






# Telemedicine in the era of coronavirus 19: Implications for postoperative care in cardiac surgery

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## Abstract

**Background:** The Coronavirus 19 (COVID-19) pandemic forced an unprecedented shift of postoperative care for cardiac surgery patients to telemedicine. How patients and surgeons perceive telemedicine is unknown. We examined patient and provider satisfaction with postoperative telehealth visits following cardiac surgery.

**Methods:** Between April 2020 and September 2020, patients who underwent open cardiac surgery and had a postoperative appointment via telemedicine were administered a patient satisfaction survey over the phone. Time of survey administration ranged from 1 to 4 weeks following their appointment. Surgeons also completed a satisfaction survey following each telemedicine appointment they conducted.

**Results:** Fifty patients were surveyed. Of these, 36 (72%) had a postoperative appointment over the telephone, and 14 (28%) had a postoperative appointment via video-chat. Overall, patients expressed satisfaction with the care that they received via our two telemedicine modalities (mean Likert scale agreement 4.8, SD 0.5). Despite this, 46% of patients said they would prefer their next postoperative appointment to be via telemedicine even if there was not a stay-at-home order in place. All surgeons surveyed reported (*agree/strongly agree*) that they would prefer to see their postoperative patients using telemedicine.

**Conclusions:** These findings highlight acceptability of continuing telemedicine use in the postoperative care of cardiac surgery patients.

## KEYWORDS

COVID-19, postoperative care, telemedicine

## 1 | INTRODUCTION

Telemedicine refers to the use of electronic communication platforms to provide healthcare when patient and provider are separated by distance.<sup>1</sup> Although telemedicine has been in place for more than 50 years,<sup>2</sup> its implementation in surgical care is recent.<sup>3</sup> Work done by the Veteran Affairs looking at telemedicine use in the postoperative

care of patients in ambulatory surgery found low incidence of complications and a high degree of patient satisfaction.<sup>4</sup> Subsequent studies on implementation at different levels of care across various surgical subspecialties, including transplant surgery,<sup>5</sup> vascular surgery,<sup>6,7</sup> urology,<sup>8</sup> orthopedic surgery,<sup>9</sup> and pediatric surgery<sup>2</sup> shared these findings; common themes include patient satisfaction with care, diminished travel costs, less time missed from work, and avoidance of

the hospital. Despite these findings, widespread adoption of telemedicine has been slow due, in part, to variable insurance coverage of telehealth visits, patient concerns regarding telemedicine security,<sup>10</sup> and physician concerns surrounding medical liability.<sup>11</sup>

The current COVID-19 global pandemic has forced an unprecedented shift of all nonurgent surgical care to telemedicine. To facilitate this transition, the United States Congress passed the CARES Act to increase the funding of telemedicine. Since its issuance, multiple rounds of funding have been awarded to the COVID-19 Telehealth Program, removing a large barrier to the widespread implementation of telemedicine in surgery.<sup>12</sup> However, little is known about the use of telemedicine in the postoperative care of surgical patients. To our knowledge, there is no published data on the use of telemedicine in cardiac surgery. Thus, the purpose of this study is to delineate patient and provider perspectives on the efficacy, efficiency, and applicability of telemedicine in the postoperative care of patients who have recently undergone cardiac surgery.

## 2 | PATIENTS AND METHODS

### 2.1 | Patient population and study design

This was a cross-sectional study of a convenience sample conducted at Yale New Haven Hospital (YNHH), a tertiary care center. The aim of this study was to describe key attitudes of patients and providers regarding the efficacy of telemedicine for postoperative care following cardiac surgery. Telemedicine appointments were conducted by staff cardiothoracic surgeons via telephone or video-chat. To protect patient privacy, surgeons used the video-chat platform on our Electronic Medical Record (EMR), EPIC. To operate this system, patients needed to download the "MyChart" app, complete an "eCheck-in" one day before their appointment, and sign a consent in the app before being able to access the video-chat.

All cardiac surgery patients who completed a postoperative telephone visit (TV) or a video visit (VV) from April to the end of September 2020, were considered for analysis. Patients who declined the survey, who did not answer our calls after three attempts, who required an interpreter, or who were under the age of 18 were excluded. Participation was voluntary, and verbal consent was obtained before each interview. Patient recruitment was halted after 50 patient responses were reached. The Yale Institutional Review Board approved this study.

### 2.2 | Survey design

We designed a study-specific questionnaire using questions from previously validated or published questionnaires on patient satisfaction and the utility of telemedicine.<sup>8,13</sup> Questions followed the framework outlined by the National Institute of Medicine for the evaluation of telemedicine visits.<sup>1</sup> Perceived utility, confidentiality, efficiency, and satisfaction were assessed using a five-point Likert

scale (1 = *strongly disagree* → 5 = *strongly agree*; 1 = *poor* → 5 = *excellent*). We also assessed anticipated costs if patients had traveled to YNHH and affiliated hospitals for their postoperative care. If patients provided a range of estimated cost or distance traveled, the high end of the range was recorded for analysis. Finally, we allowed for comments and suggestions.

Patients were administered a 24-point questionnaire over the phone within one month of their telemedicine appointment. Questionnaires were administered by two medical students who were responsible for making the phone calls and recording responses in Qualtrics, a secure online survey platform ([www.qualtrics.com](http://www.qualtrics.com)). Participating staff cardiothoracic surgeons completed a 20-point questionnaire on Qualtrics at the conclusion of each visit to assess their satisfaction with and thoughts on the efficacy and efficiency of the encounter. Patient and provider surveys were completed anonymously and not matched.

The sample of patients was organized according to date of their postoperative appointment and divided between the medical students. If the patient did not answer our first phone call, two more calls were performed on subsequent days. If patients provided a home and mobile phone number, both were tried. Patients were not surveyed if they did not answer any of the three calls at either number, or the dialed number did not match the patient.

### 2.3 | Statistical analysis

Likert scale responses were analyzed quantitatively by expressing them as whole numbers.<sup>14</sup> The responses were summarized by the frequency and percentage of those who "strongly agreed," along with the average and standard deviation for the rating. Data were analyzed using Microsoft Excel (Version 16.38; Microsoft Corporation). Comments and suggestions were transcribed verbatim and analyzed qualitatively by arranging them into prominent themes.

## 3 | RESULTS

A total of 141 calls were made to 87 patients who underwent cardiac surgery and had a postoperative telemedicine appointment. Of these, 50 completed the survey, giving a response rate of 57.5%. Twenty-five patients had a Coronary Artery Bypass Graft (CABG), five had an aortic aneurysm repair, 11 had an open valve replacement, and 9 had another type of open cardiac surgery.

The 16 survey statements evaluating the quality of the clinical encounter as well as patient perception and satisfaction with the clinical encounter, along with the corresponding Likert scale responses, are in Table 1. Patients described the ability of their surgeons to diagnose problems and the thoroughness and skill of their surgeon in treating their conditions as good to excellent (mean Likert scale score of 4.3, SD 0.9). They rated the information given to them from their surgeon about their illness and treatment as good to excellent (mean Likert scale score of 4.8, SD 0.4). Patients expressed

**TABLE 1** Survey questions and responses regarding the quality of telemedicine encounter as well as patient satisfaction with their visit

|  | Telephone visit | Video visit   | Total         |
|--|-----------------|---------------|---------------|
| I felt comfortable using my phone/EPIC's video-chat feature for my postoperative appointment.  | <i>n</i> = 36   | <i>n</i> = 14 | <i>n</i> = 50 |
| Strongly agree, <i>n</i> (%)   | 29 (81)         | 11 (79)       | 40 (80)       |
| Mean Likert Score (SD)   | 4.6 (0.7)       | 4.4 (0.9)     | 4.6 (0.8)     |
| I was able to hear my surgeon clearly.   | <i>n</i> = 36   | <i>n</i> = 14 | <i>n</i> = 50 |
| Strongly agree, <i>n</i> (%)   | 30 (83)         | 13 (93)       | 43 (86)       |
| Mean Likert Score (SD)   | 4.8 (0.5)       | 4.7 (0.8)     | 4.8 (0.6)     |
| I was able to see my surgeon clearly.  |                 | <i>n</i> = 14 |               |
| Strongly agree, <i>n</i> (%)   |                 | 13 (93)       |               |
| Mean Likert Score (SD)   |                 | 4.9 (0.3)     |               |
| I could easily communicate with my surgeon over the phone.   | <i>n</i> = 36   | <i>n</i> = 14 | <i>n</i> = 50 |
| Strongly agree, <i>n</i> (%)   | 29 (81)         | 11 (79)       | 40 (80)       |
| Mean Likert Score (SD)   | 4.6 (0.7)       | 4.7 (0.6)     | 4.6 (0.7)     |
| My surgeon's ability to diagnose problems, the thoroughness of examinations, and their skill in treating my condition over the phone was...  | <i>n</i> = 34   | <i>n</i> = 14 | <i>n</i> = 48 |
| Excellent, <i>n</i> (%)  | 25 (74)         | 8 (57)        | 33 (69)       |
| Mean Likert Score (SD)   | 4.5 (0.8)       | 4 (1.0)       | 4.3 (0.9)     |
| The information I was given by my surgeon about my illness and treatment over the phone/EPIC's video-chat platform was...                    | <i>n</i> = 34   | <i>n</i> = 14 | <i>n</i> = 48 |
| Excellent, <i>n</i> (%)  | 27 (79)         | 11 (79)       | 38 (79)       |
| Mean Likert Score (SD)   | 4.7 (0.6)       | 4.6 (0.7)     | 4.8 (0.4)     |
| The coordination of my postoperative care and recovery by the doctors on my medical team was...  | <i>n</i> = 34   | <i>n</i> = 14 | <i>n</i> = 48 |
| Excellent, <i>n</i> (%)  | 24 (71)         | 11 (79)       | 35 (73)       |
| Mean Likert Score (SD)   | 4.6 (0.7)       | 4.4 (0.9)     | 4.5 (0.7)     |
| My visit was on-time and efficient.  | <i>n</i> = 36   | <i>n</i> = 14 | <i>n</i> = 50 |
| Strongly agree, <i>n</i> (%)   | 31 (86)         | 11 (79)       | 42 (84)       |
| Mean Likert Score (SD)   | 4.8 (0.4)       | 4.8 (0.4)     | 4.8 (0.4)     |
| I believe that my medical encounter was conducted in a confidential manner.  | <i>n</i> = 36   | <i>n</i> = 14 | <i>n</i> = 50 |
| Strongly agree, <i>n</i> (%)   | 30 (83)         | 14 (100)      | 44 (88)       |
| Mean Likert Score (SD)   | 4.8 (0.4)       | 5.0 (0.0)     | 4.9 (0.3)     |
| I felt comfortable sharing sensitive and/or personal information with my surgeon through the phone/EPIC's video-chat feature.                | <i>n</i> = 36   | <i>n</i> = 13 | <i>n</i> = 49 |
| Strongly agree, <i>n</i> (%)   | 30 (83)         | 13 (100)      | 43 (88)       |
| Mean Likert Score (SD)   | 4.8 (0.4)       | 5.0 (0.0)     | 4.9 (0.3)     |
| I believe my surgeon is able to do their job even if they weren't able to conduct an in-person physical examination during this appointment. | <i>n</i> = 36   | <i>n</i> = 14 | <i>n</i> = 50 |

(Continues)

TABLE 1 (Continued)

|   | Telephone visit | Video visit | Total     |
|---|-----------------|-------------|-----------|
| Strongly agree, n (%)   | 24 (67)         | 11 (79)     | 35 (0.7)  |
| Mean Likert Score (SD)  | 4.4 (0.9)       | 4.3 (1.1)   | 4.3 (0.9) |
| Overall, I was satisfied with my appointment.   | n = 36          | n = 14      | n = 50    |
| Strongly agree, n (%)   | 28 (78)         | 12 (86)     | 40 (80)   |
| Mean Likert Score (SD)  | 4.7 (0.5)       | 4.8 (0.4)   | 4.8 (0.5) |
| Overall, I am satisfied using my phone/EPIC's video-chat platform for postoperative appointments.   | n = 36          | n = 14      | n = 50    |
| Strongly agree, n (%)   | 21 (58)         | 11 (79)     | 32 (64)   |
| Mean Likert Score (SD)  | 4 (1.1)         | 4.6 (0.7)   | 4.2 (1.0) |
| Considering the cost and time commitment of my appointment, I would choose to meet with my surgeon over the phone/using EPIC's video-chat platform in the future. | n = 36          | n = 14      | n = 50    |
| Strongly agree, n (%)   | 12 (33)         | 6 (43)      | 18 (36)   |
| Mean Likert Score (SD)  | 3.3 (1.3)       | 3.5 (1.4)   | 3.4 (1.3) |
| I would prefer my next postoperative appointment to be using my phone/EPIC's video-chat platform even if there is not a stay-at-home order in place.              | n = 36          | n = 14      | n = 50    |
| Strongly agree, n (%)   | 12 (33)         | 5 (36)      | 17 (34)   |
| Mean Likert Score (SD)  | 2.8 (1.6)       | 2.9 (1.5)   | 2.8 (1.5) |
| I would have been open to a postoperative visit using my phone/EPIC's video-chat platform even if there was not a stay-at-home order in place.                    | n = 36          | n = 14      | n = 50    |
| Strongly agree, n (%)   | 11 (31)         | 4 (29)      | 15 (30)   |
| Mean Likert Score (SD)  | 2.6 (1.6)       | 2.8 (1.6)   | 2.6 (1.6) |

Note: Mean Likert Scores are shown for each question, categorized by telephone, video, and all visits.

satisfaction with the care they received (mean Likert scale agreement 4.8, SD 0.5), and felt that their surgeon was able to do their job even if they could not conduct an in person physical exam (mean Likert scale agreement 4.3, SD 0.9). Despite overall satisfaction with the care received via telemedicine, only 46% of patients (12% TV and 39% VV) said they would prefer their next postoperative appointment to be via telemedicine even if there was not a stay-at-home order in place. Only 42% of patients (18% TV and 60% VV) said they would have considered using telemedicine for their postoperative care if there was not a stay-at-home order in place.

Responses to the five questions regarding costs associated with attending an appointment at YNH are in Table 2. Patients who answered these questions said they would need to travel an average of 33.2 miles one-way (43.2 min) to attend their postoperative appointment in-person. This was associated with an average cost of \$9 (SD 18.7). The average time participants anticipated having to take off from work to attend a postoperative appointment in person was 0.2 days. Patients neither agreed nor disagreed with the statement "Considering the cost and time commitment of my appointment, I would choose to meet with my surgeon over the phone/using EPIC's

video-chat platform in the future" (mean Likert scale agreement 3.4, SD 1.3).

Of the patients that preferred in-person visits, 93% reported an average travel distance of 24.3 miles (34.5 min), and an average cost, reported by 67% of these patients, of \$12. Of the patients who said they preferred telemedicine visits, 79% reported an average travel distance of 23 miles, 96% reported an average travel time of 32.5 min, and 87% reported an average cost of \$6.70.

A total of 19 patients (38%) made comments and suggestions, shown in Table 3. We organized these into six separate themes: general comments, technical limitations, difficulty operative technology, technical difficulties, positive experience, and preference for in-person visits. Under "technical limitations," patients described feeling like communication with their surgeon was negatively impacted by telemedicine. Under "difficulty operating technology," patients described frustration with MyChart. Finally, under "preference for in-person visits," patients cited feelings of comfort when seeing their surgeons in-person.

There was a high level of surgeon satisfaction (agree/strongly agree) with their ability to remotely access relevant imaging before

**TABLE 2** Survey questions and responses regarding time and monetary costs saved by having a telehealth visit

|   | Telephone visit | Video visit | Total       |
|---|-----------------|-------------|-------------|
| Considering the cost and time commitment of my appointment, I would choose to meet with my surgeon over the phone/using EPIC's video-chat platform in the future. | n = 36          | n = 14      | n = 50      |
| Strongly Agree, n (%)   | 12 (33)         | 6 (43)      | 18 (36)     |
| Mean Likert Score (SD)  | 3.3 (1.3)       | 3.5 (1.4)   | 3.4 (1.3)   |
| Estimated one-way travel time to Yale for an appointment  | n = 32          | n = 14      | n = 46      |
| Mean time, min (SD)   | 43 (29.3)       | 34.7 (35.1) | 43.2 (30.8) |
| Median time, min (IQR)  | 40 (40.0)       | 30 (26.25)  | 35 (38.8)   |
| Approximate distance you would have traveled to Yale for an appointment   | n = 30          | n = 13      | n = 43      |
| Mean distance, miles (SD)   | 32 (27.3)       | 35.9 (25.4) | 33.2 (26.4) |
| Median distance, miles (IQR)  | 30 (38.8)       | 20 (30)     | 30 (37.5)   |
| Estimated total travel/lodging costs for an appointment at Yale   | n = 27          | n = 11      | n = 38      |
| Mean cost, \$ (SD)  | 5 (6.7)         | 19.9 (31.6) | 9.1 (18.7)  |
| Median cost, \$ (IQR)   | 0 (5.0)         | 10 (15.0)   | 5 (10)      |
| How many days of work would you have to miss to attend an appointment at Yale?  | n = 29          | n = 14      | n = 43      |
| Mean time, d (SD)   | 0.1 (0.3)       | 0.2 (0.4)   | 0.2 (0.3)   |
| Median time, d (IQR)  | 0 (0)           | 0.25 (0.5)  | 0 (0.25)    |

Note: Patient preferences are expressed as Mean Likert Scores. Responses are categorized by telephone, video, and all visits. Abbreviation: IQR, interquartile range.

evaluation (100%), to provide more expeditious care to their patient compared to an in-person visit (96%), and their diagnostic accuracy (96%). However, surgeons reported less satisfaction with their ability to both evaluate their patient's surgical incision and conduct a physical exam over the phone compared to over video (mean Likert scale agreement 3.8TV vs. 4.4 VV and 3.4 TV vs. 4.4VV respectively). Despite this, all surgeons surveyed reported (*agree/strongly agree*) a preference for telemedicine in the care of postoperative patients.

## 4 | CONCLUSIONS

In this survey of 50 patients who underwent cardiac surgery, telemedicine postoperative follow-up was perceived as highly satisfactory. Even so, more than half of the patients (54%) reported a preference for in-person visits. Interestingly, these patients also reported longer travel times, distances, and costs compared to those patients with a preference for telemedicine postoperative visits. However, varying response rates for each question preclude our ability to calculate significance in these differing values.

Our qualitative analysis provides some insight, showing that patients who preferred in-person visits felt that they needed in-person comfort and reassurance from their surgeon. Indeed, research shows that as much as 20%–30% of patients who have undergone or are about to undergo cardiac surgery experience significant physical and psychological distress due to uncertainty about their surgery.<sup>15,16</sup> This distress is found to remain high in patients postoperatively,

particularly 2–4 months following hospital discharge.<sup>17</sup> Thus, while in-person care is unlikely to ameliorate patient distress following cardiac surgery, it likely provides reassurance.

Patients also expressed frustration with their inability to operate MyChart for VV, forcing them to switch to TV. If patients used a video-chat platform they were already familiar with, more might opt for VV for their post-op care. Recently, the Office for Civil Rights (OCR) and the Department of Health and Human Services (HHS) has issued a notice allowing health care providers to use popular video chat applications for telemedicine visits.<sup>18</sup> This notice should facilitate patient utilization of VV while also limiting physician liability over privacy concerns.

The emergence of the COVID-19 pandemic has resulted in unprecedented changes in the delivery of surgical care. Before this pandemic, the use of telemedicine in cardiac surgery was virtually unheard of. Consequently, patient evaluation of care is imperative for cardiac surgeons to ascertain whether they are meeting patient expectations, expose areas that require improvements, and set standards for future use. This is especially needed in light of a resurgence in COVID-19 cases, making it likely that telemedicine is here to stay in cardiac surgery.

Our study is significant because: (1) To our knowledge, it is the first to evaluate the use of telemedicine in postoperative care following cardiac surgery; (2) with the ongoing pandemic and resurgence of COVID-19 cases, our study shows that patient perception of the quality of care delivered is not compromised by the use of telemedicine, supporting continued use; and finally (3) Despite

**TABLE 3** Results of free-response question asking patients to elaborate on any additional feedback

## General comments

- I would be open to using the phone but I want the option to come in if needed based on [what is discussed on] the phone call.
- Surgeons should have more face-to-face contact with their patients. I saw him once at the bed when I woke up from surgery and that was it.
- Worked out in my case, but if I had any physical situation that I wanted my physician to evaluate, I'd prefer a hands-on visit. If I had any oozing or something like that, I'd prefer to see my doctor in person.
- For a long-distance patient, this serves a real purpose, particularly if your physician can at least see your face to evaluate you, it's more reassuring. I still prefer a real personal [in-person] visit where physical assessment can be used.

## Technical limitations

- In person visit is superior by far for my type of surgery. Wish [my surgeon] checked my vitals. [My surgeon] could only see my scar through the screen which wasn't the same. Would have preferred an in-person visit.
- It's good in some respects, but not totally convinced it's the right way especially for postoperative appointments. I guess it depends on the surgery. But sometimes I think you can see more on a person's face and their interactions than on the phone. The phone conversations are wonderful but they need to be limited.

## Difficulty operating technology

- I was supposed to have a video-chat but I couldn't get it to work. I was very thankful that [my surgeon] called me on the phone and I was able to text him a picture of my sternotomy wound, but I wish I could have done the appointment via video-chat. Technology is difficult for my age group...I wonder if there is a way to make it easier to use the technology.
- Hard to figure out how to set up, but once I set it up it was great.
- It would have been better if I could have used the video options. I didn't feel computer savvy to do it myself but I didn't know who to contact [for help setting up a video-chat].

## Technical difficulties

- Difficulty hearing my surgeon on his end but otherwise great experience.

## Positive experience

- Everything went well
- They did pretty good
- Telehealth is a wonderful idea, even in the absence of quarantine.

## Preference for in-person visits

- Nothing beats coming in to see the doctor. It's extremely comforting to see the doctor especially immediately after the surgery so the doctor can actually take a look at the scar.
- I've enjoyed using telemedicine for all my appointments because it is easier, especially since my husband is working. There are some questions I feel like for the postoperative appointment that I would have been more assured getting answers in person. But I don't feel that way about my other appointments. Doing things on the phone sometimes I forget to ask specific questions that I feel like I would have remembered in person. For that first post-op, I think it's important to see him [my surgeon] in person but after that it's fine over the phone.
- The visiting nurses are limited in what they can do when they visit, and I would much rather come in to the doctor to see him in person. I had a very serious operation and I don't think a third party (a nurse) is enough. I want to see my doctor in person.
- It's ridiculous that we have to pay parking for clinic visits, [but I] still prefer in-person visits for communicating difficult information.

- Under the circumstances of COVID, tele-health was beneficial. It would have been horrible without it, but I prefer to be touched/see my doctor face-to-face. If I had the option and I knew I was going to be safe, I would go into the office. But if I had a packed worked schedule and couldn't get away, I would use tele-health. If they were to get rid of tele-health it would be a big mistake.
- The appointment went well and I understand the COVID restrictions but I would much rather prefer to meet a doctor in person.

Note: Patient responses are thematically organized

other studies showing high preference for repeat use of telemedicine<sup>8,19,20</sup> ours shows continued preference for in-person visits.

Limitations to our study include our utilization of a convenience sample without a control group, which introduces sampling bias,<sup>21</sup> and limits the generalizability of our findings. However, current restrictions due to the COVID-19 pandemic preclude our ability to randomize patients and form a control group that would attend post-op visits in person. Additionally, survey delivery was another limitation; disadvantages to the use of survey delivery via telephone include interviewer bias, lower response rates and the inability for respondents to use visual help when filling out their survey.<sup>22</sup> Finally, because patients were surveyed 1–3 weeks following their appointment, responses may have been impacted by recall bias.

Moving forward, we plan to address patient hesitancy surrounding telemedicine for their postoperative care. Per our qualitative analysis, patients expressed frustration with the technical quality of their visit. Given the OCR and HHS expansion of available video-chat platforms for telemedicine visits, we aim to examine if the type of video-chat platform impacts patient opinion on future use of telemedicine for their post-op care. To further facilitate use of the video-chat option, we plan to administer step-by-step instructions on how to set up and troubleshoot problems with the chosen video-chat platform at the time of appointment scheduling to overcome described technical difficulties. Moreover, we will explore patient outcomes following their 30- and 60-day telemedicine post-op visits. Positive outcomes from this analysis should reassure hesitant patients.

In conclusion, our results revealed overall patient satisfaction with the technical quality, visit confidentiality, efficiency, and quality of patient education delivered during their telemedicine visit. Despite this, patients expressed a preference for future postoperative visits to be conducted in person if possible. Thus, while these findings highlight the acceptability of continuing telemedicine use in the postoperative care of cardiac surgery, further studies are warranted to delineate patient continued preference for in-person visits. With recent resurgences of COVID-19 cases, telemedicine is likely to become the primary modality for cardiac surgeons to provide care for their patients outside the hospital environment. As such, it is critical that we continue to explore the utility of telemedicine through research aimed at improving the delivery of this service.

**CONFLICT OF INTERESTS**

The authors declare that there are no conflict of interests.



## ETHICS STATEMENT

This study received approval from the Yale Institutional Review Board. Verbal consent or written consent was obtained from participants before participation in this study.

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