon yapılan bölüm dermatoloji olmuştur. Hem dahili hem de cerrahi bölümlerde en çok danışılan endokrin konu diyabet olurken, ikinci sırada dahili bölümlerde tiroid, cerrahi bölümlerde ise hipofiz yer almıştır. Hasta yönetimini iyileştirmeyen konsültasyonların ortalama HbA1c değeri ve tekrarlanan konsültasyonların ortalama TSH düzeyi sırasıyla anlamlı derecede düşük ve yüksekti.

Sonuç: Gelecekte endokrin hastalıkların görülme sıklığının artması beklendiğinden, özellikle dahili departmanlardan gelen konsültasyonlar için ilgili endokrin konusuna göre yapılacak eğitim, hasta yönetimini iyileştirmeyen konsültasyon oranlarını azaltabilir.

Anahtar Kelimeler: endokrin, konsultasyon, yatan hasta

Introduction

Endocrinological disorders are common in patients as well as in the general population [1]. The recent reports display an increase in inpatient endocrine consultations compared to the past. Demand is expected to grow due to new oncological drugs and prolonged life expectancy [2-4].

One of these reports displayed that forty percent of these consultations led to no alteration in the diagnosis or treatment of the endocrine disease2. In addition, very few inpatient consultations on some endocrine issues demonstrated to change patient management [5]. Our knowledge about these consultations, i.e., no improvement management (NIM) consultations, is limited.

Therefore, in this study, we aimed to evaluate endocrine inpatient consultations that do NIM in terms of the number, endocrine issues, and laboratory parameters between non-surgical departments (NSDs) and surgical departments (SDs). Our knowledge about NIM consultations may help reduce the number of these consultations and decrease the workload of endocrinologists.

Material and Methods

This study was approved by the Ethics Committee of Ankara Training and Research Hospital (protocol no: 0083, dated: 17.04.2024). Our medical center is a tertiary care public hospital with approximately 600 beds. This retrospective study comprised all adult inpatient endocrine consults received from 7 months successively (March 1 through September 30, 2023) during work hours from Monday to Friday. Only the first hospitalization was evaluated for patients with multiple hospitalizations during this period.

The endocrinologist evaluates inpatient endocrine consultations during working hours and by the internal medicine department outside working hours the internal medicine department replies to the consultations from the emergency department for 24 hours, including consultations on endocrine issues. Diabetes and thyroid consultations are primarily evaluated by internal medicine, and endocrine consultation may be recommended if the physician judges it appropriate.

The in-patient NSDs of our hospital are constituted of the following specialities: cardiology, dermatology, gastroenterology, infectious diseases, nephrology, neurology, physical medicine and rehabilitation, and addiction centre. The psychiatry department is absent, but the addiction center is available. The SDs of our centre consist of the following specialities: anesthesiology and reanimation, cardiovascular surgery, general surgery, neurosurgery, obstetrics and gynaecology, ophthalmology, orthopaedic and trauma surgery, otolaryngology and urology. Palliative service consultations were evaluated within the anaesthesiology and reanimation unit consultations. There are no pulmonology, geriatrics, haematology, and oncology

inpatient services. The endocrinological problems of patients in the cardiology, nephrology, and gastroenterology departments are evaluated initially by the internal medicine departments, and endocrinology consultation is requested/performed if necessary.

Department of Internal Medicine-Endocrinology Branch has been run by a fellow and senior endocrinologist. No financial refunds or limitations are used on account of the use of recommendations during hospitalization in this system.

The data were retrospectively analyzed from the electronic hospital system database. The following parameters were collected: 1) age and gender; 2) department of consultation (NSDs/SDs); 3) preoperative /other consultation; 4) the cause of consultation, classified by the endocrine issue (adrenal, bone and calcium metabolism, diabetes, pituitary, thyroid, more than one endocrine issues and other issues); 5) if a change in the patient's treatment recommended (new drug, drug discontinuation or drug dose change or advice for preoperative management of endocrine diseases, for instance, glucose-insulin infusion protocol); these consultations were accepted improvement management (IM). In addition, adrenal lesions consulted preoperatively were admitted as IM due to the possibility of pheochromocytoma. 6) Those who are recommended for outpatient follow-up without any treatment recommendations/changes related to the endocrine issue consulted about (i.e., the consulted physician does not make a new diagnosis or recommend a new treatment other than to support the existing plan) were considered NIM. Also, examples of cases: patients without compression symptoms consulted for incidental thyroid nodules, patients with adrenal incidentaloma not consulted preoperatively, those consulting for gynaecomastia and hirsutism classified as NIM, too. 7) Laboratory parameters related to diabetes and thyroid consults, namely glycated hemoglobin (HbA1c), thyroid stimulating hormone (TSH), and serum-free T4 (fT4) levels.

The consultations from the coronavirus disease 2019 (COVID-19) service were not included in the study. Consultations for prescription, thyroid ultrasonography, or thyroid biopsy were not included in the analysis.

Statistical Analysis

Data were analysed with, SPSS (Statistical Package for the Social Sciences, version 20.0; SPSS, Evanston, IL, USA). The quantitative variables are listed with the mean (standard deviation). In the case of normal distribution, data were evaluated by the Shapiro-Wilk test. The categorical variables are listed with the absolute number and percentages. Comparison of continuous variables was performed using the Student T test for normally distributed data and Mann Mann-Whitney U test for non-normally distributed data. For categorical data chi-square or Fisher's exact test was used. A p-value of less than 0.05 was considered as statistically significant.

Results

Patient and consultation characteristics

During the 7 months, the endocrinologists received 361 consultations from various inpatient clinics. Fourteen consultations could not be concluded/closed since the patients were discharged before the consultations were met/replied. Eleven consultations were excluded because they were consulted from COVID-19 wards, and 21 consultations were excluded because they were requested just for the prescription of a previously given medication (some medications can only be prescribed by the specialists in endocrinology, to be paid back by health insurance providers in Türkiye) or for thyroid ultrasonography and thyroid fine needle aspiration biopsy. The remaining 315 consultations were requested from 214 patients (101 consultations were duplicate consultations, i.e., more than one consultation for the same patient), and the data of these patients were evaluated. (Figure 1).

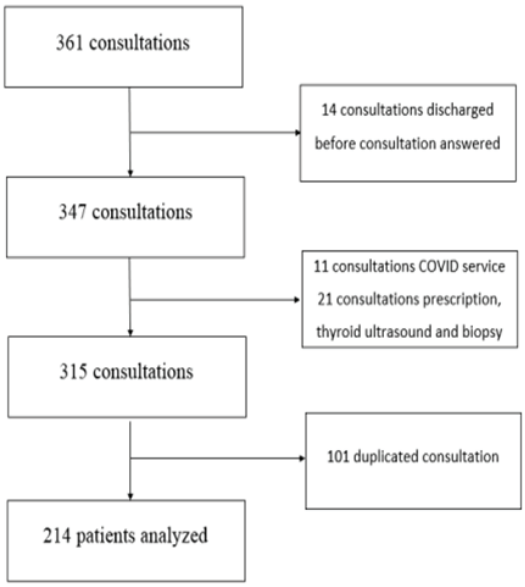

Figure 1. Flow-chart of patient selection.

The mean age of the patients was 60 (NSDs 61.7 ± 15.9; SDs 58.4 ± 16.6). When compared in terms of gender, the proportion of females was higher in SD consultations (p = 0.01). Of the total consultations, 24.8% were NIM and 24.8% were preoperative consultations. 29.4% of the consults were duplicated. The numbers of NSDs and SDs consultations were similar. The rate of

total NIM consultations was significantly higher in NSDs according to SDs (41.9% - 8.3%; p < 0.001). When only non-preoperative consultations were evaluated, the rate of consultations NIM was higher again in NSDs (43.4% - 12.9%; p < 0.001) (Table 1).

Departments that requested consultation from endocrinology

Dermatology (22%), general surgery (12.6%), neurosurgery (11.2%), and infectious diseases (10.7%) were ranked as the first four departments that requested inpatient consultations. The department with the fewest number of consultations was nephrology in NSDs. The otorhinolaryngology department had the fewest number of consultations among SDs. Department of plastic and reconstructive surgery requested no inpatient consultations to endocrinology (Table 2). The most frequently consulted diseases are diabetes (52.3%), thyroid disorders (17.3%), and pituitary disorders (8.9%). Diabetes is the most frequently consulted problem in both NSDs and SDs, followed by thyroid in NSDs and pituitary in SDs (Figure 2). More than 50% of the reasons for dermatology, general surgery, and infectious diseases consultation requests were related to diabetes. The most common reason for neurosurgery consultations was pituitary disorders. All of the pituitary consultations from NSDs were found to be pituitary microadenomas, and outpatient control with an anterior pituitary panel was recommended. NSDs and SDs had similar rates (50.9% - 49.1%) of consultations for diabetes. Most consultations on adrenal, bone, and calcium metabolism and pituitary came from SDs, while most consultations on thyroid (64.9%) were from NSDs. Patients consulted for more than one endocrine reason were mostly consulted from SDs (Figure 2).

Comparison of consultations NIM and IM in NSDs and SDs

When the consultations were compared separately in terms of endocrine disorders, the rate of NIM consultations was significantly higher in adrenal, diabetes, pituitary, and thyroid disorders consulted from NSDs. The number of IM and NIM consultations about bone and calcium metabolism was similar between NSDs and SDs (Table 3).

Table 1. Patient and consultation characteristics according to NSDs and SDs.

	Total n (%)	NSDs (49.1) n=105	SDs (50.9) n=109	p
Age (year) (mean ± SD)	60 ±16.3	61.7 ±15.9	58.4 ±16.6	0.14
Gender [n (%)]				0.01
Female	121 (56.5)	50 (47.6)	71 (65.1)	
Male	93 (43.5)	55 (52.4)	38 (34.9)	
Consultation features				0.000
NIM	53 (24.8)	44 (41.9)	9 (8.3)	
IM	161 (75.2)	61 (58.1)	100 (91.7)	
Consultation reasons				0.000
Preoperative	53 (24.8)	6 (5.7)	47 (43.1)	
Non-preoperative	161 (75.2)	99 (94.3)	62 (56.9)	
Consultation per patient [n, %)]				1.00
Patients consulted once	151 (70.6)	74 (70.5)	77 (70.6)	
Patients consulted more than once	63 (29.4)	31 (29.5)	32 (29.4)	

Abbrev.: NSDs:non-surgical departments, SDs:surgical departments, NIM:no improvement management, IM:improvement management.

Table 2: Departments that requested consultation from endocrinology*

NSDs n (%)	105 (49.1)	SDs n (%)	109 (50.9)
Cardiology	3 (1.4)	Anesthesiology and Reanimation	13 (6.1)
Dermatology	47 (22)	Cardiovascular Surgery	8 (3.7)
Gastroenterology	3 (1.4)	General Surgery	27 (12.6)
Infectious Diseases	23 (10.7)	Neurosurgery	24 (11.2)
Nephrology	2 (0.9)	Obstetrics and Gynecology	8 (3.7)
Neurology	18 (8.4)	Ophthalmology	7 (3.3)
Physical Medicine and Rehabilitation	4 (1.9)	Orthopedics and Trauma Surgery	12 (5.6)
Psychiatry (Addiction Center)	5 (2.3)	Otorhinolaryngology	4 (1.9)
		Plastic and Reconstructive Surgery	0 (0)
		Urology	6 (2.8)

*NSDs:non-surgical departments, SDs:surgical departments.

Table 3. Comparison of consultations NIM and IM in NSDs and SDs according to endocrine issues*.

Endocrine issues (n, %)	Total	NIM consultations	IM consultations	p
Adrenal (13, 6.1%)				0.02
NSDs	6	4 (66.7)	2 (33.3)	
SDs	7	0 (0)	7 (100)	
Bone and calcium metabolism (18, 8.4%)				0.49
NSDs	5	1 (20)	4 (80)	
SDs	13	1 (7.7)	12 (92.3)	
Diabetes (112, 52.3%)				0.01
NSDs	57	12 (21)	45 (79)	
SDs	55	3 (5.5)	52 (94.5)	
Pituitary (19, 8.9%)				0.009
NSDs	4	4 (100)	0 (0)	
SDs	15	3 (20)	12 (80)	
Thyroid (37, 17.3%)				0.000
NSDs	24	17 (70.8)	7 (29.2)	
SDs	13	1 (7.7)	12 (92.3)	

*Other issues (4.7%) and >1 endocrine reason (2.3%) are not shown in the table. NSDs:non-surgical departments, SDs:surgical departments, NIM:no improvement management, IM:improvement management.

Laboratory parameters of diabetes and thyroid consultations

Laboratory parameters of diabetes and thyroid consultations were compared between the groups. In 5 of 112 diabetes consultations, HbA1c was not measured before. One of these consultations was of a pregnant woman consulted for OGTT results for gestational diabetes, 2 were for blood glucose regulation, and 2 were preoperative consultations from ophthalmology. All of the thyroid consultations had previous serum TSH and fT4 measurements. There was no difference in mean HbA1c, TSH, and fT4 levels between NSDs and SDs and between preoperative and non-preoperative consultations. The mean HbA1c level in NIM consultations was significantly lower than that of IM consultations ($p < 0.001$). TSH levels of patients consulted more than once were significantly higher than those of patients consulted once ($p = 0.03$) (Table 4), but no statistical difference was found between them in terms of improved patient management ($p = 0.09$). TSH and fT4 values were in the normal reference range in 13 of 37 patients (35.1%). In 8 patients (21.6%), TSH was above the reference range, and in 5 of them, TSH was above 10 mIU/L.

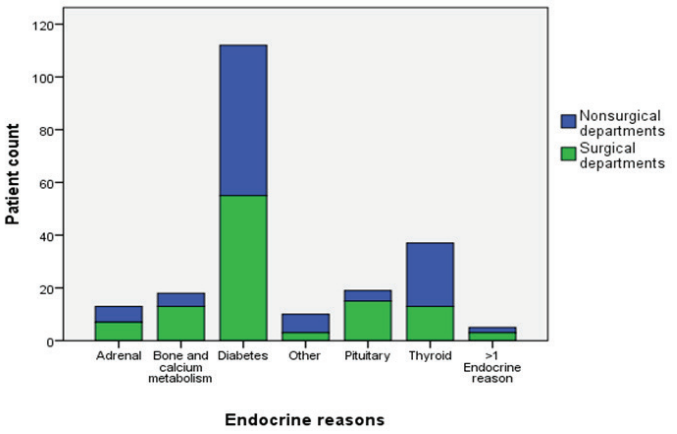

Figure 2. Consulted endocrine issues according to NSDs and SDs. Other issues include electrolyte imbalances, hypoglycemia, obesity, hypotension and gynecomastia.

Table 4. Laboratory parameters of diabetes and thyroid consultations.

	DM consult (n=107)	Mean HbA1 (%)	Thyroid consults (n=37)	Mean TSH (mIU/L)	Mean fT4 (ng/dl)	pHbA1c	pTSH	pfT4
Department (n, %)						0.06	0.64	0.39
NSDs	57(53.2)	8.2	24 (64.9)	2	1.19			
SDs	50(46.8)	9	13 (35.1)	5.1	1.30			
Consultation reasons (n, %)						0.4	0.38	0.7
Preoperative	25(23.3)	8.9	6 (16.2)	3.3	1.26			
Non-preoperative	82(76.7)	8.5	31 (83.8)	3	1.22			
Consultation features (n, %)						0.000	0.44	0.83
NIM	15 (14)	6.6	18 (48.6)	1.1	1.21			
IM	92 (86)	8.9	19 (51.4)	4.9	1.24			
Consultation count per patient (n, %)						0.89	0.03	0.63
Patients consulted once	80 (74)	8.6	30 (81.1)	2.3	1.24			
Patients consulted more than once	27 (26)	8.7	7 (18.9)	6.2	1.16			

Abbrev.: NSDs:non-surgical departments, SDs:surgical departments, NIM:no improvement management, IM:improvement management

Discussion

Yet to our knowledge, this is the first study comparing inpatient endocrinology consultations between NSDs and SDs. While the number of consultations and duplicate consultations was similar between groups, the rates of NIM consultations were significantly higher in NSDs, except for bone and calcium metabolism consults. In both NSDs and SDs, the most common issue that needs endocrinology consultation was diabetes, followed by thyroid in NSDs and pituitary in SDs. There was no difference between NSDs and SDs about mean HbA1c, TSH, and fT4 levels, but patients who were NIM consultations had lower HbA1c levels, and patients who were consulted more than once had higher TSH levels.

Endocrinology consultations play a key role in the inpatient management of both NSDs and SDs. However, some of these consultations are NIM consultations in which the patient's treatment is not altered/started. In our study, we found that about a quarter of consultations do not contribute to inpatient management. Additionally, 83% of NIM consultations were from NSDs. In a recent report, the number of consultations from NSDs and SDs was similar and the rate of consultations that NIM was 40% in line with our study 2. There are no studies in the literature comparing NSDs and SDs in terms of consultations that have an impact on improving inpatient management. This result did not change when the pre-operative consultations were excluded. By comparing NSDs and SDs, we wanted to determine whether there were differences in the number of consultations, the endocrine issues discussed and most importantly, NIM consultation rates between groups. Knowing the departments where NIM/IM consultations are performed may help identify ways to reduce the workload of endocrinologists. There is a need for studies with a larger number of patients and assessing the clinical outcomes of the patients regarding the reasons for the high rate of consultations that NIM in NSDs.

Previous studies have reported that one-third of hospitalized patients were diabetic or developed hyperglycemia during their hospitalization [6,7]. There are various reports which suggest that the organization of specific diabetes consultation teams decreases the length of hospital stay and re-hospitalisation rates [7-9]. In our study, diabetes was the most frequently consulted disease both in NSDs and SDs. Additionally, the HbA1c level of NIM consultations was found to be significantly lower (6.6% and 8.9% $p < 0.001$). Based on this report, determining an HbA1c cut-off value may decrease the number of consultations that NIM. This may be particularly useful in consultations from NSDs and non-preoperative consultations and prevent a waste of time and effort for the endocrinologist.

In our study, the dermatology department was found to have the highest rate of endocrinology consultations. In the literature, dermatology is reported as one of the departments that demand endocrine consultation2. This may be associated with the high rate of hyperglycaemia in dermatology inpatient follow up, owing to the widespread use of steroids [10]. In our study, in accordance with the literature, most dermatology consultations were related to diabetes. Hyperglycemia has been shown to increase mortality in some skin diseases [11]. Evaluation of the clinical outcomes of the patients with diabetes is beyond the scope of our study.

In the present study, thyroid disorders were the second most common problem consulted by NSDs. 70.8% of these were NIM consultations, meaning no new treatment recommendation/ dose adjustment for thyroid. In a recent report, thyroid

medication was not started or changed in 97.2 % of patients who performed thyroid function tests5. In our study, patients who were consulted more than once for thyroid had higher TSH and similar fT4 levels compared to patients who were consulted once, and no statistical difference was found between them in terms of improvement management. TSH and fT4 values were in the normal reference range in 35.1% of patients. In 8 patients (21.6%) TSH was above the reference range, and in 5 of them, TSH was above 10 mIU/L. In a study conducted in pediatric patients, high TSH and normal fT4 levels were seen in approximately 35% of abnormal thyroid tests requested from inpatients, and 74% of these had a TSH range of 5-10 mIU/mL [12]. On the contrary, in our findings, we detected that most of the high TSH values were above 10 mIU/mL. Another study evaluating the cost-effectiveness of thyrotropin measurements suggested that thyroid tests should not be ordered unless necessary due to the frequency of conditions affecting thyroid tests, such as nonthyroidal illness and medications used in inpatients [13]. Non-thyroidal illness syndrome arises when stress, cytokines, and specific drugs (glucocorticoids, dopamine agonists) interfere with thyroid function assessments. The overlapping characteristics of acute illness and thyroid problems complicate the detection of true thyroid dysfunction in hospitalised patients [14]. Based on current results and literature, we suggest that educating inpatient service providers, especially NSDs, about when and whom thyroid tests are ordered may reduce consultation counts.

In this analysis, pituitary disorders were the second most common endocrine problem consulted from SDs. There are a few studies regarding the role of endocrinologists in the management of patients undergoing pituitary surgery. A recent review underlined the beneficial role of endocrinologists in the diagnosis and treatment of pituitary diseases [15]. On the contrary, David et al report that most patients undergoing pituitary surgery do not need endocrinology consultation during hospitalisation [16]. Our study showed that most of the pituitary consultations (80%) requested from the SDs resulted in a modification in the diagnosis and treatment of the patient. Therefore, this study supports the importance of endocrinologists in the management of patients undergoing pituitary surgery. However, all patients consulted from NSDs had pituitary microadenomas without compression symptoms in whom the consultation had not improved patient management.

Limitations of the study

This study has several limitations. First, the retrospective design may have led to the missing of some data. Second, the effects of endocrine consultation on the length of hospitalization, morbidity/mortality rates and the frequency of rehospitalisation were not evaluated because our retrospective study design did not include collection of these clinical outcome measures. Third, our centre does not have pulmonology, geriatrics, haematology and oncology wards which may have affected the results. Lastly, we acknowledge that the predominance of thyroid and diabetes cases in our study population may limit generalizability and these conditions often present with subclinical manifestations in early stages that may not be visible during the study period. Additionally, the limited representation of other endocrine issues restricts the broader applicability of our findings. Future studies designed in larger patient groups may contribute to our knowledge about the effect of endocrine consultations.

In conclusion, our results showed that NIM endocrine consultations were approximately one third of the patients. This results in a waste of time and effort for the endocrinologists who also have busy outpatient clinics. Selection of the patients who are expected to benefit from the endocrine consultation may help reduce the number of NIM consultations and decrease the work burden of endocrinologists.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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Ethics approval

This study was approved by the Ethic Committee of Ankara Training and Research Hospital (protocol no: 0083, dated: 17.04.2024)

Authors' contribution

ŞED: Data curation, Writing – original draft, Writing – review & editing. ŞMK: Data curation, Formal Analysis, Writing – original draft, Writing – review & editing. SNF: Data curation, Writing – review & editing. TO: Data curation, Writing – original draft, Writing – review & editing. ÇEÖ: Data curation, Writing – review & editing. IT: Data curation, Formal Analysis, Writing – original draft, Writing – review & editing. GK: Data curation, Supervision, Writing – original draft, Writing – review & editing.

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