



Full Length Article

The use of eConsults to improve access to specialty care in thrombosis medicine



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ABSTRACT

Introduction: Electronic consultations (eConsults) are asynchronous, consultative electronic-based communications that are aimed to improve efficient and timely access to specialist advice. Our study aim was to evaluate the use and impact of the Canadian Champlain BASE™ (Building Access to Specialists through eConsultation) eConsult service in the specialty of thrombosis medicine.

Methods: We conducted a cross-sectional study that included descriptive statistics of provider and patient demographic information and consultative-specific data. The impact of eConsults on primary care provider (PCP) referral patterns and satisfaction was assessed using a mandatory close-out survey upon completion of each eConsult.

Results: There were 162 thrombosis eConsult cases completed between June 2012 and March 2016. The most common referral topics were for thrombophilia testing, management of superficial vein thrombosis, and the choice and duration of anticoagulation for venous thromboembolism. By completing an eConsult, PCPs reported 47.5% of face-to-face consultations were avoided, and 4.3% prompted a thrombosis referral that was not originally contemplated. Primary care providers' responses to a thrombosis eConsult service were overwhelmingly positive, which included appreciation for timely access for patients, expert guidance and providing additional educational opportunities.

Conclusion: An eConsult service in thrombosis medicine improved timely access to specialist advice and potentially reduces the number of face-to-face consultations needed. Further research is needed to understand how a thrombosis eConsult service affects thrombosis clinic performance data and patient outcomes.

1. Introduction

Excessive wait times and unequal access to specialist services can negatively impact patient care. Through the use of innovative technology, electronic consultation (eConsult) aims to improve timely access to specialist advice; imagine the 'hallway consultation' made digital. Electronic consultations (eConsults) are asynchronous, consultative, provider-to-provider based communications via an electronic health record or web-based platform [1]. A primary care provider (PCP: family physicians or nurse practitioners) submits a patient-specific question using a secure electronic platform, with the option of attaching any relevant electronic files. The case is then reviewed by a specialist, who has the option of providing a recommendation,

requesting more information, or suggesting a face-to-face referral [2].

The use of eConsults has been shown to reduce the number of specialist referrals, improve access to specialists in remote communities, and potentially improve cost savings to the healthcare system [3–5]. Patients and PCPs report high levels of satisfaction and acceptability of an eConsult service, and report added educational benefit and confidence in managing patients [3]. Challenges of eConsults exist, including the concern of increased workload by specialists and PCPs, technological challenges, lack of patient contact with specialists and medico-legal issues [3].

The subspecialty of thrombosis medicine is becoming increasingly complex, with expertise formally recognized by the International Society on Thrombosis and Haemostasis' core competencies of

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thrombosis/hemostasis, as well as through competency-based training programs such as Canada's Area of Focused Competency (AFC) program in Thrombosis Medicine [6,7]. While an eConsult service has the potential to improve access to advice of thrombosis medicine specialists, our literature review revealed an eConsult service has never been reported in the area of thrombosis. In a subspecialty where risk assessment and patient values and preferences are incorporated into thrombosis specialists' recommendations [8], better understanding the role of an eConsult service in thrombosis medicine is needed before it can be widely adopted.

We aim to describe the use and impact of an eConsult service in the area of thrombosis medicine. By characterizing what referral questions are most amenable to a thrombosis eConsult service, we can better target our intervention to improve timely access to thrombosis specialists and improve patient care.

2. Methods

The Champlain BASE™ (Building Access to Specialists through eConsultation) is an eConsult service developed in 2009 to service the Champlain Local Health Integration Network, one of 14 regional health districts in Ontario, Canada with a population of over 1.2 million. The subspecialty of thrombosis medicine is one of the 102 specialty services available through the Champlain BASE™ eConsult service [2]. Specialists are compensated financially for completing eConsults, based on the amount of time spent per referral. eConsults cases sent to thrombosis medicine specialists between June 2012 and March 2016 were reviewed.

We collected demographic data including patient age and gender and type of PCP (family physician or nurse practitioner) who initiated the consult. Consultation-specific data collected included number of eConsults per PCP, type of eConsults, time to specialist response, and specialists' self-reported completion time per case. The impact of eConsults on the PCPs' management plans and need for a subsequent face-to-face referral was assessed using a mandatory close-out survey administered upon completion of each eConsult (Appendix 1). The perceived value of the thrombosis eConsult service to patients and PCPs was assessed as a component of the PCP close-out survey, which was based on a five point Likert scale that ranged from 1 (minimal) to 5 (excellent).

Data were summarized as means with ranges and standard deviations (SD) for continuous variables, and frequencies with percentages for categorical variables. The eConsult topics were categorized by two reviewers (M.M., A.K.), and further refined by a third investigator (L.S.). The mean number of eConsult referrals per provider was evaluated by type of PCP (family physician or nurse practitioner) using an independent samples *t*-test with a *p* value < 0.05 reported as significant. Data were analyzed using SPSS software (IBM SPSS Statistics, Version 24.0, Armonk, NY).

A qualitative thematic analysis of free-text responses from the survey was conducted to identify emerging themes. This was conducted iteratively using a content analysis [9]. Discrepancies were resolved by consensus (L.S., A.K.). The study was approved by the Ottawa Health Science Network Research Ethics Board.

3. Results

There were 162 thrombosis eConsult cases completed by 3 thrombosis specialists between June 2012 and March 2016, representing just over 1% of all 13,413 e-Consults. There were 109 (22.6%) PCPs who used the eConsult service in thrombosis medicine among 483 PCPs who used the eConsult service for any specialty during our study period. There was a mean of 1.49 thrombosis eConsults per PCP (range 1–6, SD 0.92), with 88.9% initiated by family physicians and 11.1% initiated by nurse practitioners. There was no difference in the mean number of eConsults per PCP initiated among family physicians or nurse

Table 1
Content of the eConsult referrals.

Consult type	N (%) ^b
VTE prophylaxis	8 (4.4%)
Diagnosis of suspected VTE	3 (1.7%)
VTE management ^a	
Non-thrombophilia investigations	4 (2.2%)
Choice of anticoagulant	21 (11.6%)
Duration of anticoagulation	21 (11.6%)
Post-thrombotic syndrome	1 (0.6%)
SVT	19 (10.5%)
Atrial fibrillation	12 (6.6%)
Mechanical valve	2 (1.1%)
ATE	5 (2.8%)
Peri-procedural anticoagulation management	
Direct oral anticoagulants	14 (7.7%)
Warfarin ^a	7 (3.9%)
Antiplatelet agents	7 (3.9%)
Thrombophilia testing	24 (13.3%)
OCP/HRT (VTE risk)	15 (8.3%)
Pregnancy (VTE/pregnancy loss)	6 (3.3%)
Other	8 (3.3%)
Non-thrombosis question ^a	4 (2.2%)

VTE: venous thromboembolism; SVT: superficial venous thrombosis; ATE: arterial thromboembolism; OCP: oral contraceptive pill; HRT: hormone replacement therapy.

^a Prompted a face-to-face consultation that was not originally intended.

^b Based on 162 consults with 181 individual questions.

practitioners (*p* > 0.05).

Among the eConsult cases, the mean patient age was 58.3 (range 12.5–93.0, SD 19.7), and 54% of patients were women. There were a variety of eConsult topics, with the most common questions being about the role of thrombophilia testing, management of patients with superficial venous thrombosis (SVT), and the choice and duration of anticoagulation for patients with venous thromboembolism (VTE: deep vein thrombosis and pulmonary embolism) management (Table 1). While the majority of questions were related to VTE, > 10% of consults included questions about anticoagulation/antiplatelet management in patients with atrial fibrillation, mechanical valves or peripheral vascular disease (Table 1). There were 3 (1.9%) eConsult cases about patients < 18 years of age, two cases were not thrombosis-related and one case was about the VTE risk with the oral contraceptive pill. The mean time from consult initiation to specialist response was 36.22 h (range 10 min to 13 days, SD 61.1 h) and the mean self-reported time to complete the eConsult by specialists was 11.2 min per consult (range 10–20 min, SD 2.54).

Among the 162 cases, over half (52.5%) of PCPs got “good advice for a new or additional course of action”, and 45.1% “confirmed a course of action that they originally had in mind”. There were only two cases (1.2%) where the eConsult specialist advice was not useful according to the PCP, one because a different PCP initiated the consult and the second because the course of action was not explicitly explained by the specialist (Table 2). By completing an eConsult, in 47.5% of cases a face-to-face referral was avoided and 4.3% prompted a face-to-face referral that was not originally contemplated. The topics that prompted an unanticipated face-to-face referral included peri-procedural anticoagulation management for a patient on warfarin, VTE management issues including the duration of anticoagulation and anticoagulant choice, use of the oral contraceptive pill and a non-thrombosis question about a low factor VIII level. Additionally, there were 34.0% of cases where a face-to-face referral was never planned, but the eConsult provided useful feedback and additional information to PCPs (Table 2).

According to the close-out survey completed by PCPs, the perceived value of eConsults for patients and PCPs was highly rated (4 or 5) by 96.9% and 96.3% of PCPs, respectively (Table 3). Among the survey free-text written comments there were three themes that were identified: Improved timely access and resource utilization; Value expert

Table 2
Reported eConsult outcomes according to close-out survey responses (n = 162).

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	73 (45.1%)
I got good advice for a new or additional course of action	85 (52.5%)
I did not find the response very useful	2 (1.2%)
None of the above	2 (1.2%)
As a result of this eConsult, would you say that:	
Referral was originally contemplated but now avoided at this stage	77 (47.5%)
Referral was originally contemplated and is still needed - this eConsult likely leads to a more effective visit	19 (11.7%)
Referral was not originally contemplated and is still not needed - this eConsult provided useful feedback/information	55 (34.0%)
Referral was not originally contemplated, but eConsult process resulted in a referral being initiated	7 (4.3%)
There was no particular benefit to using eConsult in this case	2 (1.2%)
Other	2 (1.2%)

Table 3
Perceived value of the eConsult service for patients and primary care providers (PCP).

Please rate the overall value of the eConsult service in this case for your patient	
1 (minimal)	0 (0%)
2	1 (0.6%)
3	4 (2.5%)
4	28 (17.3%)
5 (excellent)	129 (79.6%)
Please rate the overall value of the eConsult service in this case for you as a PCP	
1 (minimal)	0 (0%)
2	1 (0.6%)
3	5 (3.1%)
4	18 (11.1%)
5 (excellent)	138 (85.2%)

guidance; and Educational opportunities (Table 4). Many PCPs appreciated the timely service that eConsults provided for patients, particularly for patients where access was otherwise limited. The PCPs also valued expert opinion, particularly in challenges cases where there is little evidence to guide practice. Lastly, PCPs identified the eConsult service as an educational opportunity to improve management of future patients. In addition to the themes identified by multiple providers, there was one negative comment about the usability of the eConsult interface: “I love to have the access to the email advice. It’s the format that does not work for me. It is so user-un-friendly that I will avoid using the service, even when it would be a suitable resource for me”.

4. Discussion

The eConsult service in thrombosis medicine provided timely access to specialist advice, with a perceived reduction in the number of face-

to-face referrals needed. PCPs’ responses to a thrombosis eConsult service were overwhelmingly positive, which included appreciation for timely access for patients, expert guidance and providing PCPs with additional educational opportunities.

We reported a change in PCP referral patterns in our study, both in a perceived reduction of face-to-face referrals (47.5%) and the initiation of a face-to-face referral that was not initially contemplated (4.3%). Without objective clinic data, we do not know if the perceived reduction of face-to-face referrals reported would translate into an actual reduction in referrals. While we can infer that this would improve thrombosis clinic wait times, the volume is still too low to expect an impact on our thrombosis clinic wait times or types of consults seen. A reduction in face-to-face referrals may benefit patients, particularly for those who are in rural areas or have difficulty traveling due to medical co-morbidities. Even when the PCP referral patterns did not change, specialist advice provided guidance and reassurance for PCPs, which could improve patient care prior to an initial face-to-face consultation.

Increased workload for specialists has been a reported concern for other eConsult services. Reassuringly, the average self-reported time it took specialists to complete an eConsult was 11.2 min, which is shorter than it would take to complete an in-person consult and the majority of consults were replied to well under the expected time of 7 days. However, the high number of eConsults where an in-person referral “was not originally contemplated and is still not needed” may counterbalance this ‘saved’ time. Angstman et al. surveyed 21 cardiologists where 81% reported that an electronic service was an efficient use of their time, and 67% reported that an electronic service was less disruptive than answering pages or telephone consultations [10]. One PCP identified that the eConsult interface was not user friendly which limited his or her use of the system; having a simple user-friendly interface may improve the uptake and acceptability of an eConsult program among PCPs and specialists.

There were a variety of eConsult referral questions to thrombosis specialists. While some topics may be straight forward (e.g. peri-procedural anticoagulation management of a direct oral anticoagulant), others have the potential to be complex and often have ‘no right answer’ in the scientific literature (e.g. management of superficial venous thrombosis; management of a pregnant patient at risk for VTE) [11–13]. Better understanding the patient and physician perceptions of utilizing an eConsult service for these complex cases are needed. Incorporating patients’ values and preferences in these complex ‘grey areas’ of thrombosis medicine is likely needed to provide high-quality and effective care. Learning how PCPs relay electronic specialist advice to patients deserves further study, such as for cases where a discussion addressing patient values and preferences is essential. Pecina et al. report a variety of methods that PCPs used to notify patients of specialist recommendations, which included communication via nurse or provider using telephone or secure messages, face-to-face visits and written correspondence by mail [14]. It was reassuring that there was only a small proportion of referral questions about the diagnosis of suspected

Table 4
Qualitative themes with representative quotes from the close-out survey written comments.

Theme	Representative quotes
Improved timely access and resource utilization	<p>“I had a concise but thorough answer back within hours. This is an excellent service for my patients. Where I live we do not have access to a thrombo specialist and the patient would have needed to drive over 2 h and waited months to get this information. Thank you.”</p> <p>“This allows a hallway consult for a rural GP. Great service for both the patient and the physician.”</p> <p>“An amazing service. So easy to use and so incredibly useful and convenient for my sick long term care patients who have huge issues with transportation.”</p> <p>“Excellent prompt response, allowing appropriate treatment plan to be initiated...thank you!”</p>
Value expert guidance	<p>“...‘Unequivocal’ case situations are always difficult to treat therefore expert recommendations are greatly appreciated.”</p> <p>“The consultant suggested something that I had not thought about.”</p> <p>“I liked the additional information about the conflict in what the recommendations are. Thanks.”</p>
Educational opportunities	<p>“eConsult is great. The best part about it is I can often apply what I’ve learned in an eConsult to future patients as well. Not only have I avoided a referral with this eConsult but I’ll likely save time for future patients in similar situations.”</p> <p>“Very useful consult just was hoping for more guidance on what we could do as primary care providers ourselves before referring.”</p>

VTE, which is a more urgent/emergent problem that may not be suitable for electronic communications. While the average time to a specialist response was < 48 h, having certain parameters or instructions for urgent/emergent problems may be helpful as the eConsult service grows and the time to specialist response varies.

In addition to improved timely access to specialist advice, an eConsult service has added educational value for PCPs. Primary care providers identified education opportunities as a benefit of the eConsult service, which has been described in other studies [3,15]. While a traditional consult service could theoretically offer the same benefits, having timely and specific feedback about a referral question may improve PCPs' knowledge acquisition. Using an electronic system to collect and report aggregate data could allow for summaries to be presented to PCPs and specialist providers, which could improve feedback [16]. There are other potential system-level educational benefits of an eConsult system. By evaluating the types of eConsult referral questions asked by PCPs, we may be able to better target CME interventions more effectively. For example, thrombophilia testing was a common referral question asked by PCPs, so an educational intervention focused on use of appropriate thrombophilia testing may better target educational gaps. Linking eConsults electronically to maintenance of certification (MOC) programs may also be possible [16]. Lastly, including trainees in the eConsult service process may provide them with additional learning opportunities while fostering professionalism and communication across specialties.

There are several limitations to our study. We did not collect clinic performance data, or survey data about the eConsult service from patients or thrombosis specialists, with the exception of specialists' self-reported time to consult completion. We chose to include a qualitative thematic analysis of free-text written responses to better distill the perceptions of PCPs. One key concept that underpins the basis of qualitative research is the iterative and inductive process to better understand a problem, which is inherently difficult to do in a single survey. Lastly, our pilot study only included three thrombosis specialists who are from a center that has a well-established sub-specialty thrombosis service, which may limit generalizability to other centers that have varying levels of thrombosis expertise. However, it is possible that an eConsult service may be as or more effective in a center without an established program where access to thrombosis specialists may be limited.

In summary, an eConsult service in thrombosis medicine has the potential to improve timely access to specialist advice and affect PCP referral and practice patterns. Further research is needed to better understand how an eConsult service impacts wait times and types of referrals seen in thrombosis clinic, how physicians using a eConsult system manage complex cases, and how patient outcomes are affected.

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Authorship contributions

L.S. contributed to the study design, completed data extraction, qualitative and quantitative data analysis, interpreted study results and wrote the first and subsequent drafts of the manuscript. M.M. completed data extraction and qualitative data analysis. A.K. contributed to the study design and qualitative data analysis. C.L. co-developed the eConsult service, contributed to the conception and study design. A.A. contributed to the study design. D.A. contributed to data extraction. E.K. co-developed the eConsult service, had the initial idea for the study and designed the study. All authors reviewed drafts of the manuscript and approved the final draft of the manuscript.

Conflict-of-interest disclosure

The authors have no relevant conflicts of interest to declare.

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