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Nephrology eConsults for Primary Care Providers: Original Investigation

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Abstract

Background: The Champlain BASE™ (Building Access to Specialists through eConsultation) eConsult service allows primary care providers (PCPs) to submit patient-specific clinical questions to specialists via a secure web service.
Objective: Our objective was to describe the types of nephrology questions asked through an eConsult service based in eastern Ontario and assess the service's impact on the need for face-to-face consultations.
Design: Cross-sectional study using descriptive statistics was conducted using nephrology cases submitted between May 2011 and January 2015. Specialist response times and referral avoidance were collected. Validated taxonomies were used to categorize cases based on question type and content.
Setting: Patient cases were collected from PCPs in Ottawa, Ontario, and its surrounding communities and submitted to nephrologists at the Ottawa Hospital.
Patients: During the study period, 155 eConsults were submitted to nephrology.
Measurement: Utilization and survey data were collected for all eConsults. Questions were categorized by subject matter and question type.
Results: A traditional consult visit was avoided in 45% of cases based on the specialist's advice; 21% cases required referral. Thirty-two percent of eConsults took specialists less than 10 minutes to complete, 55% took 10 to 15 minutes, 11% took 15 to 20 minutes, and only 2% took more than 20 minutes. Twenty-five percent of cases were related to proteinuria, 18% to chronic kidney disease (CKD), 17% to imaging, and 12% to drug use in CKD. Common question types included general management (37%), interpretation of laboratory test (17%), interpretation of an image report (13%), and need for nephrology referral (11%).
Limitations: Some consults contained multiple categories and question types. Our analyses required a single classification, which may underestimate the number of questions in each category. Our study had a small sample size using cases completed in a single health jurisdiction, limiting generalizability.
Conclusions: The Champlain BASE™ eConsult service provided guidance to PCPs and reduced the number of face-to-face nephrology consultations.

Abrégé

Contexte: La plateforme BASE[MD] (Building Access to Specialists through eConsultation) de Champlain, en Ontario, consiste en un service de consultation médicale en ligne : cette plateforme Web sécurisée offre la possibilité aux fournisseurs de soins de santé primaires (FSSP) de soumettre des questions d'ordre clinique à un médecin spécialiste.
Objectifs de l'étude: Notre objectif était bipartite : 1) déterminer les types de questions reliées à la néphrologie faisant l'objet d'une consultation en ligne dans l'est de l'Ontario; 2) évaluer l'incidence de ce type de service sur les besoins de consultations en clinique.
Type d'étude: L'étude transversale, menée à partir de statistiques descriptives, incluait tous les cas de néphrologie soumis entre mai 2011 et janvier 2015. On a extrait les données d'utilisation et les renseignements pertinents de chacune des consultations en ligne. Les questions ont ensuite été classées par sujet et par type.
Cadre: Les cas ont été recueillis auprès des FSSP de la grande région d'Ottawa (Ontario) et soumis aux néphrologues de l'hôpital d'Ottawa.
Participants : Au cours de la période visée, 155 consultations en ligne en néphrologie ont été soumises.
Mesures: On a noté le temps de réponse des spécialistes et recueilli les cas ayant permis d'éviter un aiguillage vers une consultation en clinique. Les taxonomies validées ont été utilisées pour classer les cas selon le type de questions et leur contenu.

Résultats: L'avis d'un spécialiste en ligne a permis d'éviter une consultation en clinique dans 45 % des cas; un aiguillage s'est avéré nécessaire dans 21 % des cas. Pour bon nombre de cas, la consultation en ligne avec le spécialiste a duré entre 10 et 15 minutes (55 % des cas); 32 % des consultations ont duré moins de 10 minutes et 11 % ont duré entre 15 et 20 minutes. Seulement deux pour cent (2 %) des consultations en ligne ont pris plus de 20 minutes. Les cas se rapportaient principalement à la protéinurie (25 %), à l'insuffisance rénale chronique (18 %), à l'imagerie (17 %) et aux traitements médicamenteux (12 %). Les principaux types de questions posées concernaient la prise en charge générale du patient (37 %), l'interprétation des résultats de laboratoire (17 %), l'interprétation d'un rapport d'imagerie (13 %) et la nécessité ou non de consulter en néphrologie (11 %).

Limites de l'étude: Le faible échantillonnage et la provenance géographique restreinte des cas sont deux facteurs qui limitent la portée et l'extrapolation des résultats. De plus, certaines consultations comportaient plusieurs types de questions ou couvraient plus d'un sujet; comme nos analyses exigeaient une classification unique, le nombre de questions d'un type donné a pu être sous-estimé.

Conclusion: Le projet de consultation en ligne BASE^{MD} de Champlain a rempli ses objectifs en procurant aux FSSP un accès aux spécialistes et en réduisant le nombre de consultations en clinique de néphrologie.

Keywords
nephrology, eConsult, referral, outcomes, questions, access

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What was known before

eConsults have been shown to improve timely access to specialist advice and reduce the need for face-to-face referrals across multiple specialties. There is no reported Canadian experience in nephrology.

What this adds

eConsults can be used in nephrology to reduce the number of face-to-face referrals and to gain understanding into common nephrology clinical questions asked by primary care providers.

Background

Chronic kidney disease (CKD) is common, affecting 10% to 15% of the general population.[1] Due to its prevalence and relationship with other chronic conditions such as diabetes and vascular disease, CKD is often managed in primary care.[2] However, many primary care providers (PCP) demonstrate poor adherence to best practice guidelines for CKD treatment.[3] Potential reasons for this include knowledge gaps and difficulties with the referral process.[4] In Manitoba, the introduction of estimated glomerular filtration rate (eGFR) reporting increased the number of nephrology referrals (63% of which were inappropriate based on guidelines), and increased non-urgent referral wait times by 40 days.[5] Coordination of care between PCPs and nephrologists is thus essential to effectively manage CKD.

Electronic consultation (eConsult) services allow PCPs to submit patient-specific clinical questions to specialists directly, without necessarily initiating a patient referral. A growing body of literature has associated eConsult services with reduced wait times, improved access to specialist advice, high levels of patient and provider satisfaction, and lower costs.[6,7] Three other groups have looked at eConsults in nephrology clinics.[8-10] A quality improvement initiative undertaken in 17 volunteer practices in one region in the United Kingdom to improve communication between PCPs and nephrologists launched a nephrology specific eConsultation service through a shared electronic medical record. Overall, 68 eConsults were completed with a mean response time of 7 days, and specialist time to complete of 15.5

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minutes. Compared with practices using the standard paper referral model, e-consultation practices boasted shorter wait times, more complete clinical advice, and fewer referrals to nephrologists.[10] A US pilot study in primary care practices linked to a tertiary-care nephrology clinic reported on 74 nephrology eConsults submitted by 49 PCPs. The nephrologists spent an average of 10 minutes per case and with a median response time of 3.13 hours. They identified CKD management, medication-related questions, and abnormal imaging as the most common types of questions asked. In 22% of cases, the nephrologist requested a face-to-face visit. To our knowledge, no studies of eConsult's use in nephrology cases have been conducted in Canada.

Our objective was to describe the types of nephrology questions asked through an eConsult service based in eastern Ontario and assess the service's impact on the need for face-to-face consultations.

Methods

Design

We conducted a cross-sectional study of all eConsult cases submitted to nephrology between May 2011 and January 2015.

The Champlain BASE™ eConsult Service

The eConsult service is a secure online platform that facilitates asynchronous communication between PCPs and specialists.[11] All PCPs practicing in Ontario are eligible to join however it is primarily deployed in one health region. To use the service, PCPs log in via a web browser, enter their question in a free-text field, attach any files they feel might be useful for the specialist (eg, images, test results), and select the preferred specialty group. A designated assigner allocates the case to a specialist, who receives an email notification requesting them to log in and respond within 1 week. Responses could include advice on how the PCP can treat the patient, recommendation that the patient be referred, or request for more information. Conversation can continue back and forth between providers until the PCP chooses to close the case, at which point they complete a mandatory 4-question survey. The first question asks whether the eConsult (1) confirmed their originally chosen course of action, (2) suggested a new or additional course of action, (3) was not very useful, or (4) none of the above. The second question allows PCPs to choose from options identifying whether or not they (1) had originally contemplated a referral and (2) ultimately referred the patient based on the advice they received from the eConsult. The third and fourth questions ask PCPs to rank the eConsult's value for their patients and themselves, respectively, using a 5-point Likert scale. A free text box is available for additional comments/feedback.

New specialties are added to the service based on PCP demand, and specialists join by invite. Specialists are remunerated at a rate of $200 per hour pro-rated to the amount of time it takes them complete their response, which is self-reported. Justification is required for any questions that take more than 20 minutes to answer.

The eConsult service began as a small proof-of-concept in 2010. It expanded to a full pilot in 2011 and has grown into a regional service with 1219 PCPs enrolled and 24 611 cases completed as of April 30, 2017. At the time of this study, 608 PCPs were enrolled in the service and could submit cases to specialists.

Setting

The eConsult service is based in the Champlain Local Health Integration Network, which comprises the city of Ottawa, Ontario, and its surrounding rural communities, with a population of approximately 1.2 million. Approximately 1077 PCPs practice in the region.[12]

Data Collection

The eConsult service automatically collects utilization data on all cases, including the type of referring PCP (family physician or nurse practitioner), specialty type (eg, cardiology, dermatology), and the specialist's self-reported time spent responding to the case. Cases are linked to the PCPs' close-out surveys. For the purposes of this study, we focused on responses to questions 1 and 2 (described above), examining the service's perceived impact on outcomes.

Data Analysis

Utilization and survey data were compiled and descriptive statistics calculated. PCP questions submitted to nephrology during the study period were reviewed and analyzed independently by 2 reviewers. A validated taxonomy was used to classify cases by question type,[13] and a modified version of the International Classification for Primary Care (ICPC-2) taxonomy was used to identify question content (ie, the type of nephrology problem discussed).[14] Any discrepancies between reviewers were resolved by consensus. Some questions contained more than one component (eg, Diagnosis and management). The predominant question, as determined by consensus between reviewers, was the one coded.

This study received ethics approval from the Ottawa Health Science Network Research Ethics Board.

Results

A total of 97 PCPs (73 family physicians and 14 nurse practitioners) submitted 155 eConsults to nephrology during the study period, encompassing 3% of the all eConsult cases completed at that time. Specialists took less than 10 minutes to complete their eConsult in 22% of cases, 10 to 15 minutes in 55%, 15 to 20 minutes in 11%, and more than 20 minutes

Table 1. Question Types Asked by Primary Care Providers.

Question type	n	% of total (N = 155)
Management		
General management question	58	37.4
Should I refer	17	10.9
Diagnosis		
Interpretation of a laboratory test	27	17.4
Interpretation of an image report	20	12.9
Drug treatment		
How to prescribe a particular drug	9	5.8
Indications/goals of treating a particular condition	8	5.2
Drug of choice	8	5.2
Adverse effects of drugs	6	3.8
Other	1	0.64
Procedure		
Indications	1	0.64

Table 2. Content of Questions Asked by Primary Care Providers.

Content	n	% of total (N = 155)
Proteinuria	39	25.2
CKD	28	18.1
Renal imaging	26	16.8
Drug use in CKD	18	11.6
Electrolyte abnormalities	9	5.8
Hematuria	7	4.5
Elevated creatinine—NOS	6	3.9
Elevated creatinine—acute	6	3.9
Hematuria with proteinuria	5	3.2
Other UA abnormalities	4	2.6
Stones and flank pain	4	2.6
Hypertension	3	1.9

Note. CKD = chronic kidney disease; NOS = not otherwise specified; UA= urinanalysis.

in 2%. In 80 cases (52%), the PCP identified that they received information for a new or additional course of action. There was a significant impact on PCP referral plans. While a traditional referral was initially planned in 103 (66%) of cases, 70 of those 103 referrals (68%) were avoided following the eConsult. In a single case, the eConsult prompt a face-to-face referral that was not originally contemplated. A total of 34 cases (22%) required referral following the eConsult. Overall, the eConsult process lead to a modification in the PCP's referral behavior in 46% (71/155) of cases.

The results of our taxonomy on question type are presented in Table 1. The most common questions posed by PCPs pertained to management (48%), followed by diagnosis (30%) and drug treatment (21%). Of the questions classified under the management category, one quarter were primarily interested in whether or not the patient needed a referral. Question content is reported in Table 2. The most common categories were diabetic and nondiabetic proteinuria (25%); CKD, which includes diabetic and polycystic kidney disease (18%); renal imaging (17%); and drug use in CKD (12%). Referrals were originally considered but ultimately avoided in 41% of proteinuria cases, 50% of drug use in CKD cases, and 46% of kidney imaging cases. The service also facilitated triage and redirection of cases, both of which improved coordination of care. In several cases, specialists asked PCPs to include "discussed on eConsults" on the referral form for triaging purposes. In 5 kidney imaging questions, the nephrologist indicated that the patient would be better served by a referral to a urologist.

Discussion

The Champlain BASE™ eConsult service is an innovative, efficient way of providing PCPs with nephrology advice. While the majority of cases were resolved without the patient requiring a face-to-face visit with a nephrologist, a referral was still required in 22% of cases. However, the patients in these cases still benefitted from eConsult, as specialists were able to guide PCPs on appropriate initial work-ups that helped patients as they waited for their appointments and ultimately led to more effective consultations. Studies have shown that patients with CKD who receive prompt treatment have lower costs[15] and mortality[16] than patients who are referred late. Given the limited supply of nephrologists, unnecessary referrals may affect wait times for all CKD patients, making eConsult a valuable way to improve access to care.

Our results are remarkably comparable to the other 3 international reports.[8-10] In all studies, there was high provider satisfaction, quick turnaround, similar requirement of specialist time (15 minutes on average), and reduction in need for face-to-face visits. There are some significant differences between our service and the others reported. In each of the other eConsult services, nephrology was the only specialty provided, whereas our service is a multispecialty service of which nephrology is one provider. In addition, each of the other services had the eConsult platform integrated into a shared electronic medical record. The types of questions asked were reported in one of the other studies.[8] They had a fewer questions on imaging (8% vs 16.8%) but otherwise had a similar mix of clinical content. The similar positive experience in 4 different countries is reassuring that eConsult has a broad application across health care systems.

The types of questions PCPs ask provide a unique opportunity to identify gaps in knowledge or access to clinical resources. PCPs most commonly asked questions focused on management (general management and whether or not a referral was needed) or drug therapy (indications, goals, adverse effects). In contrast, a study of an eConsult service in the United States providing access to 9 specialty groups (including nephrology) found that the majority of questions sent through the service were related to diagnosis (76%) and

treatment (64%).[17] Given that almost 20% of questions were related to drug therapy, future study on whether better access to a pharmacist on a family health team within primary care may be beneficial for reducing the need for traditional face-to-face consultations in nephrology. This also suggests that a knowledge gap exists regarding the management of CKD and may be a target for developing Continuing Medical Education (CME) content for family physicians.

There are some limitations to our study. Our study had a small sample size and included cases completed in a single health jurisdiction which limits generalizability. However, it should be noted that our sample size is the largest reported in the literature. In addition, the eConsult service has grown considerably since the end of the study period. Nearly 25 000 cases have been completed, compared with 5597 as of January 2015. Consistently 2% to 3% of all eConsults are directed to nephrology. We plan to continue to track the utilization and impact of eConsults across individual specialties. Last, our analyses of question type and content required that each case be assigned to a single category, despite some questions containing elements that fit into multiple groups. This required the data analysts to pick the most appropriate category, which may underestimate the number of questions in each category.

Conclusion

The Champlain BASE™ eConsult service was able to provide guidance to PCPs in the community and reduce the number of face-to-face nephrology consultations. This service identified common nephrology questions asked by PCPs and can be used to generate CME content. The value of eConsult content in directing specialist knowledge transfer to primary care physicians and PCPs' satisfaction with specialists' responses warrants further study.

List of Abbreviations

Champlain BASE™, Champlain (Building Access to Specialist Advice); CKD, chronic kidney disease; CME, Continuing Medical Education; eGFR, estimated glomerular filtration rate; ICPC-2, International Classification for Primary Care; PCPs, primary care providers.

Ethics Approval and Consent to Participate

Ethics approval and consent to participate was obtained by the University of Ottawa's Research Ethics Board.

Consent for Publication

All authors read and approved the final version of this manuscript.

Availability of Data and Materials

The datasets generated during the current study are not publicly available due patient confidentiality but are available from the corresponding author on reasonable request.

Author Contributions

E.K., A.A., and C.L. developed the eConsult service and designed this project; J.L. and P.M. took part in the adaptation of the nephrology problem list, data classification, and analysis. J.L. led manuscript preparation. All authors contributed to the interpretation of data, writing, and manuscript revision. All authors had full access to all study data. The corresponding author E.K. assumes final responsibility for the decision to submit this article for publication.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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