Received: 7 July 2020 | Revised: 8 March 2021 | Accepted: 17 March 2021

DOI: 10.1002/lio2.552

ORIGINAL RESEARCH

Laryngoscope Investigative Otolaryngology

Rapid telehealth implementation into an otolaryngology practice during the COVID-19 pandemic

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Abstract

Objective: Report outcomes of rapid implementation of telehealth across an academic otolaryngology-head and neck surgery department during the COVID-19 pandemic.

Methods: This is a retrospective, single-institution study of rapid deployment of telehealth during the COVID-19 pandemic. Characteristics of patients were compared between those who agreed and those who declined telehealth care. Reasons for declining telehealth visits were ascertained. Characteristics of telehealth visits were collected and patients were asked to complete a post-visit satisfaction survey.

Results: There was a 68% acceptance rate for telehealth visits. In multivariable analysis, patients were more likely to accept telehealth if they were being seen in the facial plastics subspecialty clinic (odds ratio [OR] 59.55, 95% confidence interval [CI] 2.21-1607.52; P = .015) compared to the general otolaryngology clinic. Patients with Medicare (compared to commercial insurance) as their primary insurance were less likely to accept telehealth visits (OR 0.10, 95% CI 0.01-0.77; P = .027). Two hundred and thirty one patients underwent telehealth visits; most visits (69%) were for established patients and residents were involved in 38% of visits. There was an 85% response rate to the post-visit survey. On a scale of one to ten, the median satisfaction score was 10 and 99% of patients gave a score of 8 or higher. Satisfaction scores were higher for new patient visits than established patient visits (P = .020).

Conclusion: Rapid implementation of telehealth in an academic otolaryngology-head and neck surgery department is feasible. There was high acceptance of and satisfaction scores with telehealth.

Level of Evidence: 3.

This work has not been presented at any meetings.

KEYWORDS
COVID-19, novel coronavirus, otolaryngology, telehealth

1 | INTRODUCTION

Telehealth is a scalable technology which allows for remote delivery of healthcare by using audio and video interaction between healthcare providers and patients.[1] Even prior to the coronavirus disease 2019 (COVID-19) pandemic, multiple evolving trends in telehealth usage were noted; these include increasing access (while reducing costs), expansion of conditions and situations deemed appropriate for telehealth usage, and migration of telehealth to patient's homes and mobile devices.[1] Telehealth has been shown to reduce travel costs for patients[2] while allowing for delivery of care with high levels of patient satisfaction.[1,3,4]

COVID-19 is a novel respiratory illness caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which has spread rapidly around the world and has been designated as a pandemic by the World Health Organization (WHO).[5] Since the primary mode of transmission is thought to be through respiratory droplets and transmission can occur by asymptomatic patients, there is high potential for human-to-human transmission, especially in situations where people are in close proximity.[6-9] For those reasons, there was widespread implementation of social distancing measures and "stay at home" orders throughout the United States.[10] This resulted in decreased patient access and utilization of healthcare for non-COVID-19 reasons, including non-urgent outpatient clinic visits and surgical procedures, especially early in the COVID-19 pandemic.[11-14]

In outpatient clinic settings, social distancing was achieved by reducing providers, decreasing clinical schedules, and reducing personnel in clinic rooms, all of which result in fewer possible episodes of human-to-human contact and subsequent risk of viral transmission. In addition to these measures, there has been increasing interest and utilization of telehealth given social distancing recommendations and "stay at home" restrictions during the COVID-19 pandemic.[15,16] Telehealth availability has been expanded by the Centers for Medicare & Medicaid Services (CMS), Medicaid in many states, and several private insurers during the COVID-19 pandemic to allow patients to access the healthcare system via telehealth from home.[17] This allows preservation of social distancing measures while allowing for continued clinical care as prior telehealth regulations required patients to present to a local clinic or other facility to access telehealth.

In this study, we report outcomes of rapid adoption and implementation of telehealth across an academic otolaryngology-head and neck surgery department to demonstrate provider acceptance and relatively rapid learning curve. The outcomes of interest were patient acceptance of telehealth as a substitute for in-person clinic visits, characteristics of telehealth visits, and patient satisfaction after telehealth visits. This information is relevant to other otolaryngology-head and neck surgery practices as they incorporate telehealth as an option for their patients.

2 | MATERIALS AND METHODS

Expedited IRB approval was obtained for this study from the Springfield Committee for Research Involving Human Subjects of Southern Illinois University School of Medicine (SIU SOM). Under the expedited protocol, exemption from patient consent was approved by the IRB and patient consent was not obtained for the study. The infrastructure for telehealth visits (ie, technology, telehealth staff support, compliance/billing support) was in place at SIU SOM prior to March 2020, but was not utilized in the Department of Otolaryngology-Head and Neck Surgery. The institutional plan prior to the COVID-19 pandemic was to incorporate telehealth to departments and service lines gradually, with a timeline of 6 months for each department or service line. After declaration of COVID-19 as a pandemic, with resultant social distancing guidelines and restrictions on non-urgent care, the institutional leadership developed a paradigm to shorten the 6-month deployment plan to 1 week to ensure access to care for the patients and communities we serve.

Individual providers decided which conditions and patients they would consider seeing via telehealth based on their clinical judgment. Departmental nursing staff contacted potential patients to assess whether they would be willing to use telehealth. During this telephone call, patients were asked about whether they had access to a computer and/or smartphone, internet or data access, an email address, and interest in receiving care through telehealth. Those who met all of the above criteria were offered telehealth appointments. Those who were unable to participate in telehealth or declined telehealth visits were offered an in-person clinic appointment within 1-2 weeks (if they had an urgent clinical need) or an in-person clinic appointment at a later time (if the provider felt that the visit could be safely delayed). Characteristics of all patients who were contacted from April 6-10, 2020 for possible involvement in a telehealth visit were recorded. Patients who declined involvement in telehealth were asked specifically why they were not interested or able to use telehealth.

The goal was to conduct all telehealth visits with audio and video using Cisco Webex Meetings (San Jose, California), a Health Insurance Portability and Accountability Act (HIPAA) compliant application for online videoconferencing. If patients were unable to access or use Cisco Webex Meetings, alternative applications (Doximity Dialer Video [San Francisco, California] or FaceTime [Apple Inc, Cupertino, California]) were used. In some cases, only audio (ie, telephone call) was used due to technical limitations. The first telehealth visit in the SIU SOM Department of Otolaryngology-Head and Neck Surgery occurred on March 31, 2020. Data from telehealth visits were collected from March 31, 2020 to May 29, 2020. This included demographic data on patients, reasons for the visits, billing data, and any

TABLE 1 Characteristics of patients who were offered telehealth visits

Patient and visit characteristics	All patients who were offered telehealth visit (n = 82)	Patients who agreed to telehealth visit (n = 56)	Patients who declined telehealth visit (n = 26)	*P*-value
Age, median (IQR)	36 (9-61)	41.5 (10-61.5)	25 (6-60)	.807
Sex				.437
Female	43 (52%)	31 (55%)	12 (46%)	
Male	39 (48%)	25 (45%)	14 (54%)	
Subspecialty clinic[a,b]				
General otolaryngology	41 (50%)	27 (48%)	14 (54%)	—
Facial plastics	9 (11%)	8 (14%)	1 (4%)	.247
Head and neck	14 (17%)	8 (14%)	6 (23%)	.749
Laryngology	6 (7%)	5 (9%)	1 (4%)	.648
Pediatric otolaryngology	12 (14%)	8 (14%)	4 (15%)	1.000
Sinus/skull base	0	0	0	—
Provider				.314
Advanced practice provider	35 (43%)	26 (46%)	9 (34%)	
Physician	47 (57%)	30 (54%)	17 (65%)	
Visit type				.266
Established	63 (77%)	45 (80%)	18 (69%)	
New	19 (23%)	11 (20%)	9 (31%)	
Primary insurance[c]				
Commercial	**30 (37%)**	**25 (45%)**	**5 (19%)**	—
Medicaid	32 (39%)	20 (36%)	12 (46%)	.066
Medicare	**19 (23%)**	**11 (20%)**	**8 (31%)**	**.049**
Self-Pay/uninsured	0	0	0	—
Unknown	1 (1%)	0	1 (4%)	.194
Presence of secondary insurance				.074
Yes	14 (17%)	7 (12.5%)	7 (27%)	
No	67 (82%)	49 (87.5%)	18 (69%)	
Unknown	1 (1%)	0	1 (4%)	
Reasons for declining telehealth visit[d] Preference for in-person visit Lack of technology Uncomfortable with technology Reason for visit resolved Financial or insurance concerns Other No reason provided	—	—	9 (35%) 3 (12%) 3 (12%) 2 (8%) 0 7 (35%) 4 (15%)	—

Note: Characteristics that were statistically significant ($P < .05$) are shown in bold.
Abbreviation: IQR: interquartile range.
[a]General otolaryngology was the comparison group for the statistical analyses.
[b]No patients for the sinus/skull base clinic were screened for telehealth visits during the dates of inclusion.
[c]Commercial insurance was the comparison group for the statistical analyses.
[d]Some patients selected more than one reason for declining participating in a telehealth visit and some patients did not provide any reasons.

technical problems that occurred. After telehealth visits that occurred from March 31, 2020 to April 28, 2020, patients were contacted via telephone to provide an overall satisfaction score (from 1 to 10) for the visit. They were also asked whether there was anything that would have made the visit better and whether they would continue using telehealth for their healthcare.

The Shapiro-Wilk W test and Shapiro-Francia W' test were used to assess for normal distribution among the continuous variables (patient age and satisfaction scores). These tests showed that these variables were not normally distributed. Therefore, the continuous variables were described using median and interquartile range (IQR); comparisons between groups were made using Wilcoxon ranksum

and Kruskal-Wallis tests. Categorical variables were compared between groups using chi-squared tests and, when appropriate, Fisher's exact tests. Logistic regression models were fit for multivariable analysis. StataSE 14 64-bit (College Station, Texas) was used for statistical analyses.

3 | RESULTS

Eighty-two patients who were deemed appropriate for telehealth visits were contacted between April 6-10, 2020 to assess whether they would accept a telehealth visit with an otolaryngologist-head and neck surgeon. Of these patients, 56 (68%) agreed to have a telehealth visit. Characteristics of patients who were screened for telehealth are shown in Table 1. Medicare as primary insurance was associated with higher chance of refusing a telehealth visit (P = .049). None of the other characteristics were associated with accepting or refusing telehealth visits in the univariate analyses (see Table 1).

A multivariable regression model was fit with telehealth acceptance as the outcomes of interest (see Table 2). Patients were more likely to accept telehealth if they were being seen in the facial plastics subspecialty clinic (odds ratio (OR) 59.55, 95% confidence interval (CI) 2.21-1607.52; P = .015). Patients seeing a physician (compared to an advanced practice provider) (OR 0.05, 95% CI 0.003-0.75; P = .030) and those with Medicare (compared to commercial insurance) (OR 0.10, 95% CI 0.01-0.77; P = .027) as their primary insurance were less likely to accept telehealth visits. Patients being seen in the laryngology (OR 20.31, 95% CI 0.76-544.52; P = .073) and pediatric otolaryngology (OR 19.23, 95% CI 0.94-394.62; P = .055) subspecialty clinics were more likely to accept telehealth visits, although these differences did not achieve statistical significance.

Between March 31, 2020 to May 29, 2020, 240 patients were scheduled for telehealth visits during the time frame of the study. This number of patients who were scheduled for telehealth visits is different from the number specified above who agreed to telehealth because of the date ranges for inclusion in this study (and because some patients preferred an appointment outside the date ranges for inclusion in this study). Of these 240 scheduled appointments, 231 telehealth visits took place and 9 patients (4%) no-showed for their appointments. Characteristics of these telehealth visits are shown in Table 3. The age distribution was bimodal and shown in Figure 1. Peak frequency of telehealth visits occurred for patients whose age was 0-5 and 60-65. Most visits (69%) were for established patients and residents were involved in 38% of visits. Current procedural terminology (CPT) billing ranged from levels 1 through 5 and also included postoperative visits and virtual check-ins. The most common billing levels were 3 (52%) and 4 (23%). Characteristics of new patient and established patient visits were compared (Table 3). Patients being seen for new telehealth visits were younger than patients being seen for established telehealth visits (median age: 35 vs 48, respectively, P = .016). Patients seen in the head and neck subspecialty clinic were more likely to be established patients (compared to the general otolaryngology clinic; P = .013). Physicians utilized telehealth more often for established patients compared to advanced practice providers (P = .038).

TABLE 2 Multivariable logistic regression analysis of characteristics associated with accepting telehealth visits

Patient and visit characteristics	OR (95% CI)	*P*-value
Age	1.03 (0.99-1.07)	.106
Sex		
Female (baseline)	—	—
Male	1.33 (0.40-4.48)	.640
Subspecialty clinic		
General otolaryngology (baseline)	—	—
Facial plastics	**59.55 (2.21-1607.52)**	**.015**
Head and neck	4.69 (0.32-68.56)	.259
Laryngology	**20.31 (0.76-544.52)**	**.073**
Pediatric otolaryngology	**19.23 (0.94-394.62)**	**.055**
Provider		
Advanced practice provider (baseline)	—	—
Physician	**0.05 (0.003-0.75)**	**.030**
Visit type		
Established (baseline)	—	
New	0.85 (0.22-3.21)	.805
Primary insurance		
Commercial (baseline)	—	—
Medicaid	0.34 (0.08-1.34)	.123
Medicare	**0.10 (0.01-0.77)**	**.027**

Note: Characteristics that were statistically significant (P < .05) or showed a trend toward significant (P < .10) are shown in bold.
Abbreviations: CI, confidence interval; OR, odds ratio.

Of the 89 patients who successfully completed telehealth visits and were asked to provide feedback on the telehealth visit via a post-visit phone call, 76 responded (85% response rate). On a scale of one to ten, with ten being the highest satisfaction, the median satisfaction score was ten (n = 75, since one patient refused to provide a satisfaction score, but provided qualitative feedback) and 99% of patients gave a score of eight or higher (Figure 2). Satisfaction scores were compared among patient and visit characteristics (Table 4). Satisfaction scores were higher for new patient visits (88% had a score of 10) than established patient visits (59% had a score of 10) (P = .020) (Figure 3). No other characteristics were associated with patient satisfaction scores.

Of the patients who completed the post-visit survey, 15 patients (20%) had suggestions for improvement of their telehealth visit experience, including more clear pre-visit technical instructions or help with technical components of the visit (n = 10), desire for an in-person clinic visit (n = 4), desire for flexible laryngoscopy (n = 1), and ease of scheduling since the appointment time was changed due to provider availability (n = 1). Despite these areas for improvement, all respondents wanted to continue to use telehealth for their healthcare in the future.

TABLE 3 Patient and visit characteristics of telehealth visits

Patient and visit characteristics	All patients who had telehealth visits (n = 231)	New patient telehealth visits (n = 72)	Established patient telehealth visits (n = 159)	*P*-value
Age, median (IQR)	**44 (12-61)**	**35 (9-53)**	**48 (14-63)**	**.016**
Sex				.153
Female	109 (47%)	39 (54%)	70 (44%)	
Male	122 (53%)	33 (46%)	89 (56%)	
Subspecialty clinic[a]				
General otolaryngology	**64 (28%)**	**25 (35%)**	**39 (25%)**	—
Facial plastics	35 (15%)	14 (19%)	21 (13%)	.927
Head and neck	**38 (16%)**	**7 (10%)**	**31 (20%)**	**.030**
Laryngology	31 (13%)	6 (8%)	25 (16%)	.055
Pediatric otolaryngology	31 (13%)	10 (14%)	21 (13%)	.519
Sinus/skull base	32 (14%)	10 (14%)	22 (14%)	.453
Provider				**.038**
Advanced practice provider	**54 (23%)**	**23 (32%)**	**31 (20.5%)**	
Physician	**177 (77%)**	**49 (68%)**	**128 (80.5%)**	
Insurance[b]				
Commercial	101 (44%)	31 (43%)	70 (44%)	—
Medicaid	79 (34%)	29 (40%)	50 (31%)	.396
Medicare	40 (17%)	7 (10%)	33 (21%)	.111
Self-pay/uninsured	7 (3%)	2 (3%)	5 (3%)	1.000
Unknown	4 (2%)	3 (4%)	1 (1%)	.099
Resident involvement				.900
No	143 (62%)	45 (62.5%)	98 (62%)	
Yes	88 (38%)	27 (37.5%)	61 (38%)	
Billing level[c,d]				
Postoperative visit	**7 (3%)**	**0**	**7 (4%)**	**.045**
Virtual check-in	1 (0.4%)	0	1 (1%)	1.000
Level 1	4 (2%)	1 (1%)	3 (2%)	1.000
Level 2	**41 (18%)**	**7 (10%)**	**34 (21%)**	**.009**
Level 3	**119 (52%)**	**47 (65%)**	**72 (45%)**	—
Level 4	53 (23%)	15 (21%)	38 (24%)	.158
Level 5	6 (3%)	2 (3%)	4 (3%)	1.000

Note: Characteristics that were statistically significant ($P < .05$) are shown in bold.
Abbreviations: CPT, current procedural terminology; IQR, interquartile range.
[a]General otolaryngology was the comparison group for the statistical analyses.
[b]Commercial insurance was the comparison group for the statistical analyses.
[c]Billing level refers to the CPT code that used for the visit.
[d]CPT billing level 3 was the comparison group for the statistical analyses.

4 | DISCUSSION

Prior studies have demonstrated feasibility of telehealth integration into otolaryngology-head and neck surgery.[18,19] During the COVID-19 pandemic, there has been particular interest in utilizing telehealth to facilitate patient care while preserving the beneficial aspects of social distancing.[15,20,21] The current study describes rapid telehealth implementation and outcomes (patient characteristics associated with acceptance of telehealth, characteristics of telehealth visits, and patient satisfaction) in an academic otolaryngology-head and neck surgery practice during the COVID-19 pandemic.

In this study, there was a high (68%) rate of telehealth acceptance among patients who were screened and offered telehealth visits. In multivariable analysis, patients being seen in facial plastics, laryngology, and pediatric otolaryngology subspecialty clinics have higher telehealth acceptance than patients in other subspecialty clinics within otolaryngology-head and neck surgery. These differences could be related to patient motivation and availability of

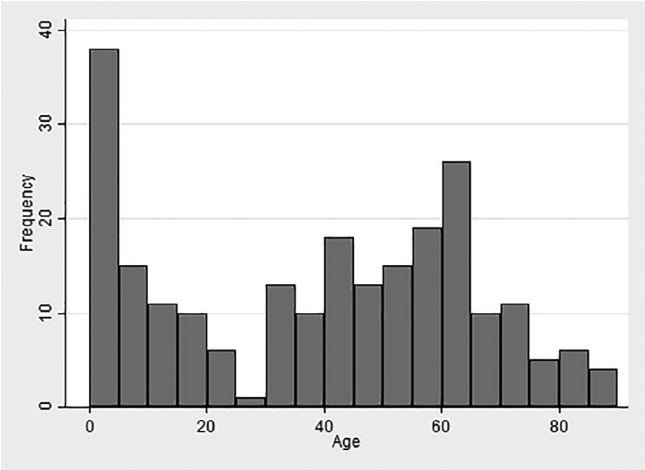

FIGURE 1 Age distribution of telehealth visits

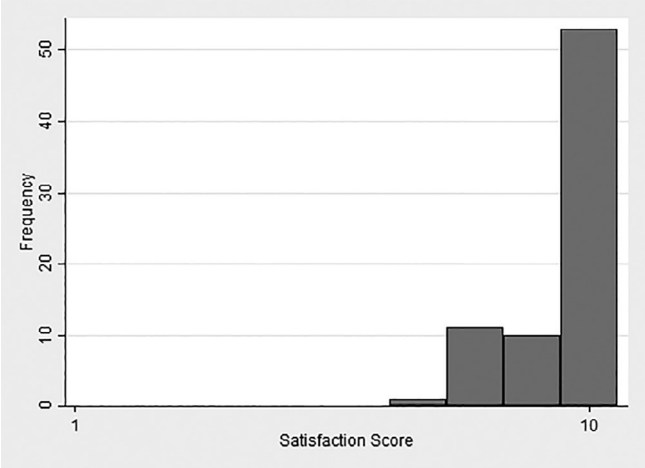

FIGURE 2 Patient post-visit satisfaction score distribution

technological requirements for telehealth. Furthermore, patient acceptance of telehealth could be related to perception of whether their clinical needs can be met via telehealth. A prior study from the Department of Veterans Affairs database estimated that over 60% of otolaryngologic encounters would be eligible for patient care through telehealth.[18] In the future, better selection of potential patients for telehealth may be helpful and allow for higher telehealth acceptance compared to the acceptance level seen in the current study.

Patients with Medicare had lower acceptance of telehealth visits in multivariable analysis, which may be related to lack of access to or familiarity with the necessary technology among older patients. However, among the Medicare patients who had telehealth visits, their satisfaction scores were high and comparable to other patients. This finding is consistent with outcomes from other fields showing benefit to telehealth care in older patients.[22-24] Given the increased risks of more severe illness with COVID-19 in older patients,[25,26] education encouraging and facilitating telehealth acceptance among this group of patients could be particularly beneficial.

TABLE 4 Patient satisfaction data

Patient and visit characteristics	Overall patient satisfaction score, median (IQR); (range 1-10)	*P*-value
Overall (n = 75)	10 (9-10)	
Age		.393
<18 (n = 23)	10 (9-10)	
18-65 (n = 39)	10 (9-10)	
>65 (n = 13)	10 (10-10)	
Sex		.256
Female (n = 37)	10 (10-10)	
Male (n = 38)	10 (9-10)	
Visit type		**.020**
Established (n = 51)	**10 (9-10)**	
New (n = 24)	**10 (10-10)**	
Insurance[a]		
Commercial (n = 32)	10 (9-10)	—
Medicaid (n = 20)	10 (9-10)	.591
Medicare (n = 16)	10 (10-10)	.268
Self-pay/uninsured (n = 5)	10 (9-10)	.809
Unknown (n = 2)	10 (10-10)	.361
Resident involvement		.694
No (n = 60)	10 (9-10)	
Yes (n = 15)	10 (8-10)	

Note: Characteristics that were statistically significant ($P < .05$) are shown in bold.
Abbreviation: IQR, interquartile range.
[a]Commercial insurance was the comparison group for the statistical analyses.

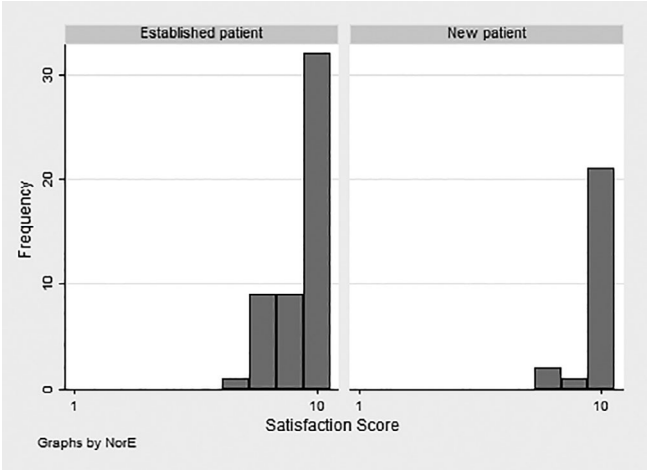

FIGURE 3 Patient post-visit satisfaction score distribution, by telehealth visit type

Among those patients who declined telehealth visits, common reasons included preference for an in-person clinic visit and lack of necessary technology (or familiarity with it). Among patients who

underwent telehealth visits, common feedback included desire for better pre-visit technical instructions and need for technical assistance during the visit. Since most patient feedback related to technical issues, institutions could implement interventions relating to pre-visit instructions and technical assistance to improve telehealth acceptance. Prior research among otolaryngology-head and neck surgery patients has shown varying levels of online health (eHealth) literacy, with lower levels among rural populations.[27] Since rural populations have worse health outcomes, decreased access to care, and longer travel times,[28-30] telehealth could help address many of these sources of disparities. However, interventions to overcome technical issues will be required to improve telehealth availability, education, and utilization among rural patients.

All otolaryngology-head and neck surgery residents in our department were provided general expectations and overall training relating to use of telehealth. Residents were involved in 38% of telehealth visits. However, greater resident involvement can and should be encouraged. Initial subjective feedback suggests that telehealth visits may allow for greater opportunity for resident feedback and education compared to traditional in-person clinic visits, although further investigation on this topic is warranted. It is anticipated that the COVID-19 pandemic will have significant impacts on otolaryngology-head and neck surgery residency training.[31] Telehealth could allow for continued clinical training for residents during periods of social distancing and containment due to COVID-19. Since telehealth will likely be used more frequently after the COVID-19 pandemic, their involvement will allow them to acquire skills that are necessary for their practices after graduation. In this report, telehealth was introduced to our department with the goals of providing clinical care for patients and ensuring that faculty are facile with the technology and have the skills required for ensuring successful telehealth visits. Now that these goals have been met, one of the subsequent goals will be to increase the level of resident involvement.

Patient satisfaction was very high in our study. The only statistically significant predictor of satisfaction scores was visit type, with new patient encounters having higher satisfaction than established patient encounters. However, the scoring system seemed to have a ceiling effect (as shown in Figure 2) with scores skewed to the top of the scale. Further research could employ a different scoring system to avoid this ceiling effect and subsequent limitations on statistical analyses.

Physicians and advanced practice providers reported multiple limitations with telehealth during this rapid implementation period. These included technical difficulties experienced by patients, which resulted in delayed appointments, need for alternative applications if patients were unable to access or use Cisco Webex Meetings, or an audio-only appointment. Furthermore, limited physical examination and difficulty communicating, especially with patients who had auditory, speech, or airway impairment, were additional limitations of telehealth.

The current report is a single-institution report of feasibility and outcomes of telehealth implementation. Our findings are likely representative of an academic otolaryngology-head and neck surgery department with a large proportion of fellowship-trained subspecialists. However, differing results and outcomes may be seen in other practice settings. Implementation of telehealth requires support from a multitude of professionals beyond physicians and advanced practice providers. Involvement of administrators, nursing staff, information technology and telehealth support staff, and compliance/billing support are critical. At our institution, all of these key players were supportive and able to facilitate rapid implementation. Local and institutional factors in other settings may limit the applicability of telehealth elsewhere.

5 | CONCLUSION

In this study, we demonstrate the successful and rapid adoption of telehealth services for a broad range of patients requiring otolaryngologic care. The majority of patients (68%) agreed to use telehealth for their healthcare needs and satisfaction scores were high. Further studies could demonstrate the utility and limitations of telehealth in delivery of care, both during and after the COVID-19 pandemic. Although many uncertainties regarding the exact long-term role of telehealth remain, we anticipate that it will likely be used to a greater and broader extent than in the pre-COVID-19 era.

ACKNOWLEDGMENTS

The authors would like to acknowledge the efforts and support of Michelle Lynn, RN, BSN and Sarah Stout, RN, BSN.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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How to cite this article: Sharma A, Bowman R, Ettema SL, et al. Rapid telehealth implementation into an otolaryngology practice during the COVID-19 pandemic. *Laryngoscope Investigative Otolaryngology*. 2021;6:386–393. https://doi.org/10.1002/lio2.552