Table 1. Overview of Participating Services

Service Name	Province	Service Type	Date of Service Launch	Date Range for Data	# of Cases Completed	Average # cases/month	Specialties Available
AHS Calgary eReferral	Alberta	BASE™	July 2014	Aug 2017 – Feb 2019	398	20.9	15
AHS Calgary Zone Specialist LINK	Alberta	RACE™	2014	Aug 2017 – Nov 2018	6,792	424.5	15
Saskatchewan LINK	Saskatchewan	RACE™	2016	May 2017 – Dec 2018	377	18.9	7
BASE™ eConsult MB	Manitoba	BASE™	December 1, 2017	Dec 2017 – Nov 2018	176	14.7	26
eConsult NB	New Brunswick	BASE™	May 7, 2018	May 2018 – Oct 2018	97	16.7	5
NL BASE™	Newfoundland and Labrador	BASE™	2016	Sep 2017 – Nov 2018	1,716	114.4	37
Fraser RACE™ Team	British Columbia	RACE™	2014	Dec 2017 – Nov 2018	401	33.4	10
Interior EASE	British Columbia	RACE™	2015	Dec 2017 – Nov 2018	612	51	7
eConsult Quebec	Quebec	BASE™	2017	May 2017 – Mar 2019	1,389	60.4	22
RACE™ North	British Columbia	RACE™	June 2012	Oct 2017 – Nov 2018	567	40.5	13
Providence eCASE	British Columbia	BASE™	April 2017	May 2017 – Dec 2018	934	46.7	-

AHS = Alberta Health Services; BASE™ = Building Access to Specialists through eConsultation; RACE™ = Rapid Access to Consultative Expertise

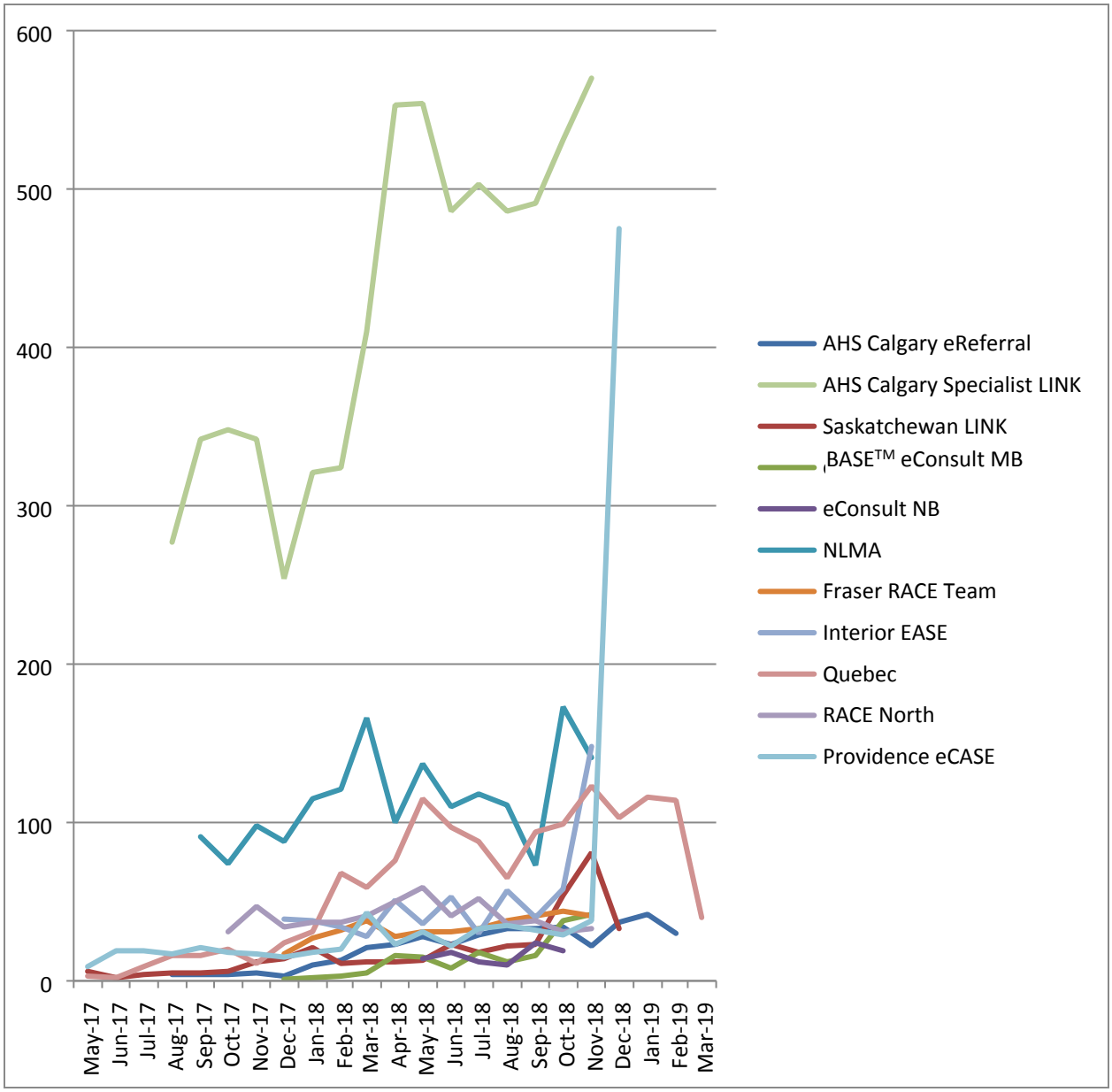

Figure 1. Monthly case volumes for participating services

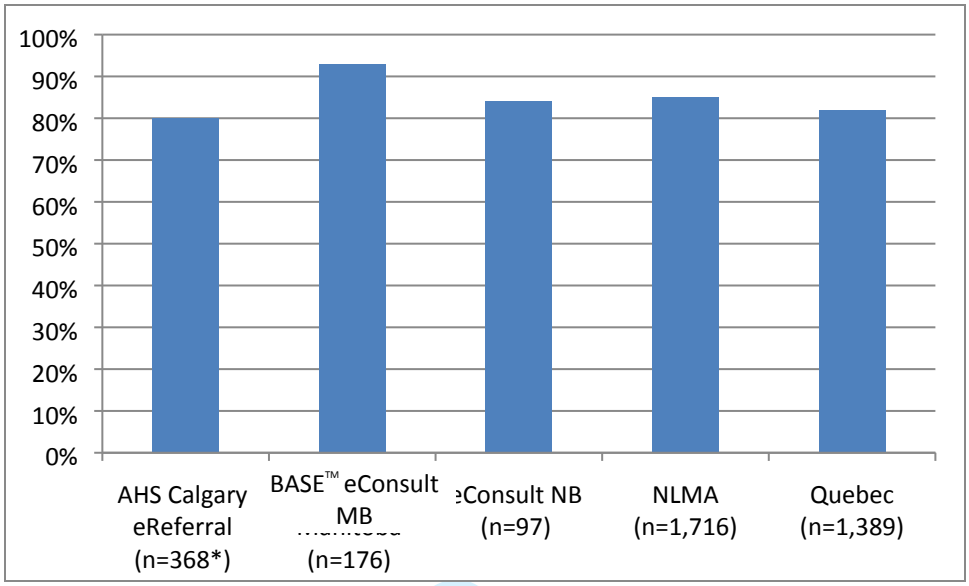

Figure 2. Percentage of cases completed within seven days of submission by service
*excludes data from February 2019

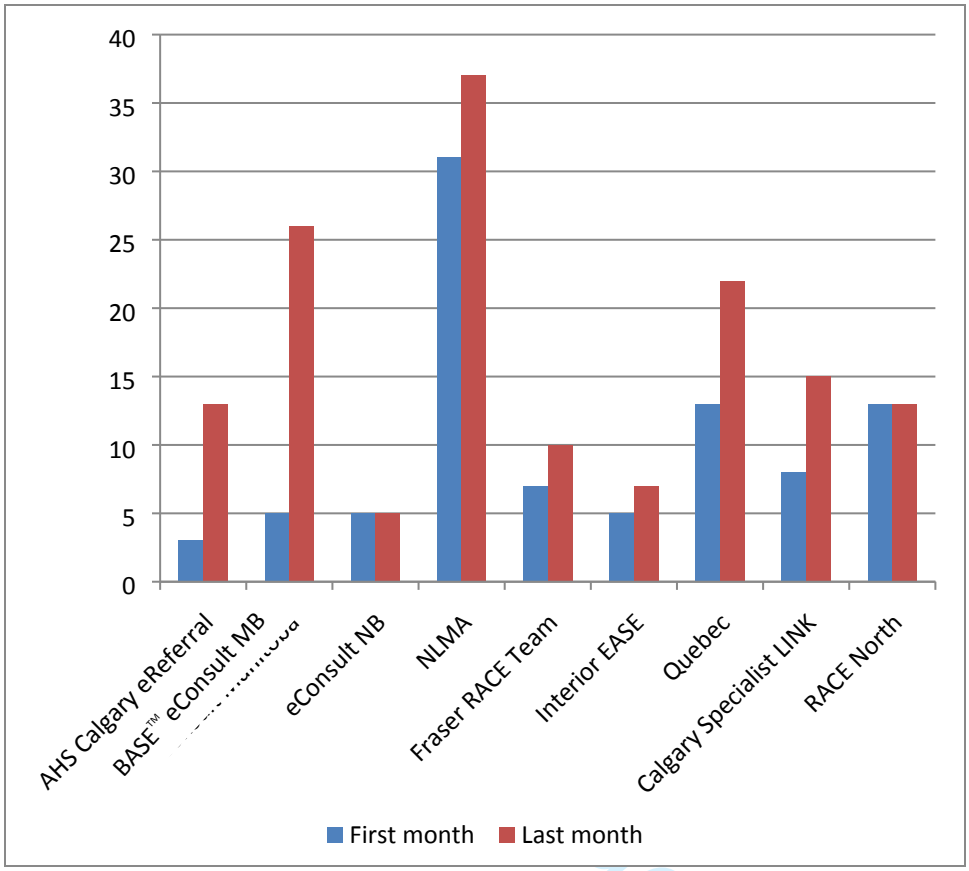

Figure 3. Number of specialty groups available from each service at first and last month of available data

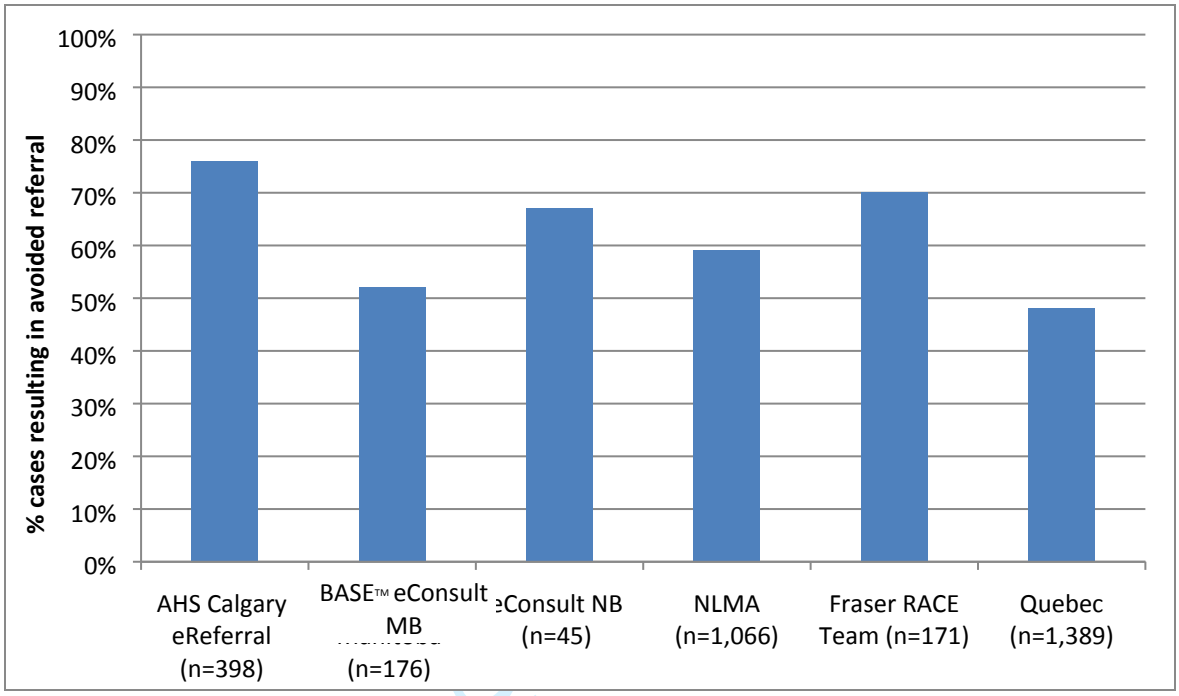

Figure 4. Percentage of cases resolved without the patient needing a face-to-face specialist visit by service

Impact of the Connected Medicine Collaborative to improve access to specialist care: A cross-sectional analysis

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Introduction

Canada's fragmented healthcare system and large size impose substantial barriers to the spread and scale-up of health care innovations. The Canadian Foundation for Healthcare Improvement launched the Connected Medicine Collaborative to support the implementation, spread and adaptation of two innovative remote consult solutions: the Champlain BASE™ eConsult service and the Rapid Access to Consultative Expertise (RACE™) service. This study evaluated the impact of the programs implemented through the Collaborative.

Methods

Eleven teams across 7 provinces and a national team participated in the Collaborative and implemented or adapted either RACE™ or BASE™, or a combination of the two. Average monthly case volume per team ranged from 14.7 to 424.5. All services offered multispecialty access with 5 to 37 specialties available.

Results

Specialists responded to eConsults within 7 days in 80% to 93% of cases. Six services provided survey data on avoidance of referrals, which occurred in 48% to 76% of cases. Two services reported on the avoidance of potential emergency department visits, noting that originally considered referrals were avoided in 28% and 74% of cases respectively.

Conclusions

The Collaborative resulted in successful implementation, spread and adaptation of two virtual care solutions across Canada. The success of these models of care in multiple settings demonstrates an effective means to move beyond the pilot stage and achieve spread and scale.

Keywords: electronic consultation, implementation, specialist care

Introduction

The Canadian healthcare system struggles with excessive wait times for specialist care. (1;2) A 2016 study by the Commonwealth Fund found that 56% of Canadians reported wait times of more than four weeks for a specialist appointment versus an international average of 36%, placing Canada last among the eleven countries surveyed. (1) Studies based solely in Canada paint a similar picture, reporting median wait times for specialist care of five to eleven weeks. (3-6) In addition to the frustration and anxiety produced by waiting for care, excessive wait times can have a negative impact on patient health outcomes. (2)

Innovators across Canada are developing novel solutions to address the issue of excessive wait times for specialist care. However, the fragmented nature of Canada's healthcare system in which each province/territory oversees its own healthcare provision, coupled with the country's immense size, impose substantial barriers to scale-up of known solutions. (7;8) Many promising projects languish at the pilot phase and are unable to expand beyond the regions in which they were originally implemented,(9) an issue that led former Member of Parliament and Minister of Health Monique Bégin to dub Canada "a country of perpetual pilot projects." (7;8)

In an effort to address this problem, the Canadian Foundation for Healthcare Improvement (CFHI) partnered with the College of Family Physicians of Canada, Canada Health Infoway, and the Royal College of Physicians and Surgeons of Canada to launch the Connected Medicine Quality Improvement Collaborative, an 18-month program that connected health care improvement teams interested in improving access to specialist care in their regions with proven remote access innovations. (10) Participating teams received support from CFHI in the form of seed funding, access to a network of expert faculty and coaches, and tailored curriculum content

delivered through online and in-person sessions aimed at enhancing change management and quality improvement capacity.

The purpose of this study is to evaluate the impact of the programs implemented through the Collaborative. Impact was evaluated by examining: the number of cases completed; the percentage of cases resulting in the avoidance of face-to-face visits; integration of eConsult into clinical workflow; response time to specialist advice; and the number specialities added during the observation period. By assessing the Collaborative's effectiveness, our study aims to refute the notion of Canada as a land of perpetual pilot projects and inform future endeavours for spreading and scaling up healthcare innovations.

Methods

Design

This study involves a cross-sectional analysis of data from teams that participated in the Collaborative.

Setting

Aspects of the Canadian healthcare system are publicly funded, with universal access to a host of physician and hospital services, including primary care, specialty care, and emergency medicine. Other elements of healthcare, such as pharmaceuticals and allied health services, are not universally funded. While the federal government provides funding, each province and territory is responsible for overseeing the administration of healthcare in its jurisdiction, with the exception of some specialty populations where care is managed federally (e.g. First Nations communities, members of the military, and inmates of federal penitentiaries). As such, the exact healthcare context varies between provinces.

Participants

This study includes aggregated information from all sites that participated in the Connected Medicine Collaborative.

Connected Medicine Collaborative

The Collaborative took place between June 2017 and December 2018. Participants implemented or adapted one of two established remote consult services in their jurisdictions: the Champlain BASE™ (Building Access to Specialists through eConsultation) eConsult service, and the Rapid Access to Consultative Expertise (RACE™) service, or a combination of the two. (10)

Champlain BASE™

The Champlain BASE™ eConsult service is a secure online platform that allows for primary care providers (PCP) to submit cases to a regional or provincial managed service – a group of specialists responding to eConsults cases for a given specialty or subspecialty. BASE™ is a model of care and not a specific technology, and as such can be adopted on any digital platform capable of facilitating secure communication between providers. In the BASE™ model of care, PCPs log into the platform, enter a clinical question regarding the patient's care, and select the most relevant specialty group from the list of available specialties. A case assigner allocates the eConsult to an appropriate specialist based on availability. The specialist responds to the PCP's question within one week by providing advice on how to manage the patient, recommending the patient receive a face-to-face referral (not necessarily with them) or requesting additional information. PCPs can then respond with additional questions or close the case. Launched as a small proof-of-concept and soon expanded to a full pilot in the Champlain health region of Eastern Ontario, Canada, the eConsult service, as of 2018, has completed over 60,000 eConsults, enrolled more than 1,700 PCPs, and provides access to 135 specialty groups. Specialists respond to cases in a median of 1.9 days. (11) *RACE™ service*

RACE™ is a shared care model that allows PCPs to contact specialists by telephone to ask clinical questions concerning a patient's care. Unlike the BASE™ service, which allows for asynchronous messages to be sent and answered at a later date, RACE™ facilitates synchronous (i.e. "real-time") conversations between providers. PCPs can call the hotline between 8 AM and 5 PM PST Monday to Friday, and choose to be connected with specialists from one of 48 available specialty groups. The specialist will call them back within two hours to discuss the patient's care. Launched at Providence Health Care in Vancouver, British Columbia in 2010, the service operates in the Vancouver Coastal Health region, offers a subset of 23 specialties to PCPs province-wide, has a roster of approximately 300 specialists and has logged over 60,000 calls.

Data Collection and Analysis

Each participating team contributed data collected by the service via two sources where available. The first source was utilization data collected by the services, and included number of cases per month, number of PCPs submitting cases, number of specialists responding to cases, number of specialties available, and specialist response time. The second source was surveys completed by PCPs at the conclusion of cases, which assessed the proportion of cases resulting in an avoided referral, and (for RACE™ services only) the proportion of cases resulting in the patient not being sent to the emergency department (ED) where an ED visit would have otherwise been contemplated.

Ethics

The Ottawa Health Science Network and Bruyère Research Ethics Boards provided ethics approval for this project.

Results

Eleven teams, including the Canadian Forces Health Services, participated in the Connected Medicine Collaborative. Of these, 5 implemented services using or adapted from the BASE™ model and 5 using or adapted from the RACE™ model, while Alberta Health Services (AHS) implemented services using both the BASE™ (AHS Calgary eReferral) and RACE™ (AHS Calgary Zone Specialist LINK) models. Canadian Forces Health Services implemented a national service using the RACE™ model, but utilization data was not available and, thus, not included in this study. The final dataset thus includes 11 services from 10 teams. Details of the participating services are available in Table 1.

Participating teams joined the Collaborative at different stages of implementation, with some having already adopted services and focusing on expansion, while others began without any prior implementation work. As a result, the date ranges for usage data provided varied considerably between services, with some teams providing data from as early as May 2017 (a month before the official start of the Collaborative) and others providing shorter datasets. The most extensive dataset ranged between May 2017 to March 2019 (Quebec), while the shortest spanned only six months between May 2018 and October 2018 (eConsult NB).

Services reported a combined total of 13,459 completed cases. Case volume ranged considerably between services, from 6,792 cases (Calgary Zone Specialist LINK) to 97 cases (eConsult NB) (Figure 1). The average number of cases per month ranged from 14.7 (BASE™ eConsult MB) to 425 (Calgary Zone Specialist LINK). Among the five eConsult services that reported on response time to answer a consult, a range of 89% (AHS Calgary eReferral) to 93% (BASE™ eConsult MB) of cases received responses within 7 days (Figure 2).

Services offered access to multiple specialty groups, with menus ranging from 5 specialties (eConsult NB) to 37 (NL BASE™). For most services, the number of available

specialties did not remain static throughout the duration of the project, but increased over time as new specialists were onboarded (Figure 3). BASE™ eConsult MB demonstrated the largest increase in available specialties, growing from 5 in December 2017 to 26 in November 2018.

Six services provided survey responses exploring the proportion of cases concluded without resulting in a face-to-face specialist referral. In three services (AHS Calgary eReferral, BASE™ eConsult MB, eConsult Quebec), the closeout survey was mandatory, resulting in 100% response rates. Response rates for the remaining services were 43% (Fraser RACE™ Team), 46% (eConsult NB), and 62% (NL BASE™). The proportion of cases resolved without the patient needing a face-to-face specialist visit ranged from 48% (eConsult Quebec) to 76% (AHS Calgary eReferral) (Figure 4).

Two phone consult services provided data on their impact on ED visits: Fraser RACE™ Team (n=171, response rate 43%), and AHS Calgary Zone Specialist LINK (n=492, response rate 7%). In the Fraser RACE™ Team service, PCPs reported that 74% of cases resulted in patients not being sent to the ED where an ED visit would have been contemplated without a remote consult. In the AHS Calgary Zone Specialist LINK service, the rate of potential ED visit avoidance was 28%.

Discussion

The Connected Medicine Collaborative successfully supported the spread and scale-up of two remote access innovations addressing excessive wait times for specialist care. All teams that participated in the program were able to implement their chosen innovation(s). The scope of implementation varied, but all teams sustained their innovations for the duration of the Collaborative and beyond, demonstrating growth in utilization. The majority of services added new specialties during the study period, suggesting recruitment efforts that extended beyond the

initial launch. Responses from PCP surveys, where available, describe encouraging impact on avoidance of unnecessary specialist and ED visits, and quick response times from specialists - often within a week. By facilitating the replication and adaptation of the BASE™ and RACE™ services across Canada, the Collaborative refutes Canada's reputation as a land of perpetual pilot projects, and suggests a promising strategy for expanding successful pilot projects beyond the regions in which they were initially implemented.

Several studies have explored the implementation barriers affecting virtual care innovations such as BASE™ and RACE™. Major barriers identified by multiple studies include increases in physician workload,(12-14) a lack of resources or funding,(13-15) and resistance to change. (12;14) The Collaborative avoided or mitigated these issues by connecting motivated teams with knowledgeable innovators and proven innovations. One of the cornerstones of the Collaborative's approach to implementation was its focus on quality improvement, change management, and facilitating coaching directly with innovators. The Collaborative put groups interested in implementing virtual care solutions in direct contact with representatives from the BASE™ and RACE™ teams, whose experience allowed them to provide solutions for challenges faced during the initial implementation and offer a sense of the initiative's trajectory. Meanwhile, the teams seeking to adopt the innovations provided an understanding of local needs and connections with regional providers that an organization imposing a top-down implementation could not easily provide. In addition to the exchange between teams and innovators, the Collaborative offered opportunities for the teams from each province to learn from each other, as many of them encountered similar challenges, and those at a later stage of implementation could provide support, guidance and change ideas to those at an earlier stage. Experienced teams could also gain invaluable input, particularly when branching out in new

directions. For instance, the Providence eCASE team had already implemented the RACE™ service, and leveraged the expertise offered through the Collaborative to develop a BASE™ service operating in tandem. Additionally, leveraging the experience of proven innovators may have helped reduce concerns of failure among teams, who could see proof of the service's prior effectiveness, and the adoption of established innovations meant that increases in workload had already been considered and addressed during initial implementation. For instance, the Champlain BASE™ eConsult service has worked with clinicians in its home region to develop a delegate model of eConsult delivery, through which PCPs fill out the information necessary for an eConsult using the clinic's existing infrastructure (e.g. an EMR) and a central administrative employee enters this information into the eConsult platform on the physician's behalf. This method has proven effective in promoting eConsult's use among participating clinics. (16) By collaborating with innovators through the CFHI Connected Medicine Collaborative, teams were able to gain access to this knowledge prior to peer-reviewed publication of the evaluation. Moreover, the direct interaction allowed for understanding of the nuance and potential pitfalls or enablers related to the specific details of executing the improvement, which can only be developed over the course of a previous implementation and evaluation process. In this way, the relational and interactive aspects of the Collaborative model were able to support the teams in ways that isolated improvement activities often lack.

The BASE™ and RACE™ services have continued to expand in the wake of the Collaborative. Services using the BASE™ model of care are now underway or operational in nine provinces/territories across Canada, and account for a combined total of more than 75,000 completed cases, while RACE™ has completed over 35,000 calls. (17) Multiple analyses of BASE™ data has shown consistently that in 40% cases, a face-to-face referral was originally

considered by the PCP but avoided based on the advice contained in the eConsult,(11) while a 2016 study of the RACE™ service found that 60% of cases resulted in the patient avoiding a face-to-face specialist visit,(18) figures that have been largely replicated by the Collaborative teams. (19) Using these numbers, we estimate that 51,000 patients had improved access to specialist care as a direct consequence of these two programs. Given the cost of specialist appointments to the health care system, coupled with the consequences of excessive wait times on patient outcomes and anxiety and the reduction in costs associated with referrals (travel costs, missed work, etc.), the benefit of these services has been considerable. Additional expansion, supported by the Collaborative and other such initiatives, would further increase their impact. The next steps for research in this area should consider examination of the factors contributing to the Collaborative's success, in order to further bolster replication.

To our knowledge, this is the first study to assess the spread and scale of virtual care innovations across Canada through a collaborative approach. However, our study has several limitations. While ten teams participated in the study, they began implementation at different times and the method, frequency and duration of their data reporting varied, making comparisons across services more difficult. The Collaborative also supported the implementation of two distinct services—BASE™ and RACE™—that, despite sharing a common goal of improving access to specialist advice, pursued different models of care delivery that make direct comparison challenging. Not all teams conducted PCP surveys, and those that did used varying methods that resulted in a range of response rates. This also raises a challenge of comparison across services, particularly between those that instituted mandatory surveys and those that made surveys voluntary.

Conclusion

The Connected Medicine Collaborative resulted in the successful implementation and spread of two innovative virtual care solutions in jurisdictions across Canada. The success of these services in multiple settings demonstrates an effective means to overcome the challenge of sustaining implementation of a virtual care innovation beyond the pilot phase, and supporting its continued spread and scale.

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Contributorship statements

CL and EK conceived of and designed the study, and contributed to the data analysis and drafting of the publication. EB led the collection, analysis and interpretation of the data for one of the teams involved in the Collaborative and contributed to the review and editing of the publication. LC also contributed to the design of the study, data collection and revision of the manuscript. MDP contributed to the data collection for one of the teams involved in the Collaborative, and reviewed and edited the manuscript. ND and CK contributed to the design of the study, review, editing and data analysis of the publication. GF was involved in designing the study, collecting and analysing data, and contributed to the review and editing of the publication. LI led data collection and analysis for one of the teams involved in the collaborative, and has edited and reviewed the publication. VN led the data collection for one of the teams involved in the Collaborative and contributed to the review and editing of the publication. AS led the data collection for one of the teams involved in the Collaborative and contributed to the review and editing of the publication..

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Competing interest declaration

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Ethics approval

This study was approved by the Ottawa Health Science Network Research Ethics Board (Protocol # 2009848-01H).

Data availability statement

Data from the study is available from the corresponding author upon reasonable request.

Transparency declaration

The lead author, CL, affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained. All authors had full access to the data and can take responsibility for the integrity of the data and the accuracy of the analysis.

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