

# Improving primary care access to respirologists using eConsult

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## Abstract

**Background:** Patients and primary care providers (PCPs) can experience frustration about poor access to specialist care. The Champlain Building Access to Specialists through eConsultation (BASE™) is a secure online platform that allows PCPs to ask a clinical question to 142 different specialty groups. The specialist is expected to respond within 7 days.

**Methods:** This is a retrospective review of the Champlain BASE™ respirology eConsults from January 2017 to December 2018. The eConsults were categorized by types of questions asked by the referring provider and by the clinical content of the referral. Specialists' response time and time spent answering the clinical question were analyzed. Referring providers' close-out surveys were reviewed to assess the impact of the respirology eConsult service on traditional referral rates and clinical course of action.

**Results:** Of the 26 679 cases submitted to the Champlain BASE™ eConsult service, 268 were respirology cases (1%). 91% were sent by family physicians and 9% by nurse practitioners. The median time to respond by specialists was 0.8 days, and the median time billed by specialists was 20 min. The most common topics were pulmonary nodules and masses (16.4%), cough (10.4%), infective problems (8.6%), chronic obstructive pulmonary disease (8.6%) and dyspnea Not Yet Diagnosed (NYD) (7.8%). The most common types of questions asked by PCP were related to investigations warranted (43.1% of cases), general management (17.5%), monitoring (12.6%), need for a respirology referral (12.3%) and drug of choice (6.3%). In 23% of cases, the PCP indicated they were planning to refer the patient for an in-person consultation but no longer needed to after receiving the eConsult advice (avoided referrals). On the other hand, in 13% of cases, the PCP was not going to refer but did after the eConsult (prompted referrals). The eConsult led to a new or additional clinical course of action by the PCP in 49% of cases. In 51% of cases, the PCP suggested the clinical topic would be well suited to a CME event.

**Conclusions:** Participation in eConsult services can improve timely access to respirologists while potentially avoiding clinic visits and significantly impacting referring PCPs clinical course of action. Using the most common clinical topics and types of questions for CME planning should be considered. Future research may include a cost analysis and provider perspectives on the role of eConsult in respirology care.

**Key words:** eConsult, eConsultation, electronic consultation, virtual care, respirology, pulmonology, referral time, wait times, access to health care, clinical content, question type

## Background

Over 3 million Canadians currently live with one of five serious respiratory diseases (asthma, chronic obstructive pulmonary disease (COPD), lung cancer, tuberculosis and cystic fibrosis). The number of Canadians living with a respiratory condition is expected to increase, largely due to an aging population and to the chronic nature of these diseases [1]. In turn, this will inevitably lead to an increase in demand for services that will pose a significant challenge to the Canadian health-care system, particularly considering that there is an estimated 10–22% shortfall of respirologists in Canada [2]. Accessibility of respirologists to primary care providers (PCPs) remains essential to provide quality healthcare and continuity of care to respiratory patients. Based on a Royal College of Physicians and Surgeons report in 2000, average wait times to

see a respirologist was just over a month for private practice and just under 2 months for university-based respirologist [2]. More recent estimates suggest median wait times from time of referral from PCP to consultation with a specialist of 8.7 weeks in Canada across all specialties [3]. Compared to 11 other developed countries, Canada had the highest percentage of seniors who waited at least 4 weeks to see a specialist in the past 2 years (59%) and a quarter of them waited more than 2 months [4].

Modern information communication technologies offer the possibility of improving access to health care, delivering healthcare to more patients and extending the reach of services to remote locations [5]. Electronic consultation is one example of such technologies, and it allows PCPs to communicate with specialists in a timely manner and asynchronously—that

is, at different times that are convenient for each physician [6]. Several benefits of electronic consultation have been described, including but not limited to—high patient and physician satisfaction, improved access to specialist care, reduced cost of care, reduced demand on existing hospital and healthcare services and improved educational experience for PCPs [5, 6].

Although multiple studies have evaluated the use of eConsults in different specialties through various online platforms, our review of the literature only identified two studies looking at the use of eConsults in respirology [7, 8]. The clinical content of eConsults in Respirology has never been described. A group from Italy assessed the feasibility of an eConsult service to assist PCPs in interpreting spirometry performed in their office (telespirometries) to provide real-time guidance on the management of patients with respiratory disease [7]. A study from the Netherlands subsequently showed that the percentage of prevented physical referrals was 27% following implantation of a respirology eConsult service for PCPs following spirometry in their office. The authors also found that the answer provided by the respirologist was helpful for PCPs or patients in 96% of cases [8]. Importantly, those studies focused on assisting PCPs in interpreting spirometry via telemedicine, but most PCPs in Canada do not have access to spirometry in their office.

The goal of this study is to describe respirology-related cases (clinical topic and types of question) through an eConsult service based in eastern Ontario and evaluate the impact of eConsult on PCP clinical course of action and on the need for an in-office respirology referral.

## Methods

### Champlain BASE™ eConsult service

Studies using the Champlain BASE system that details its process have been published previously [13]. The Champlain BASE eConsult service is a secure online platform developed as a proof of concept in Ottawa, Canada, in 2010. It has since been fully operational and funded by the Ministry of Health. It serves to connect PCPs (1718 enrolled in the program at the time of the study) with 142 different specialist groups in the Champlain Local Health Integration Network (LHIN). LHINs are regional health authorities in the province of Ontario that regulate and fund healthcare. The eConsult service allows PCP to pose clinical questions to a specialist using a standardized, patient-specific form. Other clinical information pertinent to the case can be attached (laboratory results, medical imaging, etc.). A designated assigner allocates the case to a specialist, who receives an email notification informing them that a new encounter has been created. The receiving specialist can then ask for additional information, provide clinical advice or advise on the need for an in-office referral. They are expected to respond to the PCP within 7 days. The two parties can communicate using the secure platform until the PCP decides to close the encounter. Before each encounter can be formally closed, the PCP must complete a mandatory close-out survey (Table 1). This survey allows the PCP to rank their experience with the eConsult service and provides data on the outcome of the eConsult.

**Table 1** Close-out survey questions. Following completion of the respirology encounter, the PCP had to complete a mandatory close-out survey (four questions listed above) to formally close the encounter. This survey allowed the PCP to rank their experience with the eConsult service and provided data on the outcome of the eConsult

Question 1	Which of the following best describes the outcome of this eConsultation for your patient? A. I was able to confirm a course of action that I originally had in mind B. I got clear advice for a new or additional course of action that I will be implementing C. I got clear advice for a new or additional course of action that I am <u>not</u> able to implement D. None of the above (please comment)
Question 2	As a result of the eConsultation would you say that: A. Referral was originally contemplated but now <u>avoided</u> at this stage B. Referral was originally contemplated and is <u>still needed</u> C. Referral was <u>not</u> originally contemplated and is <u>still not needed</u> D. Referral was <u>not</u> originally contemplated, but eConsult process resulted in a referral being initiated E. Other (please explain)
Question 3	How helpful and/or educational was this response in guiding your ongoing evaluation or management of the patient? A. 1 Minimal B. 2 C. 3 D. 4 E. 5 Very valuable
Question 4	This eConsult addresses an important clinical problem that should be incorporated into upcoming CME events: A. Strongly disagree B. Disagree C. Neutral D. Agree E. Strongly agree

### Study participants

The Champlain BASE™ eConsult service is based in the Champlain region of Eastern Ontario that has a population of 1.3 million individuals. Two-hundred and sixty-eight eConsultations were directed through this service to respirology and completed by a single respirologist between January 2017 and December 2018.

### Study design

This is a retrospective cohort study of all the Champlain BASE™ respirology eConsultations between January 2017 and December 2018. The cases were de-identified and uploaded to a secure server. The cases were individually reviewed and categorized by predefined clinical topics, and the types of referral questions asked by the PCP were recorded. The predefined clinical topics were established based on previously published data on frequently

encountered respiratory diseases in a pulmonary clinic [9]. These predefined topics were reviewed and agreed upon by two experienced respirologists in the Champlain LHIN. A modified version of a validated taxonomy was used to classify cases by question type [10–12]. To ensure standardization in the categorization of eConsults, the first 20 cases were reviewed by two raters separately. Disagreement on categorization was then discussed between the reviewers until agreement was reached. The remaining cases were analyzed by a single rater. In some cases, there were more than two types of referral questions and these cases were deemed unclassifiable.

Data regarding the type of PCP sending a referral, specialists' response time and time spent by the specialist answering the clinical question were available for analysis. Referring providers' close-out surveys were reviewed to assess the impact of the respirology eConsult service on PCPs traditional referral rates and clinical course of action. Descriptive statistics were the only statistics compiled.

## Results

From January 2017 to December 2018, 26 679 cases were submitted to the Champlain BASE™ eConsult service. Of those, 268 (1%) cases were directed to respirology and answered by one respirologist. Those consultations came primarily from family physicians (91%), with nurse practitioners accounting for the remaining referrals.

The median time to respond by the specialist was 0.8 days (mean 1.28, CI 0.006–9.399). The median time billed by the specialist to complete an eConsult was 20 min (mean 19.7, CI 5–60).

The clinical content of the eConsults was diverse, but recurrent topics were identified. The most common topics were pulmonary nodules and masses (16.4%), cough (10.4%), infective problems (8.6%), COPD (8.6%) and dyspnea NYD (7.8%) (Figure 1).

In regard to the specific types of questions in eConsults, PCPs asked more than one question 35.8% of the time.

Twenty-seven cases, or 10.1% of all cases, were deemed unclassifiable as more than two questions were posed by the PCP. Of the cases that contained one or two questions, next investigations warranted ('what test to order') was the most common question type in 43.1% of cases. Following this were general management (17.5%), monitoring (12.6%), need for a respirology referral (12.3%) and drug of choice (6.3%) (Figure 2).

The eConsult service frequently had an impact on the decision of the PCP to refer or not for an in-office specialty consultation. In 62 (23%) of the cases, the PCP indicated they were planning to refer the patient for an in-person consultation but no longer needed to after receiving the eConsult advice (avoided referrals). On the other hand, in 36 (13%) of the cases, the PCP was not going to refer but did after the eConsult (prompted referrals) (Figure 3). In the remainder of the cases, the eConsult did not change the PCP's plans for formal referral.

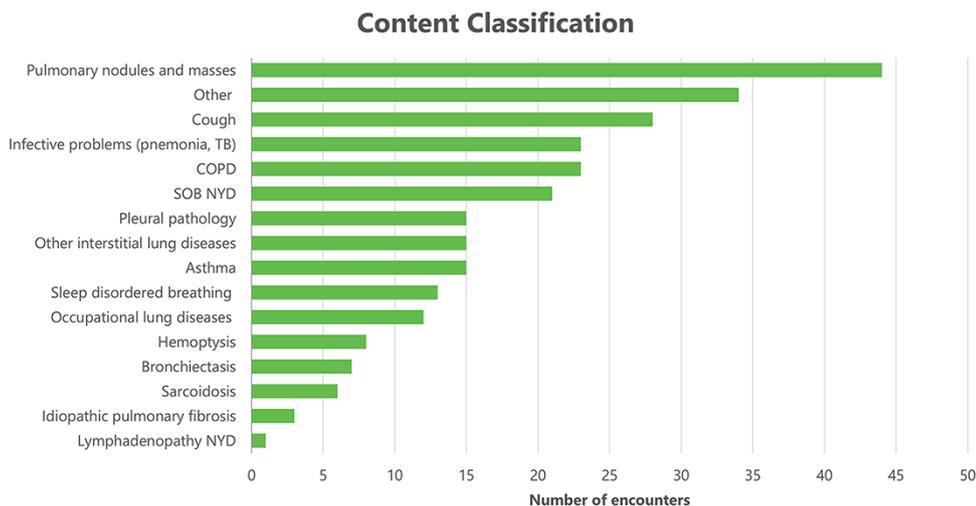
The eConsult service affected care provided by PCPs. In 49% of cases, a new or additional clinical course of action was implemented by PCPs after specialist opinion. PCPs were able to confirm a course of action with the specialist in 43% of eConsults.

Overall, PCPs rated the service very highly, with 83% giving a rating of 4 or 5 on a five-point Likert scale for value in guiding their ongoing evaluation and management of the patient. In 52% of cases, the PCP suggested the clinical topic would be well suited to a CME event.

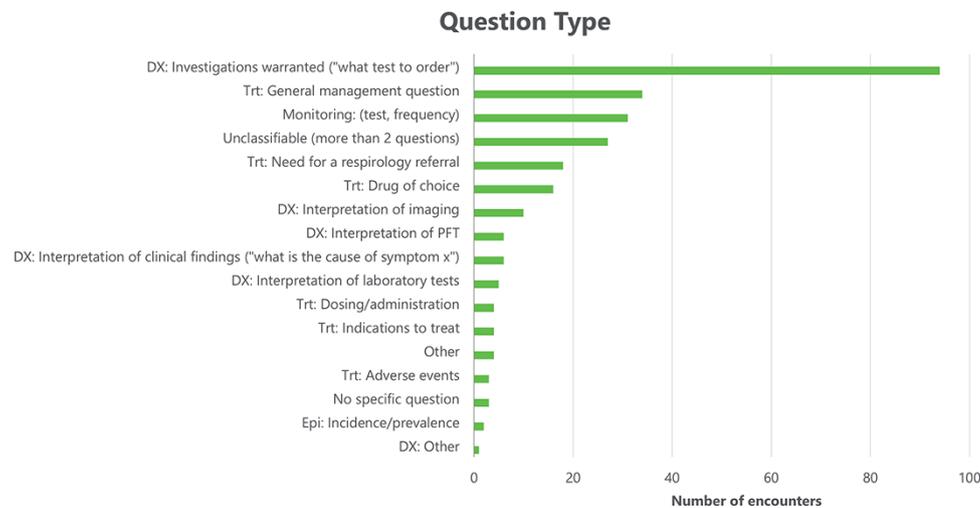
## Discussion

### Statement of principal findings

The Champlain BASE eConsult service is an efficient way to provide timely advice to PCPs about respiratory diseases and can significantly impact PCPs clinical course of action. Our study confirms prior findings that PCPs value highly an eConsult service to access advice from a specialist, including in respirology. We found that pulmonary nodules and masses were the most common clinical topic for which clin-

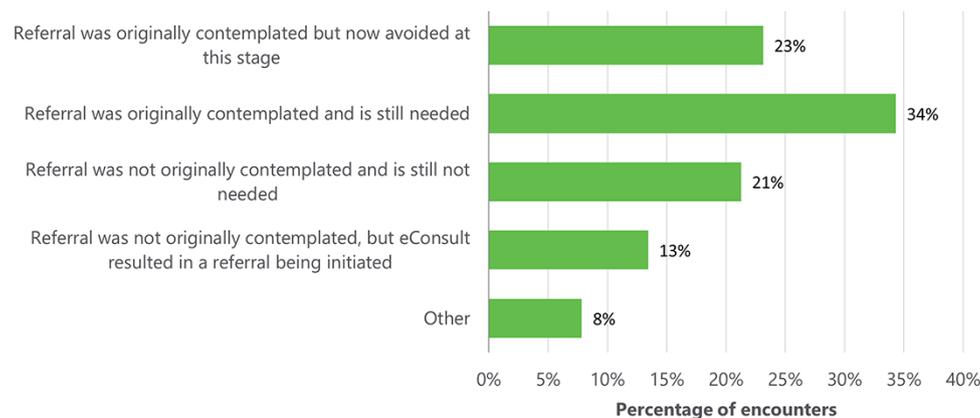


**Figure 1** Clinical topics of eConsultations. All respirology encounters ( $n = 268$ ) between January 2017 and December 2018 were analyzed and categorized based on the predefined clinic topics. To ensure standardization in the categorization of eConsults, the first 20 cases were reviewed by two raters separately. Disagreement on categorization was then discussed between the reviewers until agreement was reached. The remaining cases were analyzed by a single rater.



**Figure 2** Type of referral questions posed by primary care providers. All respirology encounters ( $n = 268$ ) between January 2017 and December 2018 were analyzed and categorized based on the type of question posed in the encounter. If there were more than two types of referral questions, the encounters were deemed unclassifiable. The question types are plotted on the x' axis, and the percentage of encounters containing these are plotted on the 'y' axis. To ensure standardization in the categorization of eConsults, the first 20 cases were reviewed by two raters separately. Disagreement on categorization was then discussed between the reviewers until agreement was reached. The remaining cases were analyzed by a single rater.

## Survey Question 2



**Figure 3** Referral outcomes following completion of eConsultation, as reported by primary care providers. Following completion of the encounter ( $n = 268$ ), the PCP had to complete a mandatory close-out survey (four questions) to formally close the encounter. This survey allowed the PCP to rank their experience with the eConsult service and provided data on the outcome of the eConsult. The answers of question 2 (*As a result of the eConsultation would you say that:*) are plotted on the 'y' axis, and the percentage of encounters on the 'x' axis.

ical assistance was requested, followed by cough, infective problems and COPD. The most common types of referral questions were related to investigations warranted, general management, monitoring, need for an in-person referral and drug of choice.

### Interpretation within the context of the wider literature

The most common types of referral questions identified in our study are comparable to previously published data on types of frequently asked questions by PCPs across specialties [10–12]. The avoided referral rate in our study (23%) is similar to that of a study from the Netherlands looking at eConsults in respirology following spirometry in family doctors' offices [8]. However, this rate is lower than the rate of avoided referrals in other specialties participating in the

Champlain BASE eConsult service. The average avoided referral rate for the service across all specialties is around 40% [13]. Also, the prompted referral rate in our study is three times higher than for other specialties in the Champlain BASE eConsult service (13 vs 4%). This means that patients are now accessing a respirologist who otherwise were not going to get a referral, therefore resulting in a true avoided referral rate of 10% when accounting for these new referrals. The higher prompted referral rate in our study compared to other specialties should not necessarily be viewed as an additional burden on our healthcare system, as it may in fact improve patient safety and lead to the prevention of delayed necessary in-person medical referrals [14]. A published review of electronic consultations suggests that the potential benefits of eConsults may vary across specialties—that is, specialties that provide cognitive advice are most likely to benefit

from an eConsult service compared to specialties that perform procedures [6]. A possible explanation for the difference in referral rates found in our study is that respirology is a specialty that relies heavily on physical examination, interpretation of diagnostic tests (pulmonary function tests, imaging) and procedures (bronchoscopy) for clinical decision making. Additionally, specialists are more likely to respond effectively to eConsults if those are structured to include a clear question, proposed task or intervention, and desired outcome. On the other hand, if the eConsult request is vague, specialists are more likely to recommend a face-to-face visit [6]. In our study, PCPs asked more than one question in 35.8% of cases, and 10.1% of cases were deemed unclassifiable as three or more questions were posed. This suggests that many of the eConsults were complex, thereby prompting more in-office referrals.

### Strengths and limitations

To our knowledge, this study is the first to report on the use of an eConsult service in respirology without a prerequisite for spirometry. There are several limitations to our study. First, our study has a relatively small sample size and evaluated one eConsult service providing access to one respirologist in one local health network, and therefore, the results may not be generalizable to other populations or healthcare systems. Second, although we attempted to standardize the categorization of clinical topics and question types by having two reviewers analyze the first 20 cases, the majority of studies were based on a single rater's assessment of the cases possibly leading to bias. Third, clinical topics for a significant number of cases were categorized as 'other'. This raises the possibility that certain important clinical topics in respirology were not captured in our study. However, an exhaustive list of clinical topics was generated at the start of the study and reviewed by two experienced respirologists, making this unlikely. It is possible that those cases did not have a clearly defined clinical topic. Finally, the data collected at the end of the encounters between the PCP and the specialist was self-reported by PCP. We cannot confirm whether the PCP followed the recommendations made by the specialist and whether this had any impact on patient outcomes.

### Implications for policy, practice and research

Our study also provides an opportunity to identify gaps in knowledge that would help inform future professional development activities. The high rate of change in referral plans, especially the prompted referrals, suggests that there is a need to communicate to PCPs when a respirologist should be consulted. Although further research is required on this topic, the eConsult service could be a tool to improve the efficiency and utility of in-person respirology care. It could represent an opportunity for the respiratory specialist to recommend additional investigations that would be useful or necessary for an initial assessment, thereby possibly affecting the outcomes of the initial in-person consultation. Furthermore, more than half (52%) of PCPs suggested that the clinical topic discussed during the eConsult would be well suited for a continuous medical education event. Based on the most common clinical topic (pulmonary nodules and

masses) and the most common question types (investigations warranted), we can cautiously infer that CME events focused on the interpretation of pulmonary nodules and their subsequent monitoring would be of high value for PCPs, possibly through collaboration between different specialties such as respirology and radiology. Cough was also a recurring clinical topic that could be well suited for CME events.

### Conclusions

The Champlain BASE™ eConsult was able to provide timely specialist advice to PCPs on respiratory diseases with high user satisfaction. The service identified the most common clinical content and question types asked by PCPs and offers an opportunity to address gaps in knowledge and to provide education on when a respirologist should be consulted.

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### Contributorship

Authors #2, 3 and 4 designed the study. Authors #1, 4 and 5 gathered and analyzed the data. Author #2 provided methodological expertise. Author #1 wrote the first draft of the manuscript and all authors approved the final version.

### Ethics

This study was approved by the Ottawa Hospital Research Ethics Board.

### Data availability statement

The data contains personal health information and is not available.

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