

Tele dermatology Utilization and Integration in Residency Training Over the COVID-19 Pandemic

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DOI: 10.1177/12034754211045393
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Abstract

Background: During the 2019 Coronavirus (COVID-19) pandemic, the Division of Dermatology, University of Ottawa, adapted pre-existing local healthcare infrastructures to provide increased provider-to-provider tele dermatology services as well as integrated tele dermatology into the dermatology residency training program.

Objectives: (1) To assess the differences in utilization of provider-to-provider tele dermatology services before and during the COVID-19 pandemic; and (2) to assess dermatology resident and faculty experiences with the integration of tele dermatology into dermatology residency training at the University of Ottawa.

Methods: We conducted a cross-sectional analysis comparing provider-to-provider tele dermatology consults submitted to dermatologists from April 2019 to October 2019 pre-pandemic with the same period during the pandemic in 2020. Two different questionnaires were also disseminated to the dermatology residents and faculty at our institution inquiring about their perspectives on tele dermatology, education, and practice.

Results: The number of dermatologists completing consults, the number of providers submitting a case to Dermatology, and the number of consults initiated all increased during the pandemic period. Ninety-one percent of residents agreed that eConsults and tele dermatology enhanced their residency education, enabled continuation of training during the pandemic, and that eConsult-based training should be incorporated into the curriculum. Ninety-six percent of staff incorporated a virtual dermatology practice model, and one-third used tele dermatology with residents during the pandemic. Most staff felt there was value in providing virtual visits in some capacity during the pandemic.

Conclusions: Our study confirms that the use of tele dermatology services continues to increase accessibility during the pandemic. Tele dermatology enhances the education and training of residents and will be incorporated into dermatology residency programs.

Keywords

telemedicine, tele dermatology, electronic consultations, dermatology residency, education, COVID-19

Introduction

The province of Ontario, Canada, underwent a state of emergency and lockdown in March 2020, due to the emerging threat of the Coronavirus 2019 (COVID-19) pandemic.¹ This led to restricted or limited access to healthcare providers including specialist clinics. In Canada, access to dermatological care was already limited, with only 1.7 dermatologists per 100 000 Canadians, a total of just 634 dermatologists Canada-wide in 2019. In Ontario specifically, there were 215 dermatologists as of 2019, which is 1.5 dermatologists per 100 000 Ontarians.² In Ontario, the median wait time for a face-to-face dermatology consultation was approximately 112 days.³ The pandemic further restricted in-person medical appointments including

appointments with dermatologists and reduced clinical opportunities for trainees.

Tele dermatology, which includes electronic consultations (eConsults), enables direct communication about a specific

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patient clinical question between primary care providers (PCPs) and specialists and often reduces the need for in-person consultations. This is especially important for patients at risk of contracting COVID-19, limited by proximity to dermatologists, and the disabled or elderly with transportation and accessibility barriers.⁴⁻⁶ During the pandemic, there has been a drastic increase in the utilization of teledermatology platforms in dermatology practices and academic institutions, including implementation into dermatology residency training programs.⁶⁻¹³ The majority of these studies stem from the United States (US). There are no studies from Canada reporting changes in the utilization of teledermatology during the pandemic.

In Ontario, all PCPs have access to teledermatology through 1 of 3 services: Ontario eConsult Service, OTN-Teledermatology, and Champlain BASE (Building Access to Specialists through eConsultation) Regional Service.¹⁴ These services use different platforms to enable PCPs to attach historical information and photos and receive diagnoses and treatment plans within 7 days from dermatologists. There is no direct interaction between the dermatologists and patients. Data from the Champlain service demonstrated that the average dermatologist's response took 10-15 minutes, and 49% of these eConsults avoided in-person visits. PCPs rated the value of the Champlain service as very good or excellent in 95% of cases. The most common questions in the eConsults included diagnosis (65.2%), management (29%), and drug treatment (10.6%).¹⁵

eConsults have been recognized as a standard of practice by the Royal College of Physicians and Surgeons of Canada, and there is increasing recognition that virtual care should be included in residency programs.¹⁶ With the reduced in-person clinical learning opportunities due to COVID-19 and recognition of the need to prepare residents to use teledermatology platforms in their future careers, the Division of Dermatology, University of Ottawa, leveraged the existing Champlain BASE eConsult service to include residents in the teledermatology experience.

The aims of this study are (1) to assess the differences in utilization of Ontario eConsult services for dermatology questions prior to versus during the COVID-19 pandemic; and (2) to assess dermatology resident and faculty experiences with the integration of teledermatology at the Division of Dermatology, University of Ottawa.

Methods

Setting

Three provincial teledermatology services were included, each on a separate platform. Two of the services, the Ontario teledermatology service and the Ontario eConsult service, are accessed through the Ontario Telemedicine Network hub. The Champlain BASE service uses a SharePoint platform and is primarily available in the Ottawa region.

Utilization of Electronic Consultations During COVID-19

A cross-sectional analysis was performed comparing all electronic consults submitted by PCPs to dermatologists from April-October 2019 (pre-pandemic) to April-October 2020 (during pandemic). These teledermatology platforms enable PCPs to virtually submit questions along with supplementary documents including bloodwork, medical histories, radiologic imaging, and multimedia/digital images (pictures and videos) to 1 of 151 subspecialty groups. The dermatologist is expected to respond to the PCP within 1 week. The dermatologists have the option to provide advice, request additional information, or recommend an in-person visit. Upon responses from the dermatologists, PCPs have the option to close the encounter or reply to the dermatologist with further inquiries. Once the encounter is closed, the requesting providers complete a close-out survey if using the Ontario eConsult or Champlain BASE services. Specialists are compensated on a prorated hourly basis or fee for service.¹⁷⁻¹⁹

The following data were automatically collected and analyzed via descriptive analysis from the Ontario eConsult service and Champlain BASE services: total number of eConsults sent, number of active dermatologists per month (defined as those who participated in three or more eConsults in the 6-month intervals), number of providers who submitted one or more eConsults per month, and PCP close-out survey responses.

Incorporation Into Training Program

During the early COVID19 pandemic, the Ottawa Hospital mandated clinic closures allowing nurses and clerks to be redeployed. During this time, residents were assigned to virtual dermatology clinics. These clinics were varied in their delivery and included both telephone visits and electronic consultations. Telephone follow-ups or consults were conducted by residents with in-person review with faculty review thereafter, followed by a 3-way call back to the patient. Electronic consultation replies were either reviewed with residents after they were submitted by the faculty or while the faculty was answering consults in real-time via screen sharing virtually or in-person with a resident viewing the screen.

Resident and Faculty Questionnaire

A qualitative questionnaire was administered to all dermatology residents (postgraduate year 1-5; $n = 15$; supplementary file S1) and all active dermatologists in Ottawa ($n = 27$; supplementary file S2). The practice settings of the dermatologists surveyed included pediatrics, academic hospital, community office, and cosmetic. Both surveys were disseminated to potential participants by email. No incentives were offered. Respondents were advised that the completion of surveys was voluntary. The residents' survey asked 8 single-choice and open-ended questions about their experience with teledermatology throughout the pandemic including the platforms and methods used for teaching and



Figure 1. Total number of teledermatology consults submitted across all three Ontario services (Ontario eConsult Service, OTN-Teledermatology, Champlain eConsult BASE). (a) chronological order and (b) Differentiated between April-October 2019 compared to 2020.

their perceived educational value. An exemption letter for ethics approval was obtained from the Ottawa Hospital Research Ethics Board in light of this survey being deemed a quality improvement initiative.

Results

Utilization of Electronic Consultations During COVID-19

The number of active dermatologists completing provider-to-provider teledermatology consults, the number of unique providers who submitted a case to Dermatology, as well as the number of teledermatology consults initiated all increased during the pandemic period.

Across all 3 services, there was an average increase of 123.57 (10.7%) teledermatology consults per month during

the pandemic period April 2020-October 2020 compared to the same time period 1 year earlier (Figure 1). The number of initiated consults on the Ontario eConsult service alone more than doubled when comparing data from pre-pandemic to during pandemic, with 5058 teledermatology consults initiated during the period after the pandemic had started April 2020-October 2020, when compared to 2275 during April 2019-October 2019.

On average, there were approximately 13 (41.9%) more active and unique dermatologists who completed teledermatology consults per month across all 3 services during April 2020-October 2020 compared to April 2019-October 2019 inclusive (Figure 2).

There were 260 (38.5%) more providers who submitted a case to Dermatology per month across all 3 services during the pandemic than during the same period the year before

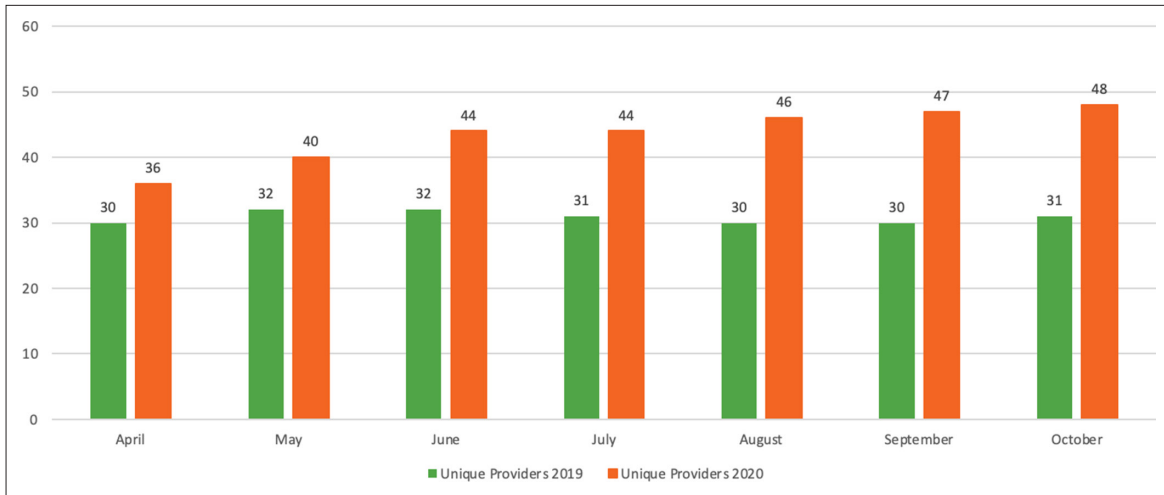


Figure 2. Total number of active dermatologists who provided 3 or more eConsults in 6 months in 2019 compared to 2020 across all three Ontario services (Ontario eConsult Service, OTN-Teledermatology, Champlain eConsult BASE).

(Figure 3). The average number of cases submitted per provider increased to 5.14 (24.9%) during the pandemic period of April 2020-October 2020 from 4.12 cases during the same period in 2019.

Resident Questionnaire

The survey was completed by a total of 13 residents (86%; 13/15). Of these 13 participants, 2 did not complete the entire survey as they had not participated in teledermatology over the COVID-19 pandemic period. Of those who did participate, the most common experiences were reviewing Provincial or BASE eConsults with dermatologists in person (63% of residents for each, $n = 7/11$), teledermatology consults or in-person assessments with dermatologist virtually

via screen sharing (63% $n = 7/11$), and telephone call follow-ups (63% $n = 7/11$). Other frequently used teaching methods included reviewing Provincial or BASE eConsults with dermatologists virtually (54% of residents for each, $n = 6/11$) and telephone consults (54% $n = 6/11$).

Overall, 91% of included respondents ($n = 10/11$) either agreed or strongly agreed with the statement “my experience with eConsults and teledermatology enhanced and added to my residency education in a positive and meaningful way,” and felt that participation in teledermatology during the first wave of the COVID-19 pandemic in Ottawa helped to make up for the decreased amount of in-person clinical encounters. Similarly, 91% ($n = 10/11$) of resident respondents felt that if given the choice, they would like to see

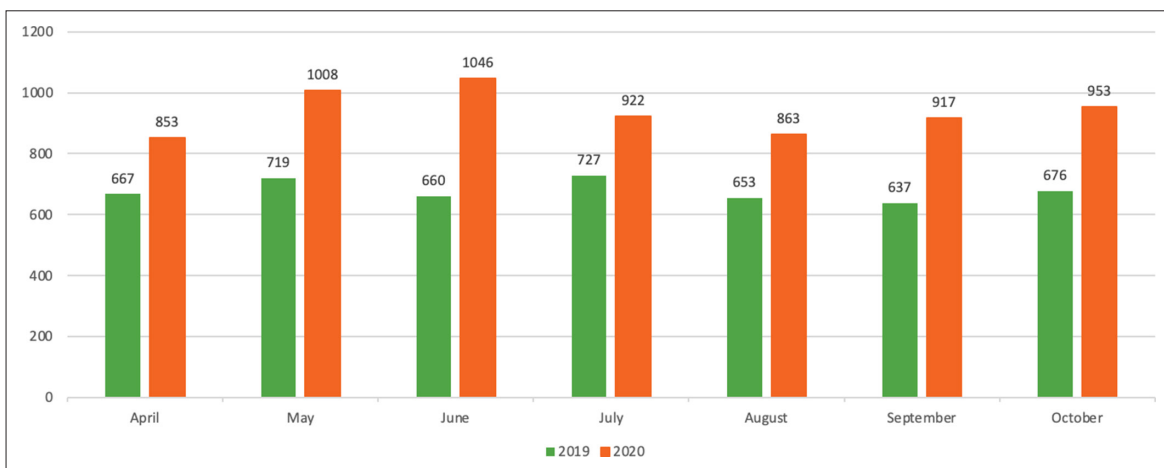


Figure 3. Number of PCPs who submitted a case to Dermatology in 2019 compared to 2020 across all three Ontario services (Ontario eConsult Service, OTN-Teledermatology, Champlain eConsult BASE).

teledermatology-based learning incorporated into the dermatology curriculum. Specifically, residents felt that teledermatology consultations with the capacity to have a resident log-on to complete, and subsequently review with staff before sign off (91%, $n = 10/11$), or with staff screen-sharing or in-person (91%, $n = 10/11$), would be more beneficial than telephone consults (36%, $n = 4/11$), or follow-ups (27%, $n = 3/11$).

Faculty Questionnaire

Twenty-one of 27 (78%) staff returned the survey fully completed. Prior to the pandemic, two-thirds of staff did not participate in any form of teledermatology. This changed with the pandemic as 20 of 21 staff incorporated virtual dermatology into their practice, and 85% anticipated keeping virtual care in some form (if billing codes remain viable). Most staff utilized phone calls for follow-ups (90%) and consults (80%) as well as emailed photographs (80%). Seven of 21 staff provided eConsults before March 2020, and 13 began after March 2020.

Seven of 20 staff who provide teledermatology consults incorporated it into their teaching during the pandemic; none had done so prior to the pandemic. Sixty-two percent of staff thought teledermatology consults should be incorporated into the curriculum, while 19% were unsure. Most staff felt that there was value in providing virtual visits in some capacity during the pandemic, though 40% felt this could not replace in-person visits, and 15% of staff did not think that virtual visits helped make up for the decreased number of in-person clinical encounters.

Many dermatologists cited advantages for patients living far from Ottawa, those with mobility issues and underlying health concerns. Most staff felt that this technology was better for follow-up visits due to the desire of dermatologists to see and feel lesions at an initial consult. The utility of teledermatology is limited to lesions themselves and many dermatologists commented that teledermatology with residents eased time pressure and sometimes allowed greater teaching.

Discussion

The COVID-19 pandemic restricts patient access to specialists, including dermatologists, and hinders the training and education of dermatology residents. Teledermatology enables PCPs to virtually consult with dermatologists and continues dermatology training and education during the pandemic. The utilization of dermatology-related eConsults increased during the pandemic, and teledermatology was well-received by dermatologists and dermatology residents, as it benefitted their practice and training, respectively.

Utilization of Electronic Consultations During COVID-19

The Champlain BASE eConsult service has previously been reported to improve access and wait times to specialty care, improve access for older persons, reduce the need for face-to-face specialist visits, be cost-effective, and lead to high physician satisfaction in many specialties.¹⁸⁻²¹ Teledermatology has allowed patients to maintain social distancing guidelines while gaining access to dermatologists virtually, between PCPs and dermatologists. Our results demonstrate that there has been an overall increase in the utilization of teledermatology in practice and residency training. There has also been increased utilization of teledermatology services by providers such as family doctors or nurse practitioners.

Prior to this pandemic, teledermatology use was less common; however, there has been a recent increase in its utilization reported in the US,⁶ which is in line with our study findings. A survey administered to American dermatologists comparing the outpatient volumes and scheduling issues during COVID-19 found that 48.6% of visits were conducted using teledermatology during the peak of the pandemic compared to 26% of visits with the reopening of dermatology practices.⁶ Our study found a total increase in usage of teledermatology of 25% across all services. Similar increases have been noted in other North American centers. Su et al. (2020) published a similar study across 12 dermatology clinics affiliated with Massachusetts General Hospital, which compared the volume of in-person visits, virtual visits, e-visits, and eConsults between April 2019 and April 2020 (pre and during COVID-19). They found that eConsults increased from 2% to 10% of all visits comparing April 2019 to April 2020, respectively.²²

Although teledermatology allows dermatologists and patients at our institution to overcome barriers such as distance, scheduling conflicts, and/or limited mobility, there are some limitations with teledermatology. Due to the COVID-19 pandemic restrictions, some patients had minimal in-person access to their primary care providers and several PCPs were consulting with their patients using telecommunication modalities themselves during the pandemic.²³ Thus, during the pandemic, more patients are capturing photographs of their own dermatologic conditions, which may have impaired the quality of the images. Furthermore, some patients may not have access to or the ability to operate mobiles, laptops, or other telecommunication devices with high-quality cameras.²⁴ It is possible that purely virtual consultations may limit diagnostic accuracy due to the lack of dermoscopy images or full-body exams.^{25,26} Thus, teledermatology should not replace in-person dermatology visits, but rather should complement them. This way, dermatologists may support their working diagnoses from the teledermatology consultations with the use of dermoscopy and full-body

exams in-clinic. Previous studies have demonstrated improved diagnostic accuracy with the use of dermoscopy versus teledermatology.^{27,28}

Incorporation of Teledermatology Into a Dermatology Residency Program

During the COVID-19 pandemic, dermatology residency programs across the world, including Canadian programs, implemented teledermatology as a means of providing care and training dermatology residents. The Division of Dermatology at the University of Ottawa is a Canadian academic institution that implemented teledermatology as means for clinical exposure early during the pandemic. Although this implementation came unexpectedly, the Royal College of Physicians and Surgeons of Canada (RCPSC) has identified teledermatology as a key competency in dermatology residency education. These requirements are set to be transitioned to a competency-based model in 2022; however, COVID-19 allowed for early trial and error implementation before it was required. Implementing teledermatology into the curriculum was encouraged early in the pandemic in March 2020, when the Canadian Accreditation Council for Graduate Medical Education permitted residents to provide teledermatology care to patients under supervision.²⁹ Our research is the first in Canada to emphasize the positive impact that training in teledermatology provides not only in clinical practice but also in the dermatology residency curriculum for resident trainees and supervisors alike.

The delivery methods of teledermatology that could be considered for this new curriculum include a variety of learning experiences that range from working remotely with screen-sharing with supervisors to working side-by-side in clinics making phone calls. The most common method used at our center was screen-sharing between resident and supervisor implementing local healthcare infrastructures that were already in place. One unexpected benefit of using these platforms was that supervisors had access to previously completed cases and could use the photos and histories of interesting or classic dermatologic presentations to challenge residents to provide a simulated “real-time” response, without the pressure of a patient or practitioner waiting. Residents concluded that, ideally, they would prefer to have their own log-in to a teledermatology system and be assigned cases to assess prior to clinic review with staff. This would enable residents to focus not only on morphology, differential diagnosis, and management, but also on formulating the best teledermatology response.

The majority of University of Ottawa residents and faculty were receptive to incorporating some form of teledermatology in either their practice or the dermatology residency curriculum. The University of Ottawa Dermatology program is now optimizing teledermatology training for dermatology residents. A survey recently conducted in the US assessing the perceived effects of COVID-19 on dermatology residents found 96% of the represented residency programs in the survey implemented

teledermatology during the pandemic with heavy resident involvement, compared to 30% pre-COVID-19.⁷

The implementation of teledermatology has been reported by some other dermatology residency programs as well. The Department of Dermatology, University of California, found that the most educational and effective ways to train dermatology residents included: (1) hosting virtual consults with residents, attendings and patients; (2) having the resident lead history and physical assessments with patients; (3) having residents discuss assessments and plans with patients; and then (4) reviewing and discussing with the attending.⁸ The Department of Dermatology, Yale School of Medicine also transitioned to a teledermatology model during the pandemic and found that similar to our results, a hybrid model consisting of store-and-forward and live interaction was superior when evaluating patient concerns including triaging lesions.⁹

Future studies could focus on the application of teledermatology as an effective tool to train Canadian medical students and to facilitate global health education.¹¹ Teledermatology may also be a useful platform for international virtual grand rounds, allowing residents around the world the opportunity to learn diagnosis and management options from dermatologists practicing in resource-limited environments. This was trialed with dermatology residents in Kabul, Afghanistan, and was noted to help increase awareness of the sociocultural determinants of skin health amongst dermatology residents who participated.¹² Teledermatology has also been implemented internationally during the pandemic. Dermatologists in the United Kingdom also offer teledermatology services ranging from triaging referrals to consulting with PCPs,³⁰ and teledermatology appointments increased from 26% of total appointments in December 2019 to 100% in June 2020. Spain and India are also using direct-to-patient or store-and-forward teledermatology during the pandemic; however, both Spain and India have reported the need for improved regulatory frameworks for these services.^{31–35}

Limitations

The utilization data of teledermatology in our study are specific to Ontario. Thus, the results may not be generalizable to other jurisdictions. Furthermore, we only analyzed the use of teledermatology and the perspectives of residents and faculty at our institution. Other Canadian dermatology residency programs were not analyzed.

Conclusion

It has been shown in many jurisdictions that the use of teledermatology increases accessibility, decreases wait times, increases throughput per clinician, and does not decrease the quality of care. Our study confirms that the use of teledermatology increases accessibility to specialty care during the COVID-19 pandemic. At our institution,

tele dermatology further enhanced the education and training experiences of dermatology residents. There is value in implementing tele dermatology training across dermatology residency programs.

Consent for Publication

Informed implied consent was obtained from the survey participants.

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.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Supplemental Material

Supplemental material for this article is available online.

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