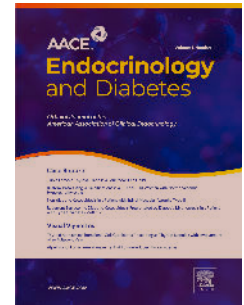


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PII: S3050-9157(26)00228-6

DOI: <https://doi.org/10.1016/j.aed.2026.08.030>

Reference: AED 702

To appear in: *AACE Endocrinology and Diabetes*

Received Date: 8 May 2026

Revised Date: 6 August 2026

Accepted Date: 24 August 2026

Please cite this article as: Sethuram C, Liepert M, O'Neill Z, Mukerji G, Humphrey-Murto S, Lochnan H, Tran C, Keely E, Specialist Triage of Endocrinology Referrals to Advice-Only eConsults (TReC): A Cross-Sectional Utilization Study, *AACE Endocrinology and Diabetes* (2026), doi: <https://doi.org/10.1016/j.aed.2026.08.030>.

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Specialist Triage of Endocrinology Referrals to Advice-Only eConsults (TReC): A Cross-Sectional Utilization Study

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Running title: Triaging Referrals to eConsult

Acknowledgements

The authors wish to thank Brynn O'Dwyer who provided support for data compilation and statistical analysis.

Abbreviation List:

TReC – Triaging Referrals to eConsult

eConsult – electronic consultation

PCP – primary care provider

Sources of Support: None

Patient Consent Statement: Not applicable. This study was deemed a quality improvement/program evaluation project and analyzed de-identified endocrinology referral data at the aggregate level, with no individual patient case details, images, or identifiable information included in the manuscript.

Specialist Triage of Endocrinology Referrals to Advice-Only eConsults (TReC): A Cross-Sectional Utilization Study

Abstract

Background: Timely access to specialist endocrine care is challenging. An alternative is triaging referrals to advice-only eConsults (TReC), where specialists provide guidance directly to the referring provider in lieu of a synchronous patient visit. The objective of this study is to characterize the endocrinology referrals that were triaged to eConsults over one year and describe the impact of the advice provided by TReC.

Methods: We conducted a cross-sectional study of all endocrinology referrals submitted to our institution between September 1, 2023 and August 31, 2024 that were triaged to advice-only eConsults. We categorized referrals using a preset taxonomy of cases appropriate for eConsult established through a Delphi consensus process. Three reviewers independently coded the first 20 eConsults and then resolved discrepancies to reach consensus. The remaining eConsults were then divided among the reviewers for independent coding.

Results: A total of 402 of the 5377 endocrinology referrals received (7.4%) were triaged to eConsult during the study period. The most common referrals included guidance regarding add-on drugs for type 2 diabetes glycemic control ($n = 51$), hypothyroidism requiring minor thyroid hormone dose adjustments ($n=27$), and routine questions on osteoporosis investigations and therapies ($n = 27$).

Conclusion: This study describes common referral questions in endocrinology that can be effectively addressed with advice-only eConsults. These findings support the development of standardized approaches for managing common endocrinology referrals often suitable for advice

23 back to the referring provider, and may inform the implementation of TReC models at other
24 institutions seeking to improve access to endocrine care.

25

26 **Key words:** electronic consultation (eConsult), specialist triage, access to specialty care, referral
27 management

Introduction

Accessing specialty care in a timely manner is increasingly challenging in many regions, including Canada. In many centres, referrals are either accepted—often with very long wait times—or rejected outright, leaving referring clinicians with limited guidance and potentially delaying patient care. One potential solution to this problem is electronic consultation (eConsult), which is secure provider-to-provider communication where specialists provide asynchronous advice to referring providers, often avoiding the need for an in-person appointment (1). This leads to more timely patient care and decreases the need for in-person consultation with specialists.

In our region, we have 15 years of experience providing an eConsult service where the referring provider determines whether a case is appropriate for advice-only consultation and initiates the request. Using a workflow distinct from the standard referral process, referring providers submit their clinical question through a separate eConsult platform. However, this approach relies on the referring provider to recognize cases that are suitable for eConsult and be aware of, and able to access, the alternative platform used to submit these requests (2-5). At our Diabetes and Endocrinology clinic, we found that 8-15% of faxed referrals could be answered with an eConsult (6). Additionally, a survey of patients after face-to-face consultation with an endocrinologist found that 46% would have accepted replacing the in-person visit with specialist advice provided directly to their primary care provider (PCP) when appropriate (7). As such, there may be an avenue to optimize the use and uptake of eConsult to build capacity for specialist care.

To try and improve access to specialist advice, we developed a complementary pathway to our referring provider-initiated eConsults. A new pathway of triaging referrals is for the

51 triaging endocrinologist to convert requests for in-person consultations to “advice only”. This
52 Triaging Referrals to eConsults (TReC) workflow allows specialists to respond to non-urgent
53 referrals with advice back to the referring provider at the time of triaging, eliminating the need
54 for a specialist appointment for the patient. Some centres outside of Canada already have a
55 similar pathway where the specialist, rather than the referring provider, can decide whether the
56 referral requires an in-person appointment versus advice-only (8-11), however there is little
57 published in regard to physician consensus about clinical scenarios that are appropriate for
58 advice-only. To address the existing capacity constraints and to support referring providers, our
59 institution implemented TReC in November 2022. Referrals eligible for providing advice only
60 included non-urgent cases where patients had a healthcare provider who could provide
61 longitudinal care, and cases where advice was within the referring provider’s scope of practice.
62 A recent study regarding TReC examined PCPs’ perspectives on the safety and acceptability of
63 TReC (12). The results demonstrate that specialists triaging referrals to provide advice to PCPs,
64 often in lieu of an appointment, was acceptable, feasible, and PCPs did not raise any major
65 patient safety concerns.

66 In preparation for the launch of this new referral pathway, consensus on endocrinology
67 cases most suitable for TReC was achieved using a nominal group and Delphi process (13). The
68 same clinicians who participated in this process currently triage referrals at our institution. The
69 aim of the current study is to examine whether endocrinology referrals converted to eConsults
70 through TReC aligned with the clinical scenarios identified in the Delphi process. This analysis
71 will allow us to determine whether the theoretically derived scenarios are reflective of current
72 real-world triage practices and to identify additional clinical topics suitable for advice-only
73 consultation. Identifying clinical topics that are appropriate for advice-only eConsult is important

to ensure triage consistency and equity within a single site and to support endocrinologists in other centres.

Methods

Design

We performed a cross-sectional study of all endocrinology referrals triaged to advice-only eConsults between September 1, 2023 and August 31, 2024.

Context

This study took place at a three-campus academic tertiary care center and teaching hospital with a catchment area of approximately 1.2 million people within Canada. Referrals sent to the endocrinology service at our institution are triaged by an endocrinologist for appointment only, advice only with eConsult, advice and appointment, or are declined (Figure 1). Referrals at this centre are triaged within the hospital information system and the TReC workflow was embedded within routine triaging workflows.

Participants

The study included all referrals made to endocrinology by PCPs (either family physicians or nurse practitioners) or non-endocrinology specialists.

Data collection

All referrals submitted to endocrinology that were triaged to advice-only eConsult over the one year timeframe were collected and extracted from electronic medical records. Eleven endocrinologists share triage responsibilities equally, each covering one day on a rotating basis. We excluded referrals that were declined, resulted in an in-person consultation visit, or if the patient died prior to advice being sent back. Data included the full exchange between the referring provider and the triaging endocrinologist. We also collected utilization data from these

cases, which includes the type of referring provider (family physician, nurse practitioner, specialist), total number of referrals, number of referrals converted to advice-only, time from referral creation to referral triage completion (response time), and self-reported billing time for the specialist.

Data analysis

The referrals triaged to eConsults were classified using a preset taxonomy of the 38 clinical scenarios developed through the Delphi process and reaching consensus as appropriate for advice back (13). Each code corresponded directly to one of these clinical scenarios. A list of these clinical codes can be found in Appendix A. Three reviewers independently coded the first 20 cases and then compared coding classifications to ensure consistency. Where differences occurred, the reviewers agreed upon how similar questions should be further classified. The remainder of the cases were divided, so two independent reviewers coded each case. If there was disagreement between two reviewers, the third reviewer was consulted. If there was still disagreement among reviewers, a group of clinical experts (endocrinologists on the research team who did not provide the advice back) was consulted. Cases were analyzed on an individual basis; for example, if an initial referral was triaged to advice-only eConsult, but was later accepted for an in-person referral, we coded the content of the initial referral as an individual entity. In cases where more than one question was asked, all questions were coded.

Clinical cases that did not fit into one of the 38 codes were classified as “Other”. We first attempted to classify these cases within the “Other” category by using one of the 20 remaining clinical scenarios deemed to be not appropriate for advice back or where there was no consensus achieved through the original Delphi process (13). A list of these clinical codes can be found in Appendix B.

If the case was still not classifiable using one of the 58 scenarios developed through the Delphi process, new codes were created for clinical topics that recurred in ≥ 5 referrals during the study period.

Cases in which a second referral was sent for the same patient (re-referral) were also analyzed. For these cases, we collected data regarding clinical content and outcome of the referral (in-person consultation, advice-back with an in-person consultation, advice-only, or declined).

Ethics approval

The hospital Research Ethics Board (REB) deemed that this project falls within the context of quality initiative, quality improvement, and program evaluation. It was therefore exempt from REB review.

Results

During the study period, 5377 completed referrals were submitted to endocrinology. Of these referrals, 3898 were accepted for in-person appointment, 320 were accepted for advice and appointment, and 748 were rejected. There were 411 referrals triaged to eConsult (Figure 2). After duplicates were removed and exclusion criteria applied, 402 referrals were analyzed (7.4% of all total referrals). These referrals were submitted by 329 referring providers and triaged to eConsult by 11 endocrinologists.

Utilization Data

The median response time to complete TReC by endocrinologists was less than one day (IQR 0-1 days), with 95% of referrals receiving a response within 14 days. The median self-reported time by endocrinologists to complete an eConsult was 10 minutes (IQR 5-10 minutes).

Most referrals were submitted by physicians (92%), with the remaining submitted by nurse practitioners (8%).

Of the 402 referrals, 249 (62%) were for one of the 38 clinical scenarios identified through the Delphi process to be appropriate for advice back, as shown in Table 1. Of the 153 cases (38%) not captured by the Delphi classification as appropriate for advice back, 27 corresponded to clinical scenarios considered in the Delphi process but not deemed appropriate for TReC (voted out or lacking consensus – see Table 2), while 126 had clinical scenarios not included in the Delphi process. Of these 126 cases, 38 had topics that occurred in ≥ 5 referrals and were classified using new clinical scenarios that were developed by our reviewers and content experts, which are described in Table 3.

Re-Referral Data

A second referral to endocrinology for the same patient was identified in 53 cases. Two cases were excluded (one duplicate, and one patient could not be found in the original dataset), resulting in 51 cases included for analysis (12% re-referrals of all TReC cases). Of these cases, the majority (n=49, 96.1%) were for the same issue as the original referral. Four of the 49 referrals (8.2%) included a second/new issue. Two referrals (3.9%) were not related to the same issue as in the original referral. Fifty-seven percent (n=29) of re-referrals were ultimately booked for an in-person appointment, which is 7% of all TReC cases. Eleven of these re-referrals (22%) resulted in another eConsult with advice back to the referring provider, and eleven of these re-referrals (22%) were rejected. Advice back to the referring provider with an in-person appointment in the future was provided in three of these cases (5.9%). Eighteen re-referrals (35%) occurred less than one month after the original eConsult, eleven (22%) were within 1-3 months, ten (20%) were within 3-6 months, four (7.8%) were within 6-9 months, six (12%) were

within 9-12 months, and two (3.9%) occurred greater than 12 months after the original eConsult advice was provided. Additional data on the clinical content of questions and clinical outcomes of re-referral cases can be found in Appendix C.

Discussion

Triaging Referrals to eConsult is one solution to reduce long wait times for specialist appointments while still supporting referring clinicians in the care of their patients. We describe an innovative method of providing timely advice back to referring providers with the specialist-initiated TReC model, which was feasibly implemented for endocrinology care within routine triage workflows at a large academic institution. Almost all eConsults were completed within 14 days, and only 6% received an in-person appointment after the advice was received, highlighting real value to expand access to specialist care with this model. Although the majority of cases aligned with our pre-launch consensus criteria on clinical scenarios appropriate for TReC, the implementation of this workflow highlighted new clinical topics that may be appropriate for advice-back. Our results describe 402 referrals that have been triaged to eConsult over the study period with 33 of 58 clinical topics developed in the previous study (13) represented in these referrals. Additionally, four new clinical topics that are suitable for advice back were identified in our analysis, highlighting the importance of pragmatic re-evaluation of TReC with real-world data.

Determining which clinical scenarios are appropriate for triage to advice-only eConsult remains challenging in practice. Although a rigorous Delphi process involving the same group of endocrinologists who currently triage referrals was undertaken to identify scenarios suitable for advice-only management, our findings suggest that translating these consensus scenarios into consistent real-world practice is complex. While the majority of cases (62%) converted from

referral to eConsult aligned with the Delphi-identified scenarios, a substantial proportion (38%) did not. These cases included topics that had not reached consensus, had been deemed not appropriate in the Delphi process, or had not been captured in the original list. Given that the Delphi process initially considered a large number of potential topics, this finding highlights the need for ongoing pragmatic re-evaluation of triage criteria. It also underscores the inherent variability in triage decisions and suggests that contextual factors—such as characteristics of the referral, perceived capabilities of the referring physician, or evolving clinical practice—may influence whether cases are managed through advice-only consultation.

Overall, our study found that most referrals triaged to eConsult were for issues related to thyroid disease and diabetes. The most represented topics were those that can be managed within the scope of primary care providers, including a hypothyroid patient on thyroid hormone with fluctuating or elevated TSH levels requiring minor dose adjustment, or a patient with Type 2 diabetes where advice for improving glycemic control does not require an in-person assessment. In both scenarios, laboratory values included in the referral provided guidance on treatment intensification, supporting cases which may not require an in-person assessment to guide timely therapeutic decisions based on pre-referral investigations. Guidelines outlining referrals appropriate for advice-back rather than an in-person consultation should be developed based on the clinical scenarios described in this study to ensure consistency in triaging at our site and at other institutions looking to implement a TReC program.

Our study also identified two clinical topics—weight management and gender-affirming care—that were managed through advice-back during the study period despite not being supported in the prior Delphi study (weight management did not achieve consensus; gender-affirming care reached consensus as not appropriate) (13). We also highlighted four new clinical

topics that were often managed with advice-back that were not previously described in the Delphi study. These new topics, elevated cortisol in the context of OCP use, thyroid nodule meeting criteria for biopsy with no prior biopsy completed, thyroid nodule with incomplete work-up, and male patient treated with testosterone without apparent issue, warrant inclusion in standardized guidelines of referrals appropriate for an eConsult. All of the described clinical scenarios are appropriate topics for continuing medical education that are generally considered within the scope of primary care.

Other regions outside of Canada have been using models similar to TReC where the requested provider, not the referring provider, decides if electronically submitted referrals can be addressed by advice-only rather than booking an appointment (8-11,14). The rate of referrals converted to advice-only eConsult (conversion rate) was 7.4% in our study, which is slightly lower than expected based on literature from other institutions. Three studies from the USA describing multispecialty eConsult services report conversion rates of 13%, 20%, and 25% (15-17). Two studies from the UK describing an eConsult service for neurology and general surgery both report a 10% conversion rate (18,19). Another study from the UK describes an e-Triage service for osteoporosis care and reports an 8.3% conversion rate (20). A review of faxed endocrinology referrals to our institution in 2017 reported that between 8 to 15% of referrals could be answered with an advice-only eConsult (6). Our conversion rate could be slightly lower than other studies in the literature for a few reasons. Firstly, there is limited information available on the shared medical record in our region, so specialists may not be able to review additional clinical information to guide the advice and many do not have access to primary care electronic medical record information within their hospital information system. Conversion rates are heavily dependent on the digital infrastructure available, so cross-platform interoperability is

essential for widespread adoption of the TReC model. Secondly, there is a lack of consensus on the best suited clinical scenarios for TReC and as such, our study aims to provide a standardized description of clinical scenarios that are appropriate for eConsult. Thirdly, there is concern for increased workload, both for the referring provider, who must act on the advice, and the specialist, who must take the time to provide high-quality advice. However, the administrative burden of providing an eConsult is often outweighed by the reduction in inappropriate in-person consultations, resulting in workload optimization rather than increase. We expect that our conversion rate will likely increase as we develop more standardized guidelines for TReC at our institution, specialists' comfort with this model increases, and as long wait times continue to limit the number of patients that can be seen in-person.

Strengths and Limitations

This study examines the real-world implementation and clinical content of a specialist-initiated triage model within endocrinology to advice-only at a large academic tertiary care centre. To our knowledge, this is the first study to analyze this novel workflow and included a large volume of referrals over a full year, capturing both seasonal variation and demonstrated the real-world feasibility within routine workflows. While there are other studies that present the rate of referrals converted to advice-only eConsult, there are no prior studies describing the clinical scenarios that would be appropriate for endocrinology advice-back. To improve rigor, we used a previously developed Delphi-derived taxonomy that allowed systemic classification of clinical scenarios suitable for advice-only eConsult, improving comparability with prior published work. However, there are limitations to our study. We did not assess whether the advice provided by endocrinologists was followed. This study is part of the foundation of a larger research program with future research to understand if there are impacts on patient outcomes as a result of TReC.

We could not analyze referrals that were accepted for in-person consultation that could have been triaged to advice-only eConsults. Additionally, our site is a large academic tertiary care center, which may limit generalizability to other settings with different referral patterns, specialist availability or digital infrastructure. Although a predefined taxonomy was used, some referrals required creation of new clinical categories, so expansion of the clinical taxonomy based on these newly identified referral scenarios amenable to advice-only eConsult may further refine guidance on which referrals are most appropriate to the TReC model in endocrinology. With respect to the re-referral data presented in this study, it is limited to re-referrals back to our tertiary care center, and we do not know if patients have been referred elsewhere (e.g., a community endocrinologist) after the eConsult advice was provided.

Conclusions

This study describes common referral questions in endocrinology that can be effectively addressed with advice-only eConsults. These findings support the development of standardized approaches for managing common endocrinology referrals suitable for advice back to the referring provider to improve triage consistency, support capacity and equity in triage outcomes, and inform the implementation of TReC models at other institutions seeking to improve access to endocrine care. At the same time, our findings highlight the challenges of consistently identifying scenarios appropriate for advice-only consultation in practice, underscoring the need for ongoing pragmatic evaluation and refinement of triage criteria.

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Figure Captions:

Figure 1. TReC workflow

Figure 2. Referrals triaged to eConsult per month between September 2023 to August 2024.

Percentages represent the proportion of TReC out of the total referrals per month

Table 1. Referrals triaged to eConsult by clinical topic (reaching consensus as appropriate for eConsult in the Delphi study)

Clinical scenario	Number of referrals, N=402 (%)
Diabetes	
Type 2 diabetes where simple advice regarding add on drugs for glycemic control or cardio renal risk reduction does not require an in-person assessment	51 (13)
Patients identified as pre-diabetes	8 (2.0)
Newly diagnosed type 2 diabetes that does not appear to be type 1 diabetes, and is stable and not immediately requiring insulin	6 (1.5)
Patient/physician who requesting education, lifestyle support, or dietary advice	3 (0.8)
Thyroid	
Hypothyroid patient on thyroid hormone with fluctuating or with elevated TSH levels that warrants minor dose adjustment	27 (6.7)
Euthyroid patient with thyroid nodule(s) or multinodular goiter that is stable on US and no nodules meeting biopsy criteria	19 (4.7)
Normal thyroid function tests with positive thyroid antibodies	14 (3.5)
Patient requests endocrinology involvement or second opinion for managing hypothyroidism which is appropriately treated	12 (3.0)

Subclinical hypothyroidism, TSH < 10 for discussion of indications for treatment	11 (2.7)
Patient who has subclinical hyperthyroidism and is otherwise well	10 (2.5)
Newly diagnosed hypothyroidism with elevated TSH who has not yet been started on thyroid hormone. Patient is well and no urgent concerns	8 (2.0)
Hypothyroid patient with normal TSH who is still experiencing symptoms	7 (1.7)
Inconsistent lab results - now normal or explainable	2 (0.5)
Hypothyroid patient planning a pregnancy	1 (0.3)
Hypothyroid patient on desiccated thyroid hormone who does not want to change to l-thyroxine	1 (0.3)
Osteoporosis	
Routine questions on osteoporosis investigation and therapy covered in guidelines	27 (6.7)
Interpretation of BMD - eg is this change significant or on risk calculation with FRAX / CAROC	7 (1.7)
Patient unable to tolerate oral bisphosphonate and question around second line therapy	4 (1.0)
Adrenal	
Patient with adrenal lesion on US or MRI who has not had an adrenal CT	3 (0.8)
Patient with incidental adrenal lesion with HU < 20 units, no worrisome features on CT/MRI who is otherwise well with no endocrinology work up	1

Patient with incidental adrenal lesion with HU < 20 units, no worrisome features on CT/MRI who is otherwise well with normal endocrinology work up ie. no hypersecretion	1
Other	
Other*	153 (38.1)
Male patient with normal androgen levels and prolactin with hypogonadal symptoms	8 (2.0)
Patient with normal calcium (corrected for albumin) with elevated PTH and low vitamin D	7 (1.7)
Recommendations for initiation of lipid lowering agent in person without coronary/vascular disease	3 (0.8)
Mild asymptomatic hyperprolactinemia with no imaging or normal imaging	2 (0.5)
Incidental microadenoma (< 10 mm) with no clinical evidence of hyper or hypofunction (advise on what testing to do if not done)	1 (0.3)

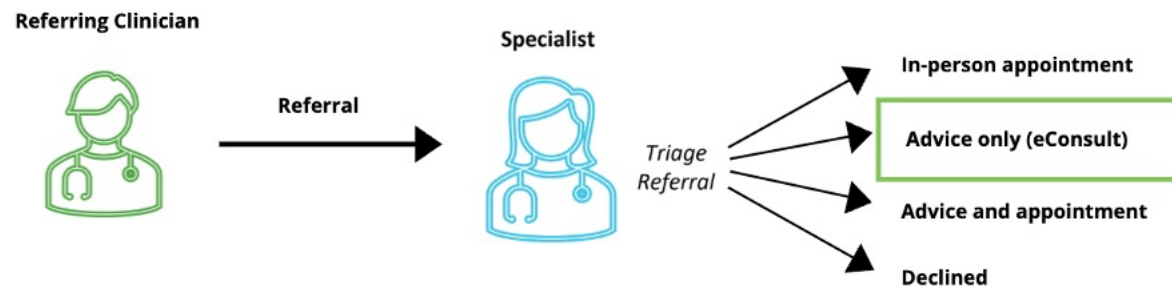
*please see Table 2 for additional classification

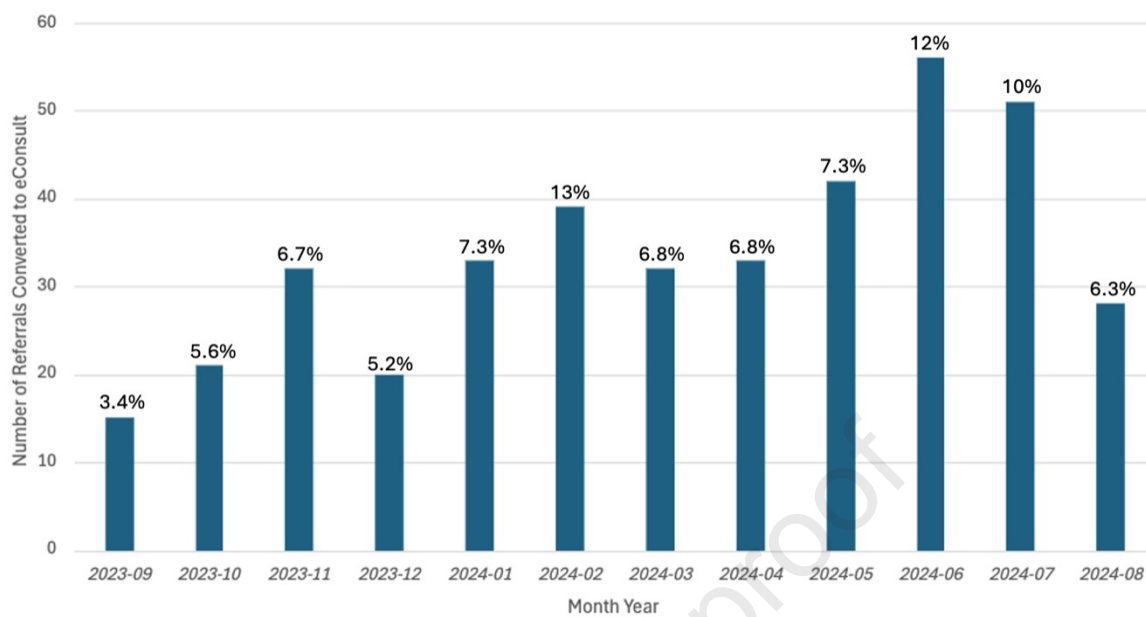
Table 2. Referrals in the ‘Other’ category with codes that did not reach consensus for eConsult in the Delphi study

Clinical scenario	Number of referrals, N=27 (%)
Weight management question	11 (40.7)
Gender affirming hormone therapy	7 (25.9)
Female patient with hirsutism with normal androgen levels	3 (11.1)
Hormone replacement therapy for menopausal /premature ovarian insufficiency	2 (7.4)
Patient on glucocorticoids for non-adrenal illness for iatrogenic adrenal insufficiency/withdrawal of glucocorticoids	2 (7.4)
Type 2 diabetes requesting change in endocrinologist who has A1c near target (< 8%)	1 (3.7)
Patient with hyperthyroidism, free T4 < 40 pmol/L , mild symptoms, with tender neck in keeping with likely diagnosis of subacute thyroiditis	1 (3.7)

Table 3. New codes developed from clinical questions that recurred in 5 or more referrals, originally classified within the “Other” category

Clinical scenario	Number of referrals, N=38 (%)
Patient with elevated cortisol in the context of oral contraceptive pill (OCP) use	14 (36)
Patient with thyroid nodule meeting criteria for biopsy, with no biopsy done, requesting endocrinology involvement to arrange tests	13 (34)
Patient with thyroid nodule with incomplete work up	6 (15)
Male patient being treated with testosterone without apparent issue	5 (13)





Highlights:

- Timely access to specialist endocrine care can be achieved with triaging referrals to advice-only electronic consultations (TReC) in appropriate clinical scenarios.
- Our study describes 37 clinical scenarios that are appropriate for TReC based on one year of data from our academic tertiary care center.
- These findings are useful to improve triage consistency and equity in triage outcomes, and support the development of TReC models at other institutions to improve access to endocrine care.

Clinical Relevance:

Triaging Referrals to eConsults (TReC) enables endocrinologists to provide timely advice back to referring providers in lieu of in-person visits, improving specialist access. This study identifies common endocrinology scenarios suitable for advice-only consultation, informing standardized triage criteria and TReC implementation at other institutions.