



Emerging Evidence

An Evaluation of Cardiology Virtual Care During the COVID-19 Pandemic

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ABSTRACT

A survey evaluation was conducted in the division of cardiology at a tertiary care academic centre to assess barriers, facilitators, acceptability, and feasibility of virtual care during the COVID-19 pandemic. Survey responses from 26 health care providers, 45 patients, and 2 caregivers showed that virtual visits (primarily by telephone) were feasible and generally acceptable to most respondents. Key opportunities for improvement included availability of easy-to-use video platforms, space and equipment in clinics, provision of information to patients before visits, and appropriate selection of patients for virtual visits. Results will inform optimization of virtual care during this pandemic and beyond.

RÉSUMÉ

Une enquête a été menée dans la division de cardiologie d'un centre universitaire de soins tertiaires pour évaluer les facteurs qui entravent ou facilitent les soins virtuels pendant la pandémie de COVID-19, ainsi que l'acceptabilité et la faisabilité de ces soins. Selon les réponses fournies par 26 dispensateurs de soins de santé, 45 patients et deux aidants sondés, les visites virtuelles (principalement par téléphone) sont réalisables et généralement acceptables pour la plupart des répondants. Les principales possibilités d'amélioration concernent l'offre de plateformes vidéo conviviales, l'espace et l'équipement dans les cliniques, la fourniture de renseignements aux patients avant les visites et la sélection appropriée des patients pour les visites virtuelles. Les résultats permettront d'optimiser les soins virtuels au cours de cette pandémie et par la suite.

The development of Web-based platforms and technologies has created new opportunities for health care providers to interact with their patients virtually instead of in person. The use of virtual clinical visits has the potential to improve health outcomes, reduce inefficiencies, and reduce costs to both the health care system and the patient (eg, time off work, parking fees); however, challenges are often encountered with respect to technological limitations, acceptability by both patients and health care providers, and incorporation of virtual care into established clinical routines.^{1,2} Results from randomized controlled trials comparing virtual care with traditional modalities of care found variable effects on health outcomes, acceptability, and costs to the health system across different clinical conditions and patient populations.¹ Data from a Canadian survey indicate that 41% of patients would like to

have video visits with their providers,³ but only 10.3% of specialist providers reported that their patients can meet with them virtually,⁴ suggesting that there is room for improvement in availability of virtual care options.

The COVID-19 pandemic resulted in the mandated use of virtual care in place of in-person visits for all nonurgent outpatient clinical encounters. This situation provided a unique opportunity to assess virtual care for a wide range of outpatients and health care providers that may not have otherwise opted for virtual visits. A recent systematic review of studies investigating the role of virtual options for preventing, diagnosing, treating, and controlling diseases during the COVID-19 pandemic concluded that virtual care has the potential to address many challenges during the pandemic; however, barriers and facilitators to use of virtual visits were not thoroughly examined.⁵ A study was initiated to evaluate the barriers and facilitators, acceptability, and feasibility of virtual visits at a tertiary hospital corporation during the COVID-19 pandemic from the patient, caregiver, and health care provider perspective. For the purposes of this evaluation, virtual visits included visits between health care providers and patients or caregivers, conducted by either video or telephone. This work also supports the postpandemic sustainability of a virtual care model

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Ethics Statement: The research reported has adhered to the relevant ethical guidelines.

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in the Canadian health care setting. This brief report presents the survey results from the evaluation in the clinical cardiology services.

Methods

The evaluation was led by a collaborative team including the hospital corporation's knowledge translation program, the Centre for Evidence-Based Implementation (CEBI), and a virtual care task force. Three surveys were drafted to capture the perspectives of patients, caregivers, and health care providers. Survey questions addressed use of technology, experience with virtual visits, and preferences for future visits and were in the form of multiple selection, Likert scale, matrix, or open-ended questions. Domains of the Consolidated Framework for Implementation Research informed the selection of survey questions to identify key barriers and facilitators to virtual care⁶ (ie, Intervention Characteristics, Outer Setting, Inner Setting, Characteristics of Individuals, and Process). The CEBI team developed a draft list of survey questions associated with these domains. The draft questions were then reviewed by a privacy officer, patient and family advisors, and staff in the division of cardiology in which the evaluation was piloted. Following feedback from these reviewers, some items were deleted to reduce duplication and focus on key quality improvement topics, whereas others were added to address perspectives of all stakeholders. Wording of survey questions was modified for clarity as required. The project team approved the final list of survey questions. Electronic surveys were created in REDCap, hosted at Public Health Research Institute.⁷ Survey responses were designed to be anonymous.

Health care provider surveys

Invitations to complete the electronic health care provider survey were distributed to all health care professionals within the division of cardiology (physicians, physician trainees [fellows and residents], nurses, and allied health professionals) by e-mail using administrative distribution lists. Invitations included a summary of the evaluation project, a link to the survey, and a script to use during virtual visits to inform patients that they might be contacted to complete a survey about their visit. A reminder e-mail was sent after 1 week.

Patient and caregiver surveys

Information about patients who participated in recent virtual visits with a health care provider in the division of cardiology was extracted by information technology services staff from an electronic health record system, including patient names, contact information (phone number and e-mail address), date of virtual visit, type of cardiology clinic, and type of virtual visit (telephone or video conference). Patients were randomly sampled using a random number generator from a list of consecutive patients who participated in a virtual visit with a health care provider in 5 clinical units over a 2-week period, with the goal of selecting a representative sample. Patients for whom an e-mail address was available were to receive an invitation by e-mail to complete an electronic survey, whereas those without e-mail addresses were invited to complete the survey by telephone. All selected patients had the option to complete the survey online or over the

telephone. Caregiver surveys were administered only when the patient was unable to complete the patient survey (either alone or with assistance). Telephone surveys were administered by CEBI staff, with the CEBI staff member completing the online survey during their conversation with the patient or caregiver. If the patient or caregiver did not answer the phone, a generic voicemail message was left with instructions on how to complete the survey. Patients or caregivers provided consent online (electronic survey) or verbally (telephone survey), and they could withdraw from the survey at any time.

Data analysis

Descriptive analysis of quantitative data was conducted using Excel and SPSS software. Qualitative results from open-ended survey questions were summarized and organized into themes using a basic content analysis approach. Differences in means (gender and age) between the patient sample and the larger sample of patients from which they were drawn were calculated using independent samples *t* tests for equality of means.

Knowledge translation

Health care provider and patient/caregiver survey results were distributed to the division director of cardiology, clinical managers, the virtual care task force evaluation subgroup and a virtual care operations team. Results were reviewed to identify key opportunities for action at the hospital corporation, division, or clinic level to improve health care provider and patient/caregiver experience with virtual visits in the future.

Ethics and privacy

The need for a full ethics review was waived by the manager of the Hamilton Integrated Research Ethics Board because the work was considered quality assurance/improvement. The protocol was reviewed by the Hamilton Health Sciences (HHS) Chief Privacy Officer to ensure that privacy legislation was followed.

Results

Health care provider survey results

Of the 70 survey invitations distributed to health care providers in the Division of Cardiology, 26 were completed (37% response rate; 13 staff physicians, 8 physician trainees, 2 nurse practitioners, 2 allied health professionals, and 1 practical nurse).

Background information. Before the COVID-19 pandemic, 73% of respondents had never held virtual visits with their patients, but 46% reported that they now held them more than 2 times per week. Seventy-seven percent of respondents conducted these virtual visits by telephone only, whereas 4% used video only, and 19% used a mix of telephone and video visits (Fig. 1). Of those who used video, 50% used the Ontario Telehealth Network platform. Providers who used telephone only, most commonly indicated that they preferred this over video because it was less complicated, they believed their patients preferred telephone, or because they did not have easy access to a computer with

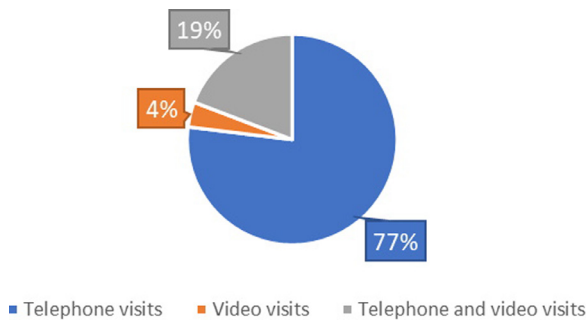


Figure 1. Types of virtual methods used by health care providers for virtual visits (n = 26).

video capabilities. Most respondents (73%) indicated that less than 25% of their patient visits were conducted in person in a clinic.

Virtual visit experience. Forty-six percent of health care providers indicated that the average length of their virtual visits was 11-15 minutes, whereas 42% reported an average length of more than 15 minutes, and 12% reported an average length of 5 to 10 minutes. Forty-six percent of respondents reported that they had experienced technical issues that significantly affected their interaction with a patient (eg, dropped call, video freezing, muffled audio, background noise). Seventy-seven percent reported that there were tasks that they needed to do for their patients but could not during a virtual visit, including physical assessment of the patient (eg, assessing heart failure patients, vital signs, diagnostic tests), review of medication lists, and online requisitions and referrals. Most health care providers responded that they were somewhat satisfied, satisfied, or very satisfied with the virtual formats they used for virtual care (38%, 35% and 4%, respectively; Fig. 2); however, 23% indicated that they were uncomfortable or very uncomfortable with conducting virtual visits. Fifty-seven percent indicated that virtual visits were more efficient than in-person visits, and 19% indicated that they were equally efficient.

Health care provider preferences. If given the choice after the COVID-19 pandemic was over, 35% of respondents indicated that they would continue to use virtual visits as an alternative to in-person visits for most first visits with new patients, and 58% indicated that they would use virtual visits for most patient follow-up visits (Fig. 3). The preferred type of virtual visit was telephone for 81% of respondents and video for 19% of respondents. Health care providers stated that virtual visits were least appropriate for patients with heart failure, patients with communication challenges (eg, language barrier, cognitive impairment, hearing impairment), very sick/critical patients, new referrals, patients requiring physical examination to determine management, and patients who are deteriorating or experiencing frequent symptom changes. Specific tasks that were reported as impossible or challenging during a virtual visit included assessing fluid status, vital signs, reviewing medication list, auscultation, electrocardiogram, response to exercise, online requisitions and referrals, and observing nonverbal communication.

Health care providers made suggestions for optimizing virtual care at HHS. Suggestions included providing an easy-to-use and patient-friendly video platform; providing dedicated rooms or cubicles with the technology and equipment required for virtual visits (eg, desks, dual monitors, computers with video capabilities, and telephone); adopting an electronic medical record to facilitate the process of providing prescriptions, entering billing, and ordering tests; and establishing a consistent process for administrative staff to confirm patients' virtual visits, provide instructions about how to prepare for the visit, and reconfirm patients' contact information.

Patient/caregiver survey results

Of the 194 patients and caregivers invited to complete the survey, responses were received from 45 patients and 2 caregivers (24% response rate). Respondents were representative of patients in the dataset from which the sample was drawn (all patients who had virtual visits in the relevant cardiology clinics within the sampled period) with respect to mean age (65.6 years vs 64.7 years in the dataset; $P = 0.704$), but there was a trend toward overrepresentation of women in the respondents

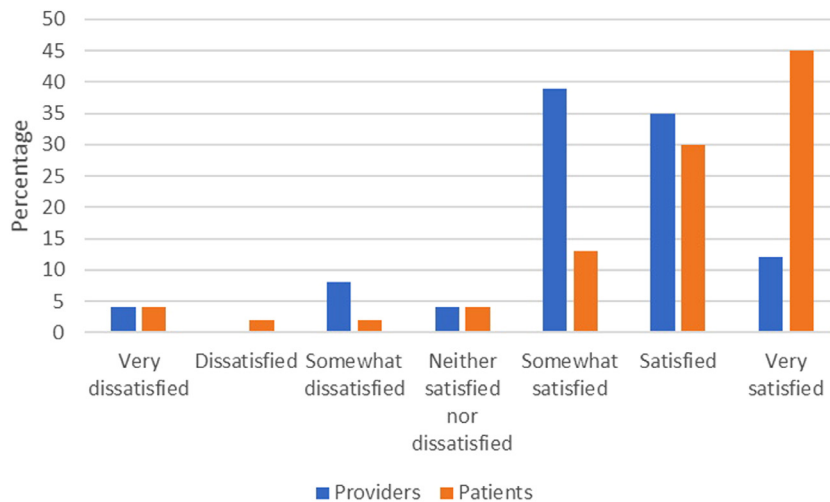


Figure 2. Level of satisfaction with virtual format of visits.

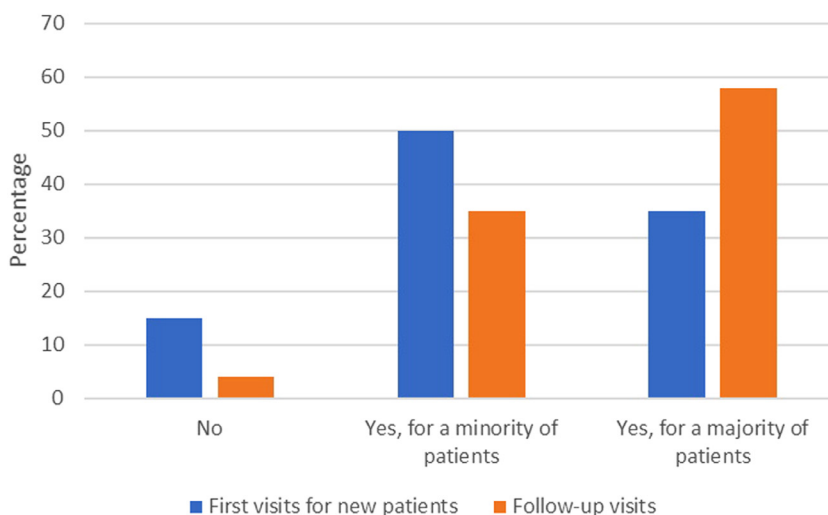


Figure 3. Providers' planned use of virtual visits after the COVID-19 pandemic.

compared with patients in the dataset (55.3% women vs 44.3% in the dataset; $P = 0.101$). All patients and caregivers were contacted by telephone to complete the survey.

Technology. Most patients and caregivers indicated that they had easy access to a device with a camera and internet access (81%). Of those with easy access, most respondents stated that they were somewhat comfortable (16%), comfortable (34%), or very comfortable (26%) with using this device; however, 28% of respondents indicated that their ability to use technology would be a concern or challenge if they were to have a visit by video. Sixty-eight percent of patients and caregivers had previously participated in at least 1 video call for any purpose (eg, medical visit, social, business).

Virtual visit experience. The virtual visit for which the patient or caregiver completed the survey was the patient's first virtual visit for 43% of respondents. Seventy-nine percent of respondents had virtual visits by telephone and 21% by video. Eighty-four percent of patients participated in the virtual visit alone, whereas 16% were accompanied by another person. Most visits were between 5 and 15 minutes long (53%), whereas 40% were longer than 15 minutes, and 6% were shorter than 5 minutes. Eleven percent of respondents indicated that there were technical problems during the visit that significantly affected their interaction with the health care provider. Most respondents reported that they were satisfied with the virtual format of the visit (13% somewhat satisfied, 30% satisfied, 45% very satisfied), whereas 9% indicated that they were somewhat dissatisfied, dissatisfied, or very dissatisfied (Fig. 2). Ninety-six percent stated that they felt their personal information was kept confidential, as it would have been with an in-person visit.

Patient and caregiver preferences. For medical visits after the COVID-19 pandemic is over that do not require in-person assessments, 40% of respondents indicated that they would prefer primarily virtual visits (with the option of an in-person visit if necessary), whereas 32% would prefer a mix of in-person and virtual visits, and 28% would prefer all in-

person visits. The following factors were considered concerns or challenges by some patients and caregivers when attending in-person visits: availability of transportation (36%), cost of transportation (34%), time required for in-person visits (40%), availability of accompanying person (9%), and infection control (40%). Sixty-four percent of patients and caregivers stated that they would prefer a telephone visit to a video visit if an in-person visit were not possible, whereas 15% would prefer a video visit, and 21% had no preference. Sixty-eight percent of respondents indicated that they would be interested in using an electronic tool (eg, e-mail, smart phone app) to share nonurgent health information with their health care provider.

Several respondents provided suggestions for improving virtual care at HHS. Key suggestions included receiving updates if the virtual visit was going to be delayed, beginning virtual visits with a clear introduction of the health care provider leading the visit, and providing additional instructions about the video platform and the health care provider's expectations of the patient before a video visit.

Discussion

Results of the survey evaluation within an academic division of cardiology indicate that care could be successfully continued virtually when the availability of in-person visits was significantly reduced during the COVID-19 pandemic. Although initial observations and guidance on the use of virtual visits in the area of cardiology during the COVID-19 pandemic have been published by other groups,^{8,9} this study is unique, as both patient and provider insights from a formal evaluation have informed optimal virtual care during the pandemic and beyond. Although a previous study focused on practical obstacles to video conferences for cardiology care,⁸ this is the first study to describe the facilitators, barriers, acceptability, and feasibility of telephone visits, which were used by most providers, and it provides new insight into patient and provider preferences, satisfaction, and patient selection specific to the cardiology setting.

Most health care providers, patients, and caregivers indicated that they were satisfied with the virtual format used for

their visits, and many stated that they would like to continue providing or receiving care through virtual means beyond the pandemic. Key benefits of virtual visits include increased efficiency compared with in-person visits for health care providers and the elimination of concerns about availability and cost of transportation, travel time, and infection control associated with in-person visits.

Despite the availability of video platforms for virtual visits (eg, Ontario Telemedicine Network [OTN]), most virtual visits continued to be provided by telephone. The preference for telephone over video visits by many health care providers and patients demonstrates the need to ensure the sustainability of this mechanism of virtual care after the pandemic is over. However, there may be an opportunity to use video visits at a greater rate. Although many health care providers believe that their patients prefer telephone visits to video visits, most patients indicated that they had easy access to the required devices, and most stated that they were comfortable with using them. Current barriers to the use of video visits include lack of required space and equipment, challenges with functionality of available video platforms, and ease of their use alongside other administrative and clinical platforms during a video visit. These barriers must be addressed before uptake of video visits increases.

Survey results provide some insight into the appropriate selection of cardiology patients for virtual visits beyond the pandemic. Feedback suggests that health care providers should provide in-person visits for patients with heart failure, with communication challenges, who are very sick, and requiring physical assessment to inform choice of care options. When patients require specific tasks that are impossible or challenging during a virtual visit, including assessing fluid status, vital signs, auscultation, electrocardiogram, and response to exercise, in-person visits are preferred when possible. In addition, results indicate that new patients may be less appropriate for virtual visits than patients having follow-up visits, although 35% of providers reported that they would continue to provide virtual visits to most new patients after the pandemic is over.

Although this study uniquely provides insight into the patient and health care provider perspectives of virtual care, there were limitations to the evaluation. Voluntary survey completion by patients, caregivers, and providers may have resulted in response bias. E-mail addresses were not available from the records of any cardiology patients; therefore, the patient and caregiver sample sizes were limited by the capacity of the research team to call patients by telephone. Patients who attended in-person visits were not evaluated for comparison because, at the time of the evaluation, the only patients being seen in person were those who had been preassessed at a virtual visit and deemed to require an in-person visit (eg, high-risk patients). Information about average time spent on in-person visits was also not available for comparison. This evaluation represents only a point in time, limiting the generalizability of the results given that this is an evolving field. Ongoing prospectively collected data from other clinical areas in the HHS hospital corporation will allow for more robust analyses. In addition, new means of remote patient monitoring in cardiology are becoming more readily available and warrant ongoing implementation and evaluation.

This survey evaluation successfully provided information regarding key barriers and facilitators, acceptability, and feasibility of virtual care within the division of cardiology at a tertiary hospital corporation during the COVID-19 pandemic. The evaluation has informed our corporation's Virtual Care Operations Team to enable local changes around administrative processes and infrastructure to optimize the use of virtual care and ultimately improve patient, health care provider, and health system outcomes both during the pandemic and beyond. Specific next steps for quality improvement include further development of cardiology patient selection criteria for virtual visits, availability of space and suitable equipment for providers, electronic medical record system capabilities to facilitate virtual care, and improved communication and instructions for patients before their appointments. Future evaluations of virtual visits in the cardiology division and ongoing evaluations in other clinical areas will improve the generalizability of these findings and assess whether these improvements result in better experiences and outcomes for patients and health care providers.

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Disclosures

The authors have no conflicts of interest to disclose.

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