

eCONSULTS TO ENDOCRINOLOGISTS IMPROVE ACCESS AND CHANGE PRIMARY CARE PROVIDER BEHAVIOR

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ABSTRACT

Objective: To describe the impact of an eConsult service on access to endocrinologists along with its influence on changing primary care provider (PCP) course of action and referral behaviors.

Methods: Established in 2011, the Champlain BASE (Building Access to Specialist Care via eConsult) service allows PCPs to access specialist care in lieu of traditional face-to-face referrals. We conducted a cross-sectional study of eConsult cases submitted to endocrinologists by PCPs between April 15, 2011 and January 31, 2015. Usage data and PCP responses to a mandatory closeout survey were analyzed to determine eConsult response times, PCP practice behavior, referral outcomes, and provider satisfaction. Each eConsult was coded according to clinical topic and question type based on established taxonomies.

Results: A total of 180 PCPs submitted 464 eConsults to endocrinology during the study period. Specialist median response time was 7 hours, with 90% of responses occurring within 3 days. PCPs received a new or additional course of action in 62% of submitted cases. An unnecessary face-to-face referral was avoided in 44% of all eCon-

sults and in 67% of cases where the PCP initially contemplated requesting a referral. Over 95% of cases were rated at least 4 out of 5 in value for PCPs and their patients.

Conclusion: The use of eConsult improves access to endocrinologists by providing timely, highly rated practice-changing clinical advice while reducing the need for patients to attend face-to-face office visits. (**Endocr Pract. 2016;22:1145-1150**)

Abbreviations:

BASE = Building Access to Specialist Advice through eConsult; **PCP** = primary care physician; **UCSF** = University of California San Francisco

INTRODUCTION

Timely access to specialists in Canada remains a barrier to patient care. Specialist-reported median wait time has nearly doubled in the past 20 years (1). Although the ideal wait time to see an endocrinologist in Canada has yet to be established (2), the median wait time is slightly higher than other specialties (3). The increasing burden of endocrinopathies including diabetes (4,5), osteoporosis (6), and thyroid cancer (7) along with a projected shortage of adult endocrinologists (8) drives further demand for endocrinologist advice by primary care providers (PCPs).

An innovative and emerging health care delivery system is eConsult: asynchronous communication between healthcare providers within shared electronic health records or secure web-based platforms (9). eConsult services can reduce wait times while improving communication between PCPs and specialists (10,11). Established in 2010, the Champlain BASE (Building Access to Specialist Advice through eConsult) service has processed over 13,000 eConsults addressed to 86 different specialties, with endocrinology being the second-most requested specialty. Overall the service has been shown to reduce the need for face-to-face referrals while being highly rated by PCPs (11).

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There are limited reports on the impact of eConsult on access to endocrinologists and influence on PCP practice behavior. The University of California San Francisco (UCSF) Medical Center reported improved timely access to endocrinologist advice (defined as specialist input within 14 days of referral) after implementation of an eConsult service with minimal effect on downstream healthcare utilization, although there was no change to the total office-based referrals to endocrinology (12). Within the Veterans Health Administration, Endocrinology had the highest rate of eConsults per 100 face-to-face consults among all other subspecialties (13). eConsult has improved treatment rates of veterans with osteoporotic fractures (14) while saving nearly 20,000 km of patient travel over the course of 1 year (15). An in-depth analysis of eConsults submitted to endocrinologists to explore if certain questions can affect primary care practice behavior and referral patterns has not yet been explored.

The purpose of this study was to describe the impact of the Champlain BASE eConsult service on access to endocrinologists and PCP practice behavior and to determine if specific clinical topics or question types are more likely affect referral outcomes by changing a PCP's originally contemplated course of action.

METHODS

Champlain BASE eConsult System

Full details of the development and implementation of the Champlain BASE eConsult system have been reported elsewhere (11,16,17). Briefly, a PCP (either a family doctor or nurse practitioner; general internists were not included as they do not typically provide primary care in Canada) uses a standardized form to submit patient-specific clinical questions to specialists through a secure web-based platform. Supplementary information including laboratory and diagnostic imaging reports can be attached. In response

to each eConsult, the specialist can (1) provide advice, (2) request more information, and/or (3) recommend that the PCP arrange a face-to-face referral. Back-and-forth communication can occur until both the PCP and specialist are satisfied with the information received from one another. Information on PCP type, patient age and sex, and time for specialists to respond to and answer an eConsult is collected prospectively.

Analysis of Endocrinology eConsults

Two authors (C.T., D.L.) independently categorized all submitted eConsults to Endocrinology using a predefined list of clinical topics (based on coding by the International Classification of Primary Care) (18) and question types (based on a validated taxonomy) (19). All discrepancies were discussed until consensus was reached.

A total of 10 different clinical topics were included (Fig. 1). Clinical topics with ≤ 8 eConsults ($<2\%$ of all submitted eConsults) were grouped into an "Other" category to facilitate analysis.

Question types were categorized as diagnosis, drug treatment, management, procedure, more than 1 question, and no specific question. Examples of drug treatment questions include those asking about the indications for initiating therapy and the drug of choice for a particular condition, how to prescribe a particular drug, medication adverse effects, and interactions with other medications. Diagnosis questions included those that requested for interpretation of clinical findings; laboratory, imaging, or pathology results; and the next best investigation to pursue during diagnostic work-up. Management questions involved cases where PCPs asked if a patient should be referred, if other providers were available, or a general request for direction. Procedure questions included those inquiring about indications and how to prepare a patient for a particular procedure (e.g., fine-needle aspiration biopsy).

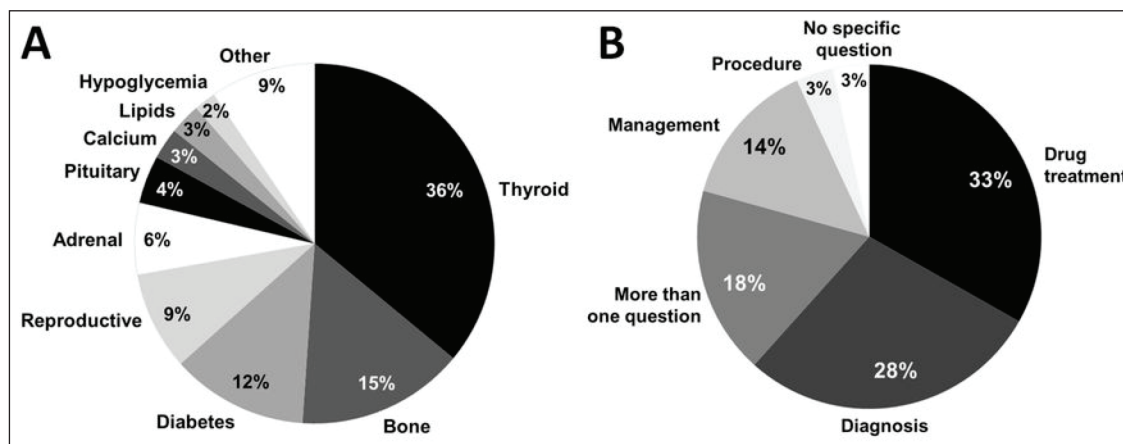


Fig. 1. Clinical topic (A) and question type (B) distribution for 464 eConsults to endocrinology. "Other" represents subject categories with $<2\%$ of eConsults, including interpretation of serum insulin, weight management, hyperhidrosis, electrolyte disturbances, pediatric cases, and hypertension.

Outcome Measures

As a final step before eConsult completion, once the PCP is satisfied with the specialist's response, the PCP completes a mandatory closeout survey; the PCP cannot receive a transcript of the consultation without completing this survey. The PCP is first asked if information from the eConsult was either (1) able to confirm their original course of action, (2) able to provide advice for a new or additional course of action, (3) not very useful, or (4) none of the above (with a free text field provided). A behavioral change due to eConsult was considered present if option #2 was selected.

The PCP then determines the impact of the eConsult on the need for a face-to-face consultation by selecting one of five options:

1. Referral was originally contemplated but now avoided at this stage
2. Referral was originally contemplated and is still needed
3. Referral was not originally contemplated and is still not needed
4. Referral was not originally contemplated, but the eConsult process resulted in a referral being initiated
5. Other (with a free text field provided)

A change in referral plans was deemed to have occurred if the PCP chose option #1 or #4. A face-to-face referral was considered to be necessary if the PCP chose either options #2 or #4, whereas face-to-face referral was considered avoided if the PCP chose option #1.

PCPs were also asked to rank both the value of the eConsult to the PCP and the perceived value to the patient using 5-point Likert scales.

Statistical Analysis

We performed χ^2 tests to examine the association of PCPs receiving new or additional information received from the eConsult. They were also used to compare the proportion of PCPs initially contemplating submitting a face-to-face referral prior to submitting the eConsult with (1) clinical topics and (2) question types. Trends in referral outcomes were analyzed using simple linear regression. All data analysis was completed using SAS version 9.4 (SAS Inst Inc, Cary, NC). Cases were categorized using Microsoft SharePoint and tabulated using Microsoft Excel (Microsoft, Redmond, WA).

RESULTS

Between April 15, 2011 and Jan 31, 2015, 180 PCPs (87% family doctors, 13% nurse practitioners) submitted 464 eConsults to endocrinologists, comprising 7% of 5,601 eConsults received by all specialties. The median patient age was 52.5 years, and 75% were female. PCPs practicing within urban centers submitted 82% of eConsults.

Most PCPs had positive experiences when using eConsult. On a 5-point Likert scale, >95% of PCPs rated the service either 4 or 5 on its overall value for patients and themselves as providers, with a mean rating of 4.8 (out of 5).

Endocrinologists provided timely responses to PCPs. The median response time between eConsult submission and the endocrinologist's first response was 7 hours, with 90% of cases responding within 3 days. Upon opening the eConsult, the self-reported time required for the endocrinologist to provide an answer was <10 minutes in 48% of cases, 10 to 15 minutes in 34% of cases, 15 to 20 minutes in 16% of cases, and >20 minutes in 2% of cases. Over 50% of all diabetes, bone, and thyroid questions required <10 minutes for the endocrinologist to provide an answer.

Over half of all eConsults were either thyroid (36%, 167/464) or bone metabolism questions (15%, 70/464) (Fig. 1A). Among thyroid questions, there was a similar distribution of cases pertaining to hyperthyroidism (34%, 57/167), hypothyroidism (28%, 47/167), and thyroid nodules (29%, 48/167). Most bone metabolism cases were centered on osteoporosis and interpretation of bone mineral density tests (90%, 63/70), whereas most diabetes questions were about achieving glycemic control (86%, 49/57). Reproductive system questions were generally evenly split among hyperandrogenism (34%, 14/41), breast-related abnormalities (e.g., gynecomastia, galactorrhea in the absence of hyperprolactinemia; 29%, 12/41), and testosterone replacement therapy (29%, 12/41).

The most common question type was drug treatment (33%, 154/464) followed by diagnosis (28%, 132 of 464) (Fig. 1B). Among 154 drug treatment questions, 40% were cases about when to start therapy for a particular condition, whereas 31% asked about the drug of choice for a particular condition. Most diagnosis questions were mainly focused on interpretation of tests (61%, 80/132)—particularly laboratory results and imaging reports—with a large remainder of diagnosis questions (36%, 47/132) asking which test would be the next best one to choose from during diagnostic workup.

PCPs received a new or additional course of action in 62% of eConsults, whereas their original course of action was confirmed in 38% of eConsults (Fig. 2). Less than 1% of eConsults were felt to be not useful for the PCP. More PCPs reported being more likely to have received a new course of action for questions related to calcium (92%, 12/13), pituitary (85%, 17/20), and adrenal disorders (77%, 23/30) when compared to all clinical topics, though the association was not significant ($P = .08$). Similarly, PCPs were more likely to receive a new course of action for diagnosis questions (70%, 92/132) versus drug treatment questions (53%, 81/154), although this was not significant ($P = .08$).

eConsult use led to a change in referral plans in a total of 45.5% cases: in 44% an originally contemplated face-to-face referral was avoided, whereas in 1.5% a referral was generated despite not being originally contemplated. A

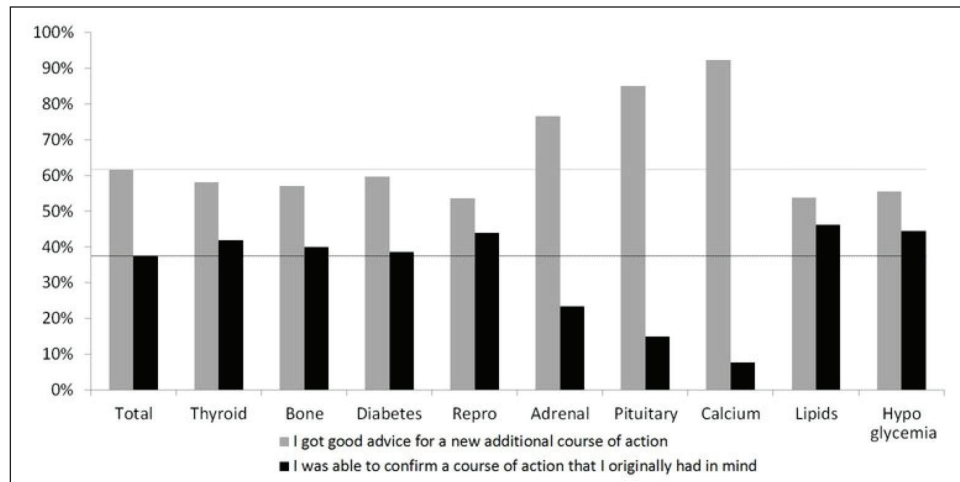


Fig. 2. Primary care physician course of action by clinical topic.

referral was avoided in at least 50% of all thyroid, adrenal, and pituitary questions (Fig. 3A).

There was a significant association between cases where a referral was initially contemplated and clinical content, with higher rates seen in thyroid (73%, 88/121), adrenal (73%, 16/22), and pituitary disorders (85%, 17/20) (Fig. 3A) when compared to across all clinical categories ($P = .001$). Similarly, there was an association between referral outcome and question type: PCPs were less likely to originally consider referring a patient when asking about drug treatment (57%, 88/154), diagnosis (63%, 83/132), or if they had no specific question (63%, 10/16) (Fig. 3B) when compared to across all question types ($P = .016$).

DISCUSSION

Longer wait times (1) and inefficiencies in traditional referral models (20) have led to emerging interest in implementing eConsult systems to improve access to specialist care. To our knowledge, ours is the first in-depth analysis of eConsults submitted to endocrinologists to explore if the availability of such a service provides information for

new courses of action for PCPs while influencing their referral patterns.

We have demonstrated that eConsults can provide meaningful, practice-changing advice. In over 60% of eConsults, PCPs were given a new or additional course of action, particularly for cases involving less common endocrinopathies such as calcium, pituitary, and adrenal disorders. Although PCPs bear much of the responsibility for patients with more common endocrine disorders including diabetes (21), thyroid disorders (22), and osteoporosis (23), PCPs were still able to receive a new course of action in more than half of these cases.

The use of eConsult led to a change in referral plans in 45.5% of cases. The majority (96%) were avoided face-to-face referrals; that is, the PCP initially contemplated a referral but no longer felt it was needed after receiving information from the eConsult. In contrast, there were 8 cases where a face-to-face referral was initiated despite the PCP not originally feeling a referral was needed prior to submitting the eConsult. This implies that the need for specialist referral was not initially recognized, potentially leading to delays in care that may negatively impact patient

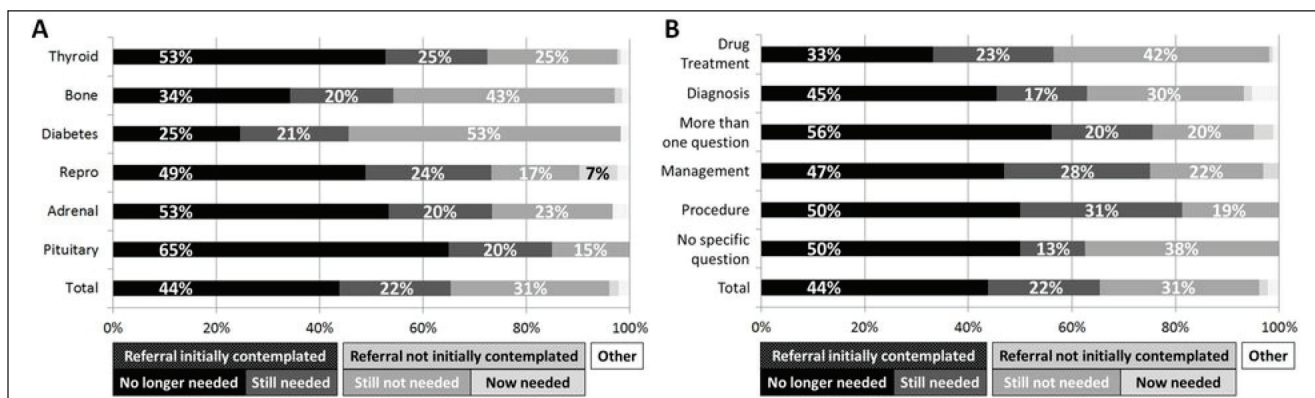


Fig. 3. Referral outcomes by (A) clinical topics having at least 20 eConsults and (B) question type.

outcomes. eConsult systems can thus be a potential novel method to assess referral appropriateness while prompting referrals that were not previously considered.

The percentage of eConsults where a referral was initially contemplated and still needed was similar across all clinical topics. Although these cases did not help avoid a face-to-face referral, the use of eConsult can lead to more effective endocrinologist office visits. While the patient waits for an in-person evaluation by the endocrinologist, PCPs can order appropriate investigations or start a trial of therapy as guided by the endocrinologist's advice.

There was a wide spectrum of question types posed by PCPs. There were higher rates of PCPs receiving a new course of action for diagnosis questions compared to those asking about drug treatment. This may reflect the expertise required for appropriate interpretation of laboratory tests as they pertain to endocrine disorders. For example, there were a number of cases where the PCP had difficulty interpreting an elevated serum cortisol found during workup for adrenal insufficiency; they did not notice that these patients were taking estrogen-containing oral contraceptives that could explain the result. Further identification of commonly requested laboratory and imaging report interpretations can help direct continuing medical education activities.

The question types with the highest avoided referral rates were cases where there was either no specific question or multiple questions asked. This illustrates the feasibility of eConsult for providing the means for PCPs to access endocrinologist care even if their questions are not focused on a particular question type. Overall we do not feel there is a role to ask PCPs to frame their questions using specific templates; we previously reported that better quality questions asked via eConsult do not necessarily lower referral rates (24).

The other large eConsult service that has reported on Endocrinology eConsults is the UCSF program that reported on 158 eConsults over a 12-month period (12). Despite differences in a PCP population (in addition to family physicians and nurse practitioners, UCSF also included general internal medicine, geriatrics, women's health primary care, and human immunodeficiency virus primary care), healthcare infrastructure, specialist remuneration, and reported sample sizes, both the Champlain BASE and UCSF eConsult services have become established methods of enabling access to endocrinologist advice in lieu of face-to-face referrals. Champlain BASE receives eConsults from over 85 distinct municipalities across Ontario and Nunavut; thus, specialists rely solely on the information and attached files provided by the PCP and not through common electronic medical records as at UCSF. Our specialists receive quarterly remuneration at a rate of \$200 per hour prorated to self-reported eConsult completion time, whereas UCSF eConsultants are paid an equivalent of 0.5 work relative value units per completed eConsult as funded by the Delivery System Reform Incentive Program Medicaid Waiver program. The distributions of frequently submitted

clinical topics to both eConsult services are similar, with diabetes, hypothyroidism, hyperthyroidism, osteoporosis, and thyroid nodules comprising the top 5 clinical topics for each service. The proportions of eConsults where specialist advice was given without a face-to-face referral being made (77%, our study) or recommended by the specialist (78%, UCSF study) were also very comparable.

eConsult services have potential economic implications. We previously reported that avoided face-to-face specialist visits due to eConsult may lead to healthcare savings (25). From a patient perspective, fewer office visits translates to less time taken off work and reduced transportation costs. Expediting access to specialist advice via eConsult may lead to decreases in visits to the emergency department, fewer prescriptions for medications, and less ordering of unnecessary tests.

In a commentary on a study by Cruz et al (12), Rushakoff and Rushakoff (26) highlighted potential future challenges faced by eConsult. Specialists are not given dedicated time to answer eConsults, and several cases are answered after hours. Although workload is not an issue at present—the Champlain BASE eConsult system averages 10 eConsults per week shared among 3 endocrinologists, with over 80% of eConsults requiring ≤ 15 minutes to answer—we acknowledge that protected time may be required should there be an increase in eConsult volume and case complexity. Issues of liability were also raised. Our national malpractice insurer, the Canadian Medical Protective Association, endorses that duty of care in completing an eConsult is the same as all other duties of care, including hallway discussions, telephone advice, or formal consultations (16). The provider is expected to make a reasonable recommendation based on the available information. Our specialists are not obliged to make a recommendation if they do not feel they have sufficient information or cannot answer the question without directly assessing the patient.

Our study has several limitations. We did not collect patient identifiers and can neither report the actual number of face-to-face referrals initiated following an eConsult nor assess whether specialist advice was implemented by the PCP and carried out by patients. Our region does not currently support readily sharable information across different healthcare sites compared to other programs where eConsults are automatically incorporated into region-wide accessible electronic medical records. As our study is set in a single regional health network, it is unclear if our results are generalizable to different regions or healthcare systems, although the similar outcomes to the UCSF group would suggest that they are.

CONCLUSION

As a result of our eConsult service, PCPs now have direct access to advice from endocrinologists, which often

results in an additional course of action being undertaken and a reduced need for face-to-face office visits. The service is delivered in a timely fashion and is highly rated by PCPs. Identifying specific, recurring clinical content that is most behavior changing may help guide continuing PCP professional development. Efforts in using eConsult as an educational tool for PCPs, specialists, and resident physicians are underway.

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DISCLOSURE

The authors have no multiplicity of interest to disclose.

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