ORIGINAL ARTICLE

Will telemedicine survive after COVID-19?

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Abstract

During the last 20 years, telemedicine has evolved in Quebec despite several barriers. We studied how a university health centre in Montreal implemented a strategy to enhance the use of telemedicine with the deployment of appropriate infrastructures, continuous training, and the use of advanced technologies, before and during the pandemic. COVID-19 accelerated the use of telemedicine by overcoming some pre-existing barriers. However, telemedicine was mainly limited to a distance consultation during the pandemic using telephone calls or videoconference. The future of telemedicine depends on lifting these obstacles. We need to better define telemedicine and in-person medicine to guarantee the quality of medical and professional acts. We propose some strategies to achieve these goals, combining cultural change, continuous training, new technologies to improve quality of care, and a vision of healthcare with telemedicine oriented on value creation.

Introduction

COVID-19 has accelerated the deployment of telemedicine in healthcare systems worldwide. During this crisis, some historical barriers were lifted that enabled health professionals and organizations to rapidly introduce telemedicine. This was used not only when distance was a critical factor but also for other reasons, like the risk of contracting and spreading the disease and decreased accessibility to care due to insufficient hospital capacity.

Based on a case study of the Centre hospitalier de l'Université de Montréal (CHUM) in Quebec, we will reflect on whether telemedicine will endure at the same level within practices, organizations, and health systems after the pandemic and share the lessons learned. We will describe how a Quebec university health centre used telemedicine prior to and during the COVID-19 pandemic. The method used for this case study is a descriptive analysis of the CHUM, which is based on an observational approach, from unstructured interviewing to direct observation and some ongoing research results. As telemedicine and telehealth are often used synonymously, we will use "telemedicine" for all health stakeholders, that is, physicians and other health professionals.

Telemedicine from 1980 to the pandemic

In the mid-1980s, Quebec healthcare workers were already using telemedicine.[1] Quebec and Canada were recognized as leaders in the field in the 2000s, ensuring equity for regional communities by using telemedicine to offer remote and accessible care. Infoway Canada is a federal agency dedicated to telemedicine development that facilitated and accelerated the adoption of modern health information and communication technologies.[2] In Quebec, four integrated health and social services networks, called "RUISSS", created their own telemedicine coordination centres to increase human and technological expertise and support the

deployment of telemedicine across health organizations and for home care, services, and education. These telemedicine centres promoted a culture of telemedicine as a factor in the continuous improvement of care and services.[3]

The CHUM is a tertiary and quaternary hospital that offers over 500,000 ambulatory and inpatient visits annually and collaborates with the RUISSS of the Université de Montréal, which is a learning health network sharing knowledge with other healthcare organizations. The CHUM introduced the culture of telemedicine among its healthcare specialists in the early 2000s. It gradually implemented telemedicine to support patient care pathways outside the hospital and to optimize resources to better respond to patient needs. The CHUM also used telemedicine for knowledge sharing, such as the ECHO[4] programs in different specialties including mental health and chronic pain management. ECHO is a guided practice model that increases workforce capacity to provide best-practice specialty care. For the RUISSS, the CHUM was used as a living lab. It was implemented to guide the development and measurement of the value of telemedicine.

To achieve this, the CHUM implemented a coordination centre that combines a 24/7 call centre with technologies to collect patient data, orient patients, and propose telemedicine solutions adapted to their needs. It also has a dedicated telehealth expert team that supports local clinicians to deploy, monitor, and measure telemedicine value. When a

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clinical sector wants to integrate remote telemedicine, this expert team meets with the clinicians and defines the new care pathway processes, which include telemedicine activities and platforms. They review the roles and responsibilities of clinicians and administrative assistants and define specific metrics with quality indicators.

Different methods were also proposed, beyond care and services, based on the needs and demand of patients and caregivers. If a clinical team wants to offer telemedicine services for ambulatory patients with complex illnesses in partnership with the primary care network, the telehealth team can propose training via different at-distance programs, such as ECHO. Telephone calls, video conferencing technologies—with or without augmented reality—and more complex remote telemonitoring platforms, such as the Internet of Things (IoT), were proposed. For example, tele-surveillance platforms are used to monitor at-home patients with chronic heart failure, diabetes, and high-risk pregnancy. These platforms are linked to clinicians, most specifically a nurse coordinator, who responds promptly when any physiological or emotional complication emerges. In all cases, telemedicine was complementary to a first in-person consultation to follow the patient's progress. Furthermore, the CHUM and its RUISSS deployed a province-wide community of practice to share knowledge, challenges, and concrete telemedicine projects. This community allowed institutions to scale up valuable telemedicine approaches and practices.

Prior to the pandemic, several obstacles hindered the acceleration of telemedicine.[5-7] The first was human nature. There was still a lack of training, support, and a fully embedded culture within all health organizations.[8] The second obstacle was financial. For doctors, who are mainly paid on a fee-for-service basis, telemedicine consultation, expertise, and training were not, for some medical specialties, admissible practices reimbursed by health authorities.[9] For healthcare professionals who were mostly employed, the challenge was more the financing of technological resources and recognizing that telemedicine care and services were equivalent to an in-person visit, which hindered the performance measurement of an organization. Legal and regulatory obstacles were still present, such as the procurement process that companies had to follow to have their technology approved by the regulatory provincial entities.[9] Challenges remained, such as concerns in medical liability,[10] and proof of the value of telemedicine on a wider scale was still limited. Lastly, ethical obstacles such as privacy and confidentiality, as well as cybersecurity issues, technological barriers (eg, bandwidth/WiFi, hardware), and data availability to external actors also hindered the spread of telemedecine.[11]

Telemedicine during the pandemic

The COVID-19 pandemic accelerated the adoption of telemedicine worldwide due to the nature of the viral disease and its impact on patients and caregivers, limiting in-person contact and reducing hospital capacity.[12,13] Indeed, there was a need to provide a safe environment for care and services, in addition to ensuring continuity of care and overcoming difficulties of offering in-person health and medical services. There were specific and new needs for COVID and non-COVID patients.

At CHUM, COVID patients were offered the use of a telemonitoring platform at hospital discharge to monitor their conditions. Patients could contact the 24/7 call centre at any time. COVID telecare offered a 14- to 21-day symptom monitoring of patients through the platform or by telephone. A research project assessed the impact of this deployment. In total, 51 patients participated in the study. Overall, the satisfaction rate regarding the quality and safety of the care services provided through the two platforms—the app and the phone line—was 80%. Over 88% of users on each platform considered the services offered by the two platforms as engaging, useful, convivial, and meeting their needs.[14] The survey also identified well-appreciated areas, such as continuity of care.[14]

For non-COVID patients, the CHUM increased the deployment of teleconsultation and telemonitoring platforms and services to ambulatory care patients, to respond to their needs particularly in the follow-up of their illness. The same structures and processes used prior to COVID were rapidly implemented to meet this objective.

Simultaneously, to better assess the needs of COVID and non-COVID patients, our coordination centre increased its human resources for the 24/7 patient call centre. The telehealth team rapidly incorporated specialties that did not use telemedicine prior to COVID and supported its deployment. The impact of this support generated an increase in telemedicine at the CHUM, from 700 telemedicine services in March 2020 to 22,500 in March 2021, and from 7 medical specialties to 23. Furthermore, to better manage intensive care unit (ICU) resources, our coordination centre managed all COVID patient beds in ICUs and inpatient wards across Quebec. They also used the expertise of qualified nurses and a medical coordinator, who applied evidence-based algorithms and a web platform to track real-time use of COVID beds across Quebec. They offered teleexpertise between medical specialists. This coordination program helped to improve resource utilization and transfer the right patient to the right place at the right time.

Telemedicine was also used inside the hospital to improve quality of care, patient and staff safety, resource optimization, and humanization of care. IoT was implemented to monitor vital signs that were connected directly to electronic medical records. The objectives were to reduce the entrance of clinicians in patient rooms, reduce the risk of contamination, increase the quality of data entry of patients' vital signs, and gain nurse time. Body sensors are currently being deployed in COVID wards to continuously monitor, at distance, oxygen saturation, and other vital signs to better detect at-risk patients who could decompensate. Patient outcomes, such as reducing decompensation of patients and increasing quality and safety, are key value indicators that will be measured.

Furthermore, nurse coordinators used telehealth internally to assess their patients remotely to accelerate discharge planning. Finally, telemedicine was used to reconnect COVID and non-COVID patients, who could not receive visits, with their loved ones. The CHUM deployed more than 250 smartphones and tablets with telecommunication tools which allowed patients and their loved ones to reconnect and interact with clinical teams. This service receives significantly high value satisfaction.[15]

Several barriers were lifted at the beginning of the COVID pandemic which highly accelerated the deployment of telemedicine. Firstly, human obstacles were tackled. The clinical teams that did not previously introduce telemedicine services were encouraged to use it, as patients could not attend in-person hospital visits. The increase in the support structure and telehealth expertise also contributed to the significant growth of telemedicine, as mentioned earlier. Financial and regulatory factors were also raised. In April 2020, the Medical College of Quebec supported the reimbursement of all telemedicine patient–clinician activities and covered the costs of telemedicine platforms for doctors. The Ministry of Health also offered secure communication platforms to all healthcare professionals in Quebec. Also, telemedicine activities for health professionals were documented and recognized as equivalent to in-person services. Furthermore, Health Canada accelerated its authorization and compliance assessment of technological platforms developed by industry. Procurement processes were also reviewed to accelerate the deployment of new telemedicine technologies within health organizations. Other barriers, such as those related to privacy and confidentiality, were partially overcome by the risk–benefit imbalance of COVID. However, cybersecurity remained a concern.

Lessons learned and perspectives

The use of telemedicine in a health crisis was a solution to maintain access and respond to the needs of patients with acute or chronic physical and mental illnesses.[16] Many barriers have been removed during COVID, as we previously mentioned. Despite those benefits, the future of telemedicine depends on several factors.

Firstly, the presence of a pre-existing culture on an individual and organizational level greatly helped. Leadership support contributed to the accelerated deployment of telemedicine during the first wave. Patient and medical satisfaction being measured and published prior to and during both waves of the pandemic was a positive factor.[17,18] Secondly, organizational structure and processes are essential to support clinicians and patients in using telemedicine, whether it be in care, training, or management. The presence of the coordination centre, combining human expertise and technologies, allowed data collection and analysis and helped orient patients and confirm the quality of care and compliance with practice standards. The telemedicine expert team was also essential in training stakeholders and supporting the rapid

deployment of telemedicine. Thirdly, technological tools facilitated the adoption of telemedicine, whether it be in care and services or training. During this pandemic, multiple technological tools were deployed in partnership with patients and clinicians, from basic telecommunication tools to IoT and telemonitoring platforms. This was possible, thanks to technical support teams that assisted clinicians and patients in their rapid experimentation, deployment, and value measurement.

Despite its acceleration and the lifting of obstacles, some limits are still observed in the large-scale deployment of telemedicine in the future. The precise role of telemedicine in medical practice is not well defined compared to in-person medicine. Most consultations were conducted by telephone or videoconference using various general or professional platforms. These tools allow an assessment of the patient based on questions to determine the history of the disease and observation of their physical and mental state. However, they do not allow for a complete physical examination such as auscultation, abdominal palpation, or measurement of vital signs or biological parameters. Telemedicine consultation was more complicated when the patient was not previously known by the physician. This limitation to the clinical examination and the results of complementary tests could be sources of error in the diagnosis or prognosis due to missing elements in the clinical reasoning.[19] This has led some medical organizations to claim that the quality of care provided by telemedicine could be lower, thus exposing the physician to an issue of medical responsibility and the patient to a false assurance that the care was complete.[20]

Some factors can help improve the quality of care through telemedicine. First of all, it is necessary to specify which medical specialties and diseases are most accessible to this practice of medicine. Today, some specialties benefit more from it,[18] such as dermatology, cardiology, or psychiatry, while others, such as surgery, benefit less or not at all. However, technological advances are progressively transforming the indications of telemedicine, such as the transfer of massive data from radiological examinations, genetic tests, and laboratory results. Thus, coordinated telemedicine networks have been developed for the diagnosis and treatment of patients in emergency departments, neurological emergencies (strokes), and cancer networks (tumour boards). Advances in technology are not the only factor that will improve the use of telemedicine. The training of stakeholders has become increasingly important, as we have observed during the pandemic.[8] The objective of this training is to increase the digital literacy of patients and the population, as well as that of doctors and healthcare professionals.

Other barriers are still present and will affect telemedicine sustainability. Some telemedicine services are still not reimbursed, such as teleexpertise, teletraining, and telemanagement. The telemedicine modalities—by phone or through a technological platform—are reimbursed equally, which does not encourage clinicians to use more advanced technologies. Moreover, the cybersecurity and privacy infringement risks are still not optimally mitigated and

remain a concern for some patients and clinicians. One major challenge that is not addressed is the economic and care viability of telemedicine practice. How do we promote a diverse telemedicine technological ecosystem adapted to various needs while being able to finance it in the long run?

Finally, telemedicine's place in the organization of health systems must be fully encouraged and evaluated to demonstrate its value in terms of access and quality of care for the population and performance gains for health organizations. The role of medical colleges and professional associations is essential in clarifying the financial and legal aspects of telemedicine to engage physicians and other clinicians. Technological developments in the field of data analysis and artificial intelligence decision-making will transform the practice of telemedicine. Similarly, the evolution of data collection technologies through increasingly diversified IoT introduces a new form of remote patient monitoring, which will in turn transform telemedicine. The collection and analysis of personal data require an evolution of laws and regulations while respecting ethical aspects and cybersecurity. This article presents a case study at CHUM, in Montreal, Quebec. Other jurisdictions have also used combined telemedicine and other technologies in new and interesting ways.[8,11,17] It may also be possible that COVID and concerns around infection control or staff fatigue, for example, have resulted in other solutions to address ongoing legal, financial, privacy, and other concerns. We are working with other jurisdictions locally and internationally to share key success factors, common barriers, and learnings.

In short, the coronavirus pandemic has accelerated and facilitated the use of telemedicine in Quebec and other countries. Many barriers have been removed during the crisis. However, the future of telemedicine depends on several factors. Although we have learned a lot from this pandemic, there remains more to be done and learned to fully adopt telemedicine in healthcare beyond the pandemic.

Acknowledgments

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