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Comparing the content of traditional faxed consultations to eConsults within an academic endocrinology clinic

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ABSTRACT

Objective: To compare the content of traditional faxed referrals and electronic consultations (eConsults) and determine how many questions sent by traditional referral could be successfully addressed using eConsult.

Methods: We conducted a cross-sectional, qualitative study of eConsults and faxed referrals sent to a tertiary diabetes and endocrinology clinic in Ottawa, Ontario. A convenience sample of 300 faxed referrals sent between March and July 2017 and 300 eConsults submitted between January and December 2017 were selected and coded using an established taxonomy to determine question type. Two endocrinologists reviewed the faxed referrals to assess whether they could have been addressed using eConsult. Responses to a mandatory closeout survey were reviewed for all eConsults, assessing the case's outcome, impact on decision to refer, and educational value.

Results: Most faxed consultations were requests for shared care in diabetes mellitus, whereas most eConsults requested help in diagnostic test interpretation. 25–27% of faxed consults were felt to be potentially amenable to eConsult. Referring provider behaviour was changed in 45.3% of eConsult cases through avoidance of face-to-face consultation.

Conclusion: eConsult is a promising tool for PCPs to improve access to specialist opinion without necessitating a face-to-face visit.

Introduction

Timely access to specialist care remains a serious concern in Canada. A study in Ontario, Canada found that patients requiring referrals to specialists waited a median of seven weeks for urgent cases and 11.3 weeks for non-urgent cases [1]. Wait times in our tertiary diabetes and endocrinology clinic in Ottawa, Ontario are even longer than this average, with one survey finding that 30% of patients waited more than six months to be seen by a specialist [2]. These delays can have a significant negative impact on health outcomes, and lead to undue worry for many patients.

One of the factors that impedes prompt access to specialist care is the structure of the referral-consultation system itself, which is fraught with inefficiencies and often relies on outdated technology such as fax

machines [3]. Referrals often lack essential information or include incomplete patient workups, necessitating additional back-and-forth between clinics that delays treatment and risk referrals falling through the cracks [4]. New models of care delivery are needed to streamline the process. One potential solution is electronic consultation (eConsult), a secure online platform that enables primary care providers (PCP) to communicate with specialists asynchronously about a patient's care. In recent years, eConsult services have become available in many countries and are increasingly being endorsed as a strategy to shorten wait times, improve equitable access and support PCPs [5–7].

In our region, the Champlain BASE™ eConsult service has provided participating PCPs access to advice from endocrinologists since 2010. In 2019, PCPs submitted 55,000 eConsults through the service, of which 6% were directed to Endocrinology. Studies of the service have found

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that two-thirds of cases are resolved without need of a face-to-face specialist visit [8], while a study focusing exclusively on endocrinology cases found a face-to-face appointment was needed in only 26% of cases [9]. Other jurisdictions have also found eConsults to endocrinology services to be safe and effective [10,11].

Despite our clinic's long-term participation in the eConsult service, most of our referrals continue to arrive by the traditional route of fax and are booked into a scheduled appointment. In this study, we compared the content of referrals sent by fax to eConsults in order to determine how many traditional referrals could be successfully addressed using the eConsult service. We also sought to determine whether PCPs' experience with eConsult changed their referral plans for the patient and whether an eConsult response was helpful and educational.

Methods

Design

We conducted a retrospective cohort study of eConsults and faxed referrals sent to endocrinology.

Setting

The study took place at the Division of Endocrinology and Metabolism at The Ottawa Hospital, a three-campus tertiary care centre and teaching hospital serving eastern Ontario, Canada with a catchment area of approximately 1.1 million people. The Champlain BASE eConsult service serves the entire region at no cost to the provider or patient, providing access to over 120 different specialties using a secure, web based platform ([www. Champlainbaseconsult.com](http://www.Champlainbaseconsult.com)).

Participants

The study included consultation requests, whether faxed referrals or eConsult, made by PCPs (either family physicians or nurse practitioners) or specialists.

Data collection

We collected a convenience sample of 300 sequential faxed referrals between March and July 2017, and 300 sequential eConsults submitted through the Champlain BASE™ service between January and December 2017. Data from eConsults included the full exchange between PCPs and specialists, as well as PCPs' responses to a mandatory four-question closeout survey.

Data analysis

The selected datasets were analyzed to assess question type (eConsult and faxed referrals), eligibility for eConsult response (faxed referrals only), and closeout survey responses (eConsult only).

Question Type. Each consultation, whether faxed or electronic, was retrospectively coded by a single reviewer using a previously validated taxonomy designed to classify type of clinical question, and underlying diagnosis or affected system (see Appendix). Broadly, types of clinical questions included diagnosis, pharmacology, management, epidemiology and other (non-clinical/ administrative). Questions that did not fall into a category as described previously, it would be classified as "no specific questions," while questions that fit multiple categories would be classified as "more than one question."

Eligibility for eConsult Response. Each faxed consultation was assessed independently by two endocrinologists who participate in the eConsult service, who determined whether the faxed-in referral could have been answered through an eConsult using the following categories: 1) I could answer this consultation with an eConsultation, thus likely avoiding a face-to-face consultation, 2) I could possibly answer this consultation

with an eConsultation, but information is missing, 3) I could provide some advice regarding this consultation via eConsultation, but patient still likely requires a face-to-face consultation, and 4) I am unable to provide advice via eConsultation.

Closeout survey responses. All PCPs who submit questions through eConsult must complete a closeout survey prior to closing the case. The survey poses four multiple-choice questions assessing the case's 1) outcome, 2) effect on decision to refer, 3) educational value, and 4) relevance to continuing medical education (CME) (Table 4). Responses to all four questions were compiled and analyzed using descriptive statistics.

Ethics approval

This study was reviewed and granted ethics approval by the Ottawa Health Science Network Research Ethics Board under Quality Assurance project protocol.

Results

Faxed consults

Of the 300 faxed consults, 206 (69%) were from a PCP (201 (67%) from a family physician and 5 (2%) from a nurse practitioner) and 93 (31%) were from a specialist. The type of clinical question was most commonly about management of a disease (55%) followed by diagnosis (36%), and pharmacology (7%) (Tables 1 and 2). The most common diagnosis addressed in the faxed consult was diabetes mellitus (42%) followed by thyroid, (27%) and bone (9.3%) were about bone disease, and the remaining (22%) were divided between pituitary, adrenal, gonadal, lipids, growth, electrolyte, and other. Baseline characteristics including referral source and diagnosis, as well as specific clinical questions, are outlined in Tables 1 and 2 respectively.

eConsults

Of the 300 eConsults analyzed, 271 (90.3%) were from physicians, and 29 (9.7%) were from nurse practitioners. The requesting provider received their response in a median time of 3 (0–14) days and median response time required for specialist to answer the clinical question was 10 (0–35) minutes. The most common type of clinical question was diagnosis (55%) followed by pharmacology (21%), and management (18%). The most common specific diagnoses addressed in the eConsult, was thyroid disease (29%) bone disease (19%) and diabetes, (13%).

Comparison of faxed consults versus eConsults

The referral source and type of clinical question between eConsult and faxed consults are compared in Tables 1 and 2. The most common specific clinical question posed through faxed consults was "management: transfer of care" (58%), which indicates the PCP/specialist requesting Endocrinology consultation or follow-up to provide shared

Table 1

Baseline characteristics of faxed and eConsults – referral source and clinical diagnosis.

| Baseline Characteristic | Fax [Number (%)] | eConsult [Number (%)] |
|-------------------------|------------------|-----------------------|
| Referral Source | | |
| Physician | 294 (98) | 271 (90.3) |
| Nurse Practitioner | 5 (1.7) | 29 (9.7) |
| Other | 1 (0.3) | 0 (0.0) |
| Clinical Diagnosis | | |
| Diabetes mellitus | 125 (41.7) | 38 (12.7) |
| Thyroid | 80 (26.7) | 88 (29.3) |
| Bone | 28 (9.3) | 56 (18.7) |
| Other | 67 (22.3) | 118 (39.3) |

Table 2
Comparing frequency of specific clinical question.

| Specific Clinical Questions | Fax [Number (%)] | eConsult [Number (%)] |
|---|------------------|-----------------------|
| Diagnosis | 107 (35.7) | 165 (55.0) |
| Interpretation of clinical finding | 15 (5.0) | 19 (6.3) |
| Interpretation of laboratory test | 53 (17.7) | 85 (28.3) |
| Interpretation of imaging test | 37 (12.3) | 38 (12.7) |
| Interpretation of pathology report | 1 (0.3) | 1 (0.3) |
| Test of choice | 0 (0.0) | 21 (7.0) |
| Other | 1 (0.3) | 1 (0.3) |
| Pharmacology | 23 (7.6) | 64 (21.3) |
| Medication choice, indications, contraindications | 22 (7.3) | 51 (17.0) |
| Adverse effect or interaction | 1 (0.3) | 6 (2.0) |
| Other | 0 (0.0) | 7 (2.3) |
| Management | 165 (55.0) | 53 (17.7) |
| General management question | 12 (4.0) | 15 (5.0) |
| Transfer of care | 153 (51.0) | 38 (12.7) |
| Epidemiology | 0 (0.0) | 1 (0.3) |
| Non-Clinical | 5 (1.7) | 17 (5.7) |
| More than one question | 3 (1.0) | 16 (5.3) |
| No specific question | 2 (0.7) | 1 (0.3) |

care; in contrast, the most common specific clinical question posed through eConsults was “diagnosis: interpretation of a laboratory test” (28%). Other questions well-represented in faxed consults were “diagnosis: interpretation of a laboratory test” (18%), and “diagnosis: interpretation of an imaging test” (13%); in eConsults, the next most common clinical questions were “drug treatment: drug of choice” (14%), “diagnosis: interpretation of an imaging test” (13%), and “management: general management question” (13%). Of note, once faxed diabetes consults (n = 125) were removed from analysis, the most common diagnosis represented was thyroid-related issues, and the most common specific clinical question posed was “diagnosis: interpretation of lab test”.

Suitability for eConsult

Reviewer A coded that 8.3% of faxed consults received could likely be answered with an eConsult, 17% could possibly be answered with an eConsult, but information is missing, 36.7% could be provided with some advice with an eConsult but patient would likely still require a face-to-face consultation, and 38% could not be addressed with an eConsult. Reviewer B coded that 15.3% of faxed consults received could likely be answered with an eConsult, 11.3% could possibly be answered with an eConsult, but information is missing, 44.3% could be provided with some advice with an eConsult but patient would likely still require a face-to-face consultation, and 29% could not be addressed with an eConsult. Specific reason for suitability or unsuitability for eConsult as coded by both reviewers is shown in [Table 3](#).

Referring physician experience with eConsult

The use of eConsult resulted in a new or additional course of action implemented by the referring physician in 60.3% of cases, 69% of referring physicians found the specialist response via eConsult to be very helpful and/or educational, and face to face referral was avoided in 45.3% of cases ([Table 4](#)).

Discussion

The study provided a comparison of the differences between faxed referrals and eConsults to a high-volume academic endocrinology and metabolism centre. Most faxed referrals sent during the study period aimed to initiate shared care between a PCP/specialist and an endocrinologist, with almost half involving management of diabetes mellitus. In contrast, the majority of eConsults contained specific questions seeking

Table 3
Endocrinologists’ Determination of Suitability for eConsult.

| Suitability for eConsult | Reviewer A [Number (%)] | Reviewer B [Number (%)] |
|--|-------------------------|-------------------------|
| Answer fully via eConsult | 25 (8.3) | 46 (15.3) |
| Can possibly be answered with eConsult, but... | 51 (17.0) | 34 (11.3) |
| Requires further history to address this question, which could be obtained with exchange via eConsultation | 34 (11.3) | 12 (4.0) |
| Requires further investigations to address this question, which could be obtained with exchange via eConsultation | 17 (5.7) | 22 (7.3) |
| Some advice could be provided via eConsult, but face to face consult still necessary because... | 109 (36.3) | 132 (44.0) |
| Requires physical exam to address the question | 14 (4.7) | 0 (0.0) |
| Requires further investigations to address the question, which is not amenable to eConsultation exchange | 8 (2.7) | 0 (0.0) |
| Requires Endocrinologist to follow patient due to complexity/standard of care for given diagnosis/chronic drug therapy that requires Endocrinology expertise | 83 (27.7) | 111 (37.0) |
| Referred by another specialist | 4 (1.3) | 8 (2.7) |
| Other | 0 (0.0) | 13 (4.3) |
| Unable to provide advice via eConsult, because... | 115 (38.3) | 88 (29.3) |
| No clear question to be answered | 3 (1.0) | 3 (1.0) |
| Requires physical exam to address the question | 1 (0.3) | 0 (0.0) |
| Requires further investigations to address the question, which is not amenable to eConsultation exchange | 6 (2.0) | 0 (0.0) |
| Requires Endocrinologist to follow patient due to complexity/standard of care for given diagnosis/chronic drug therapy that requires Endocrinology expertise | 31 (10.3) | 19 (6.3) |
| Referred by another specialist | 70 (23.3) | 65 (21.7) |
| Other | 4 (1.3) | 1 (0.3) |

Table 4
Responses to mandatory closeout survey for eConsult.

| Question | % |
|---|-------|
| 1) Which of the following best describes the outcome of this eConsult for your patient? | |
| I was able to confirm a course of action that I originally had in mind | 35.3% |
| I got good advice for a new or additional course of action that I will be implementing | 60.3% |
| I got good advice for a new or additional course of action that I am not able to implement | 1.7% |
| None of the above | 2.7% |
| 2) As a result of this eConsult, would you say that: | |
| Referral was originally contemplated but now avoided at this stage | 45.3% |
| Referral was originally contemplated and is still needed | 15.7% |
| Referral was not originally contemplated and is still not needed | 33.0% |
| Referral was not originally contemplated, but eConsult resulted in a referral being initiated | 3.3% |
| Other | 2.7% |
| 3) How helpful and/or educational was this response in guiding your ongoing evaluation or management of the patient? (minimal = 1, very valuable = 5) | |
| 1 | 0.7% |
| 2 | 0.7% |
| 3 | 8.3% |
| 4 | 21.3% |
| 5 | 69.0% |
| 4) This eConsult addresses an important clinical problem that should be incorporated into upcoming CME events | |
| Strongly disagree | 0.0% |
| Disagree | 4.3% |
| Neither agree nor disagree | 37.0% |
| Agree | 35.3% |
| Strongly agree | 23.3% |

interpretation of laboratory or imaging tests, or guidance on prescribing medication. Despite these differences, 25–27% of faxed referrals were identified as being amenable to being answered through eConsult pending receipt of further information. The faxed referrals that were submitted by other specialists (31%) may be less likely to be amenable to providing advice only through eConsult as the other specialist would be responsible for acting on the advice provided through the eConsult; however this would need to be further explored. This provides an opportunity to consider workflows to redirect faxed referrals to eConsults to provide faster advice and reduce the worry of patients through expediting quick access to specialist advice.

Currently in our health care system, the referring provider may specifically request specialist advice through an eConsult or send a traditional referral. This is different than some other eConsult services where all referrals are triaged by the specialist, with some diverted to advice only. [12] Nurse practitioners are enabled to directly request an eConsult independently, which is not always the case for traditional referrals. This may explain the higher rate of eConsults from nurse practitioners. Our Endocrinologist reviewers felt that 37–44% of faxed consultations could be provided with some advice via eConsult while ultimately requiring face-to-face consultation, pre-consultation exchange of information between the referring provider and the specialist may improve patient care while awaiting formal consultation. By integrating the ability for a specialist to convert a traditional referral to an eConsult there is the potential to improve timely access to specialist advice and reduce the number of patients needing specialist appointments, thus reducing waitlists.

The median time to first response by an Endocrinologist via eConsult was only 3 days, which highlights the ability of eConsult to provide rapid access to specialist opinion that a PCP may not otherwise be able to provide for their patients who are awaiting face-to-face consultation. Our findings are in keeping with those reported by Anderson et al., where the implementation of an eConsult platform receiving Endocrinology referrals reduced the median consult completion time from 87 days for a face to face consult to less than 24 h for an eConsult [13]. Our study also confirms and extends the conclusions drawn in an earlier pilot study by Wasfy et al in which the creation of an Endocrinology eConsult service at their academic center was feasible and safe, and appeared to be particularly well suited for thyroid consults [10]; in our study, we were able to report on not just the diagnosis associated with the consult but with the clinical question posed, as well as provide an initial exploration of whether there were faxed consults that may have been appropriate for eConsult instead.

This study has several limitations. First, we only investigated faxed referrals and eConsults received in a single center, and therefore cannot account for regional differences in referral patterns. As utilization of electronic consultation increases, we will hopefully be able to acquire and analyze data from other parts of the country to increase the external validity of the findings of this study. In our eConsult service, specialists, who rarely function as PCPs, are not frequent submitters of eConsult, despite being eligible to do so. This is in part due to the need for the requesting provider to be willing and able to act on the advice provided. Since 31% of the faxed referrals in this study originated from a specialist physician, we may be missing cases of referrals that would otherwise have been appropriate for eConsult instead had there been a PCP to follow the patient.

Our findings raise several interesting research questions that could be addressed in future investigations. The specific clinical information that must be provided in a consultation request that would make it amenable for eConsult has not been identified but would be of interest. In a face to face consultation setting, Hendrickson et al [4] reported that specific lab test results pertaining to individual endocrinological diagnoses (e.g., diabetes mellitus, hypercalcemia) that were essential to an effective consultation visit were often omitted from the initial referral request; for an effective eConsult, essential data elements exceed

laboratory results alone and likely include crucial historical features and physical examination findings, which have not been identified in our current study but would be a logical next step to delineate. In health care systems where referring providers and specialists share the same electronic medical record and thus have access to all documentation, there may be different needs for including clinical information. Furthermore, as 69% of PCPs in this study felt that using eConsult was very helpful or educational, it would be useful to standardize and disseminate the parameters that can be used to help PCPs determine whether a referral request may be appropriately submitted as an eConsult.

Conclusion

This study demonstrates the promise of using eConsult to expedite patient care and reduce unnecessary in person visits. Providers and health care service delivery partners should consider using eConsult as an option for providing timely Endocrinology advice for patients. Further study on which clinical scenarios are best suited to eConsult rather than a traditional referral is needed.

CRediT authorship contribution statement

Nicole Pun: . **Amel Arnaut:** . **Christopher Tran:** . **Clare Liddy:** Conceptualization, Methodology, Writing - review & editing. **Erin Keely:** Conceptualization, Methodology, Writing - review & editing.

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