



Evaluation of Telehealth Use in Pediatric University Hospitals during the COVID-19 Pandemic

Nadar M*, Miron MC, Buithieu M, Adam C, Ouali H and Jouvét P

¹Department of Health Sciences, University of Quebec in Outaouais, Canada

²Unit for the Evaluation of Technologies and Intervention Methods in Health (UETIMH), Sainte-Justine University Hospital Center, Canada

³Department of Pediatrics, Division of Pediatric Critical Care, Sainte-Justine University Hospital, Canada

Abstract

Introduction: During the COVID-19 pandemic, a marked increase in the use of telehealth was observed. However, the recent popularity of these practices in an emergency setting has not resulted in a standardized practice framework for the hospital, leading to diverse practices. In a perspective of continuous improvement, we conducted an assessment of telehealth use within seven international pediatric centers. The aim of this study was to bring out the operational reality on feasibility, medical practice within a protective regulatory framework, and draw out the barriers and challenges in pediatric telehealth practice.

Materials and Method: The Health Technology Assessment Unit of Sainte Justine University Hospital Center conducted a benchmarking on seven international centers with similar care organization. An online questionnaire (Appendix 1) was developed for the telehealth managers of each identified center.

Results: The COVID-19 pandemic has changed the governance structure of telehealth in three institutions. Main aspects were related to software installation, organization of telehealth in the institution, and institutional use policy and legislation. As for the barriers, the availability of equipment and the use of technology were the most frequently mentioned barriers.

Discussion: several institutions changed their telehealth policies. These results can be explained by the temporary closure of some non-emergency hospital services during the pandemic in order to manage patients with COVID-19. Follow-up of patients who could not be followed up in person could be done remotely by teleconsultation. Overall, the majority of centers that responded to the questionnaire were satisfied with the management of telehealth during the pandemic.

Introduction

In December 2019, the first case with viral pneumonia due to unknown pathogen was reported in Wuhan, China. A novel coronavirus was subsequently identified as the causative agent provisionally named 2019 novel Coronavirus (2019-nCoV) and caused Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) pneumonia [1]. On March 13th, 2020, the World Health Organization (WHO) announced the official name of SARS-CoV-2 disease as the Coronavirus Disease 2019 (COVID-19). Globally, as of 8:00 am EST, July 11th, 2022, there have been 560,813,210 confirmed cases of COVID-19, including 6,373,103 deaths, reported to WHO [2]. Since then, the humankind lives an exceptional public health emergency in which the health care providers are on the front line to provide the necessary health care on different clinical levels [3]. In order to combat the transmission of the disease, several governments, including Quebec's, have implemented social distancing and quarantine measures [4]. The adoption of these measures has had an impact on the care offered by hospitals, forcing them to offer minimal care services, mainly reserved for emergency rooms [5]. The Sainte-Justine University Hospital Center (SJUHC) was no exception and had to temporarily close certain services in order to prioritize the care of patients with COVID-19.

The SJUHC developed continuous efforts throughout the pandemic to ensure remotely the follow-up of patients. Indeed, the Central Committee for the Evaluation of Medical, Dental and Pharmaceutical (CCEMDP) Procedures at SJUHC has observed a marked increase in the use of telehealth, e.g. teleconsultation and case tele-discussion since the beginning of the pandemic. However, the recent popularity of these practices in an emergency setting has not resulted in a

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*Correspondence:

Mahmoud Nadar, Department of Health Sciences, University of Quebec in Outaouais, 5 St Joseph Street, Qc J7Z 0B7, Canada, Tel: +1(514)834-9008; E-mail: mahmoud.nadar@uqo.ca

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standardized practice framework for the hospital, leading to diverse practices [6].

In a perspective of continuous improvement, we conducted an assessment of telehealth use within seven international pediatric centers. This assessment will make it possible to establish operational recommendations on feasibility, medical practice, technology management and the organization of telehealth appointments in pediatric facilities. The aim of this study was to establish operational recommendations on feasibility, medical practice within a protective regulatory framework, technology management and appointment scheduling in pediatric telehealth practice.

Materials and Methods

Participants & recruitment

In order to collect practices and recommendations from international pediatric centers, the Health Technology Assessment Unit of SJUHC conducted a benchmarking on seven international centers with similar care organization: SJUHC, the Montreal Children's Hospital, the Hospital for Sick Children (Sick kids), Toronto – Canada, the British Columbia Children's Hospital, British-Columbia – Canada, the University Hospital Center of Lille, France, the Hospices Civils de Lyon, France and Robert Debré Hospital, France. The choice of the seven centers as sites for this study was an opportunistic and reasoned choice where telemedicine activities were planned for in these establishments.

Data collection

All centers received an e-mailed questionnaire. They completed and returned it within the following week. If a center had not completed the questionnaire at that time, two reminders were sent. Each completed questionnaire reflected the center's perceptions of all the telehealth sessions occurred during the pandemic period.

Measurement

An online questionnaire (Appendix 1) was developed for the telehealth managers of each identified center. This questionnaire was designed to identify the organizations and practices in various pediatric centers similar to the SJUHC. It contained 19 questions developed to explore three components of the use of telehealth during the pandemic COVID-19 crisis. These three components are: telehealth organization, impact of the pandemic COVID-19 on telehealth use, and challenges and barriers. In the results section, the 19 questions were combined and presented in 10 main questions to

summarize the results. This study was approved by the research ethics committee of the SJUHC.

Results

We obtained responses from 5 out of 7 centers (SJUHC, the Montreal Children's Hospital, the Hospital for Kids Children (Sick kids) in Toronto, the University Hospital Center of Lille, the Hospices Civils de Lyon). For each of the three components, the results are presented by institution to allow readers to compare the results between the different responding institutions.

Telehealth organization

Question 1: Is there an organizational structure to manage telehealth in the institution?

All sites reported having a telehealth management structure. Table 1 summarizes the description of the different structures in place in the target hospitals, with the exception of the University Hospital de Lyon which did not provide an answer. The structures and memberships vary by institution, but there was a tactical or steering committee in each institution.

Question 2: How many people are designated specifically to the organization of telehealth in the institution?

The number of people dedicated to telehealth management on a full- or part-time basis varies by site (Table 2). In total, there are between 2 and 5 people working on telehealth on a full or part-time basis per facility. Sickkids Hospital in Toronto has the largest number of people dedicated to telehealth management on a full-time basis, with 4 people. The other centers have one or two full-time telehealth staff, with the exception of SJUHC which has no full-time staff and only two part-time staff.

In terms of part-time staff, the Montreal Children's Hospital has the largest number of part-time staff with [4]. The other centers have between 0 and 2 people working part-time in telehealth.

Note that these results are relative to the size of the center. Indeed, Sickkids is a large hospital and the Montreal Children's Hospital is part of the McGill University Health Centre (MUHC), which has twice as many employees as the SJUHC, for example.

Question 3: What is the role of the institutional information technology department in telehealth?

The role of the Information Technology (IT) department in the

Table 1: Description of the telehealth organizational structure of the different pediatric hospitals.

Center	Structure description
The Montreal Children's Hospital	Presence of a full-time telehealth clinical pilot who reports to the McGill University Health Center (MUHC) Partnerships Office, under the Direction of Professional Services (DPS). Presence of a Telehealth Tactical Committee that reports to the MUHC Executive Committee (accountability) chaired by the DPS. Sessions are held under the responsibility of the Assistant Director of the Partnerships Office and her clinical pilot. The technology pilot is represented by a delegate from MUHC IT services. The McGill Telehealth Coordination Centre is a close collaborator and provides assistance and expertise in the development and implementation of projects. The Tactical Committee is represented by all MUHC clinical missions and some support services.
Sickkids	Has a "virtual care strategy" component in the directions of the hospital's plan for the next five years. Has a Virtual Care Steering Committee and Advisory Committee as well as various working groups.
The University Hospital Center of Lille	Telehealth is managed by the IT department. The Connected Health program was set up at the end of 2019 and a cell was installed in early 2020. The Connected Health unit, under the coordination of the program manager, is composed of a multidisciplinary team (medical, digital, financial, legal, data protection, strategy, research, project management). It is responsible for evaluating innovations and helping project leaders to establish a roadmap for their concrete implementation.
The Hospices Civils de Lyon	No description of the organizational structure.
SJUHC	Presence of a tactical committee that includes most of the facility directors, as well as representatives from the patient partner office. This committee meets 3 to 4 times a year. There are also two telehealth managers, identified as the clinical pilot and the technology pilot. The mandates of the tactical committee and the roles of the pilots are clearly defined.

Table 2: Number of dedicated telehealth staff per facility.

Center	Full-time	Part-time
The Montreal Children's Hospital	1	4
Sickkids	4	1
The University Hospital Center of Lille	1	2
The Hospices Civils de Lyon	2	0
SJUHC	0	2

management of telehealth varies by institution (Table 3). Overall, they are involved in supplying equipment, installing software and providing technical support. The IT department at Lille University Hospital is heavily involved in telehealth, since it is involved in the three functions mentioned above, and also participates in the animation and coordination of telehealth.

Question 4: Has the current pandemic changed the governance structure of the institution, the workload and the number of people dedicated to telehealth?

The COVID-19 pandemic has changed the governance structure of telehealth in three institutions, namely SJUHC, Sickkids and the Lille University Hospital.

For SJUHC, subcommittees, more operational than the tactical committee, were created. As for the Sickkids Hospital, as soon as the pandemic was announced, the organization chose to focus on virtual visits. Approximately 90% of ambulatory visits were converted to virtual and the organization's goal was to have 30% of visits virtual after the pandemic. Concerning the Lille University Hospital, the pandemic led to an acceleration of the deployment of teleconsultations and expanded the regulatory possibilities. A dedicated deployment team was set up with the organization performance department with flexible equipment allocation.

At the Montreal Children's Hospital, the governance structure was not changed, but a significant number of people were added to meet the new needs and the virtualization project, which increased the workload from 50% to 75% (Table 4). Lille University Hospital also saw its number of people dedicated to telehealth increase by more than 100% and the telehealth workload increase from 25% to

50%. Sickkids Hospital increased its number of telehealth staff from 0 to 25% and its telehealth workload from 25% to 50%. Lyon University Hospital and SJUHC did not see an increase in the number of people working on telehealth despite an increase in workload of more than 50% and more than 100% respectively.

Question 5: Did institutions have a policy regarding telehealth prior to the pandemic? Following the pandemic?

With respect to telehealth policies/guidelines, only Sickkids Hospital did not have one prior to the pandemic and does have one now. Lille UHC, Lyon UHC and Montreal Children's Hospital noted a change in their telehealth policy during the pandemic. SJUHC had a policy before the pandemic.

Question 6: What type of training did physicians receive regarding telehealth practice during the pandemic?

The training provided to clinicians varied by institution and sometimes by sector, as in the case of the Montreal Children's Hospital, where some sectors had access to online tools and others to structured training (Table 5). The other institutions opted for training based on tools provided for individual training (SJUHC and Sickkids) or training offered on a voluntary basis (UHC of Lille and Lyon).

The aspects of the training that were addressed also varied by institution. Overall, all centers addressed the use of technology in their training. Other aspects addressed were related to software installation, organization of telehealth in the institution, and institutional use policy and legislation. The Montreal Children's Hospital and Lille UHC appear to be the centers with the most extensive training.

Question 7: What teleconsultation platforms are used by the facility?

Various teleconsultation platforms are used by the centers (Table 6). The Zoom platform is used by the Canadian hospitals (SJUHC, Montreal Children's Hospital and Sickkids). The two Quebec institutions, the Montreal Children's Hospital and the SJUHC, also use Reacts and the telephone.

While Sickkids has been an early adopter of Zoom, physicians have used social media and regional tools Guestlink and the Ontario

Table 3: Role of the IT department according to the institution.

Center	Supply of equipment	Software installation	Technical support	Other
The Montreal Children's Hospital		✓		
Sickkids	✓		✓	
The University Hospital Center of Lille	✓	✓	✓	Animation and coordination
The Hospices Civils de Lyon		✓	✓	
SJUHC	✓			Wi-Fi network

Table 4: Increase in telehealth staffing and workload during the pandemic by institution.

Center	Increase in the number of people	Increased work load
The Montreal Children's Hospital	75-100%	50-75%
Sickkids	0-25%	25-50%
The University Hospital Center of Lille	+ 100%	25-50%
The Hospices Civils de Lyon	None	50-75%
SJUHC	None	+ 100%

Table 5: Training offered to physicians by institution.

Centre	Training	Comments	Aspects of training
The Montreal Children's Hospital	Structured training for certain sectors of the institution	Differences by sector. Online tools, assistance when needed, more structured training, general presentations.	- Software installation - Use of technology - Organization of telehealth in the institution - Facility telehealth use policy and legislation
Sickkids	Tools provided for individual training	Telehealth staff available to assist clinicians	Use of the technology
The University Hospital Center of Lille	Training offered to individuals on a voluntary basis	Videos, FAQ, tutorials. 1 hour training offered: general information on teleconsultation, presentation of the tool, organizational model (appointments, secretariat, information circuit, valuation of the act)	- Use of the technology - Organization of teleconsultations (consent, appointment scheduling...)
The Hospices Civils de Lyon	Training offered to individuals on a voluntary basis		- Use of Technology - Organization of telehealth in the institution - Facility telehealth use policy and legislation
SJUHC	Tools provided for individual training		- Use of Technology - Facility Telehealth Use Policy and legislation

Table 6: Platforms used by physicians according to institutions.

Center	Zoom	Reacts	Teams	Skype	Telephone	Social Media	Other
The Montreal Children's Hospital	✓	✓			✓		Atlas Télémé, Orion
Sickkids	✓					✓	Guest link, Ontario Telemedicine Network
The University Hospital Center of Lille							Regional platform PREDICE (éditeur Maincare)
The Hospices Civils de Lyon							Regional tool Mon Sisra
SJUHC	✓	✓			✓		Atlas Télémé

Table 7: Barriers encountered during the use of telehealth according to the centers.

Center	Obstacles encountered
The Montreal Children's Hospital	- Availability of equipment
	- Use of technology Technical support
	- Other: Licensing (RSSS email issues, confusion with McGill email)
Sickkids	- Use of technology
	- Administration support
The University Hospital Center of Lille	- Use of technology
	- Other: Interface with computerized patient record
The Hospices Civils de Lyon	- Communication of information within the facility
	- Availability of equipment
SJUHC	- Communication of information within the facility
	- Training of physicians/healthcare professionals
	- Availability of equipment
	- Technical support
	- Quality of communication network

Telemedicine Network during the transition to Zoom.

In France, the University Hospital of Lille uses a regional platform, telephone and Teams, while Lyon University Hospital used only a regional platform.

All centers conducted a participant satisfaction survey (physician and patient views) on audio/video quality.

Question 8: Are teleconsultations allowed at home?

Regarding telecommuting, all centers allow physicians/professionals to perform teleconsultations from home. They have access from home (*via* a secure connection) to computerized clinical records, radiology data, laboratory data, pharmacy data and clinical notes of patients, with the exception of the University Hospital of Lille which does not offer access to pharmacy data and clinical notes.

In Quebec, this connection is provided by the General Directorate of Information Technology and communications of the Ministry of

Health and Social Services in the form of a token.

Challenges and barriers

Question 9: What are the barriers encountered in using telehealth?

The centers encountered a variety of barriers in the implementation and use of telehealth (Table 7). Overall, the availability of equipment and the use of technology were the most frequently mentioned barriers, with 3 out of 5 centers reporting barriers. Communication of information within the facility and technical support were barriers mentioned by 2 of 5 centers. Finally, physician training, administrative support, and the quality of the communication network were also encountered.

Question 10: How well was telehealth practice managed during the pandemic?

- Montreal Children's Hospital

There was great satisfaction with the work done during the crisis. The hospital chose to mobilize the entire partnership office team to implement Zoom for teleconsultations. After 7 months of implementation at the MUHC (which includes the Montreal Children's Hospital), the center was managing over 900 active licenses and operating 900 to 1,000 teleconsultation sessions per week. Equipment has been provided: 200 cameras, 150 headsets and sound bars.

For the Montreal Children's Hospital specifically, there was an average of 230 teleconsultations per week *via* Zoom and 300 *via* telephone. The pediatric sectors that use it the most were genetics, chronic pain, psychology, speech therapy and mental health.

An expanded project team was put in place and the Montreal Children's Hospital was assigned a three-month super user and a clinical co-pilot to lead its deployment. A set of practice guidelines for the clinician and for the patient was put in place, as well as virtual tools on the intranet. Measures to ensure compliance with good practice and safety are in place. Some clinicians were involved in new telehealth projects, including one in the emergency room, and the telehealth management team was collaborating with research teams.

- Sickkids Hospital in Toronto

The center was pleased with its telehealth management during the pandemic. In less than a week, project managers were tasked with implementing virtual visits throughout the facility, including billing, electronic medical record integration and appointment scheduling. Legal and data privacy departments were also involved in this process. Additional equipment was provided to clinics that were not equipped with cameras and speakers.

The use of WhatsApp and Guestlink were temporary, while the entire institution was migrated to Zoom (which is implemented in the Epic electronic medical record). A dashboard was available to track the number of teleconsultations and face-to-face consultations by clinic, clinician or department.

- Lille University Hospital

Satisfied with the management of telehealth during the pandemic with the implementation of the team dedicated to the deployment of teleconsultations.

- Lyon University Hospital

With the provision of exceptional resources from their software solution deployment teams, this institution was able to quickly organize training for physicians wishing to use teleconsultation. They were limited by difficulties in supplying equipment (cameras and headsets). Overall, the efforts put in place during the first wave of the pandemic allowed for the implementation of regular teleconsultations in many departments.

SJUHC

The use of the telephone facilitated teleconsultation. The SJUHC encountered difficulties in using video-consultation platforms due to technical and organizational issues. Implementation was suboptimal due to the urgency of the pandemic and lack of resources for deployment. The rules of good practice were not always well respected.

Discussion

The questionnaire sent to the different centers to collect telehealth practices was well received. We had good participation with 5 out of 7 centers. The current pandemic context as well as the workload related to the pandemic may explain the lack of response from the other centers.

All centers reported having a telehealth management structure, with a tactical committee in each facility. The number of people dedicated to telehealth varied greatly among the centers. Sickkids and the Montreal Children's Hospital are the centers with the most human resources, while the SJUHC is the least equipped with only two dedicated part-time staff. The IT department was involved at different levels depending on the center, but it participated in the implementation of telehealth in all centers.

The COVID-19 pandemic changed the telehealth governance structures of 3 centers out of 5. The latter, as well as the Montreal Children's Hospital, increased the number of people dedicated to telehealth by more than 75% during the pandemic. In addition, several institutions changed their telehealth policies. These results can be explained by the temporary closure of some non-emergency hospital services during the pandemic in order to manage patients with COVID-19 [7-8]. Follow-up of patients who could not be followed up in person could be done remotely by teleconsultation.

Training in the use of telehealth varies from center to center. Some centers offered online tools and others offered more structured training with presentations. The training also covered various aspects of telehealth.

The teleconsultation platforms used also differed from center to center. The Canadian centers used Zoom as well as the telephone, whereas the French centers use regional platforms. Teleconsultations were permitted by all centers. Physicians had secure access to patient data from home so they could conduct teleconsultations and take notes.

Regarding the obstacles encountered in the implementation of telehealth, there was an unavailability of equipment. Indeed, the sudden overall increase in teleconsultation appointments during the pandemic created a high demand for computer equipment and therefore disruptions in supply. Technical support was also a barrier mentioned by several centers. The adoption of new technology required the implementation of technical support for users. Given the urgency of the situation, this may not have been done optimally or

may be in the process of being implemented at the various sites [9,10].

Overall, the various centers that responded to the questionnaire were satisfied with the management of telehealth during the pandemic, with the exception of the SJUHC. For the SJUHC, deployment was rapid with the use of the telephone for teleconsultations, but implementation was suboptimal. This can be explained by the difference in reaction between centers to the urgent context of the pandemic as well as the lack of resources for deployment. The documentation of this delay helped in the reorganization of telehealth in SJUHC.

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