


# Patient and Provider Satisfaction With Telemedicine in Otolaryngology

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OTO Open  
 2021, 5(1) 1–9  
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 sagepub.com/journals-permissions  
 DOI: 10.1177/2473974X20981838  
 http://oto-open.org  


## Abstract

**Objective.** The objective of this study is to evaluate patient and provider satisfaction with telemedicine encounters across 3 otolaryngology practices.

**Study Design.** Cross-sectional survey.

**Setting.** A military community hospital, an academic military hospital, and a nonmilitary academic center.

**Methods.** A telephone-based survey of patients undergoing telemedicine encounters for routine otolaryngology appointments was performed between April and July 2020. Patients were asked about their satisfaction, the factors affecting care, and demographic information. A provider survey was emailed to staff otolaryngologists. The survey asked about satisfaction, concerns for reimbursement or liability, encounters best suited for telemedicine, and demographic information. The results were analyzed with descriptive statistics and a multivariable logistic linear regression model to determine odds ratios.

**Results.** A total of 325 patients were surveyed, demonstrating high satisfaction with telemedicine (average score, 4.49 of 5 [best possible answer]). Patients perceived “no negative impact” or “minor negative impact” on the encounter due to the lack of a physical examination or face-to-face interaction (1.86 and 1.95 of 5, respectively). High satisfaction was consistent across groups for distance to travel, age, and reason for referral. A total of 25 providers were surveyed, with an average satisfaction score of 3.44 of 5. Providers reported “slight” to “somewhat” concern about reimbursement (40%) and liability (32%).

**Conclusion.** Given patients’ and providers’ levels of satisfaction, there is likely a role for telemedicine in otolaryngology practice that may benefit patient care independent of the COVID-19 pandemic.

## Keywords

telemedicine, patient satisfaction, provider satisfaction, COVID-19

Received November 2, 2020; accepted November 11, 2020.

The year 2020 has been marked by the COVID-19 pandemic, creating a worldwide public health emergency. In response, the American Academy of Otolaryngology–Head and Neck Surgery, in a March statement, recommended against routine, elective, and nonurgent procedures to prevent exposure to patients, providers, and assistants while preserving resources during the pandemic.<sup>1</sup> As a result, telemedicine was widely adopted to facilitate access to care. This posed significant challenges to clinicians, as many otolaryngology practices were not prepared to implement telemedicine and had to develop protocols quickly.<sup>2</sup>

Telemedicine has been demonstrated to increase provider efficiency in otolaryngology practices and is convenient for patients.<sup>3</sup> Otolaryngology relies on testing that may

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de-emphasize physical examination, such as audiometry and radiographic imaging. Therefore, certain types of encounters may favor telemedicine with certain types of encounters. However, examinations such as otoscopy and endoscopy would remain difficult in the telemedicine environment.<sup>3</sup> McCool and Davies found that 62% of otolaryngologic encounters were eligible for telemedicine, with the remainder of patients requiring in-clinic diagnostic or therapeutic procedures.<sup>4</sup> Rimmer et al evaluated patient satisfaction for telemedicine in a head and neck cancer practice; however, the majority (70%) of the study consisted of postoperative telephone consults and did not assess provider satisfaction.<sup>5</sup> The results of their study revealed that 95% of patients were satisfied with telephone consults for postoperative visits, although patient dissatisfaction with wait times and technical issues remained.

To our knowledge, no studies have examined patient- and provider-specific satisfaction with telemedicine in otolaryngology practice. The primary aim of this study is to assess satisfaction of otolaryngology telemedicine encounters among all patient encounters. Secondary aims were to assess variables that predicted higher or lower satisfaction, including distance to travel, age, and reason for referral, as well as to assess for concerns for diagnostic concordance and reimbursement.

## Method

Institutional Review Board approval was obtained from the Department of Research Programs at the Walter Reed National Military Medical Center (WRNMMC-EDO-2020-0484) and at the Ochsner Clinic Foundation (2020.200). Study participants consisted of patients presenting for routine clinical care for telemedicine consultation at 1 of 3 tertiary otolaryngology practices between March 2020 and July 2020.

Surveys were obtained across 3 distinct practices: a military community hospital (Fort Belvoir Community Hospital), an academic military hospital (Walter Reed National Military Medical Center), and a nonmilitary academic center (Ochsner Medical Center). Respondents were asked to complete a 10-question survey to assess patient satisfaction with telemedicine encounters. The survey was conducted telephonically by an investigator not involved directly in that patient's care, with results obtained either at the time of the encounter or within 1 month of the appointment. The patient survey consisted of demographic questions (age, sex, geographic location, and reason for the visit) and questions regarding satisfaction with the telemedicine platform (see **Figure 1**). The encounter was categorized by patient-presenting complaint: ear (including hearing and dizziness), head and neck, nose, sinus, and other. For questions related to satisfaction, patients were asked to utilize a 5-point Likert scale corresponding to very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, satisfied, or very satisfied. For questions rating impact, patients used a 5-point Likert scale corresponding to no negative impact, minor negative impact, neutral, moderate negative impact, and major negative impact. At the conclusion of the survey, patients were given the opportunity to provide feedback or comments on telemedicine.

The 12-question provider survey was distributed by email to all otolaryngologists practicing at Fort Belvoir Community Hospital, Walter Reed National Military Medical Center, and Ochsner Medical Center. Included in the provider survey were demographic questions: number of years in clinical practice since the completion of training, subspecialty fellowship training, geographic location, age, and sex (see **Figure 2**). Provider respondents were queried about their satisfaction with telemedicine, impact on decision making, concern for reimbursement, concern for increased risk of malpractice or misdiagnosis, likelihood to have performed a procedure, patient's access to at-home interface, and which patients would one consider offering telemedicine encounters.

Survey responses were collected electronically, organized, and analyzed with Microsoft Excel. No personal identifying information was collected, ensuring that the surveys remained anonymous for data analysis.

## Statistical Analysis

Demographics and survey results were described with means and standard deviations or frequencies and percentages. Multivariable logistic regression was used to evaluate potential independent predictors for high patient satisfaction, defined as a response of "very satisfied" with the telehealth visit. A *P* value <.05 was considered statistically significant. Analyses were done with R version 3.6.1 (R Foundation).

## Results

A total of 325 patient satisfaction surveys and 25 provider satisfaction surveys were completed. Characteristics of the patient population are presented in **Table 1**. Patients treated at Fort Belvoir Community Hospital accounted for 44.6% of the surveys; Walter Reed National Military Medical Center, 18.8%; and Ochsner Medical Center, 36.6%. A plurality of patients was between 40 and 59 years old (45.5%). The sex distribution was evenly distributed, with 50.2% of respondents being male. The majority of patients (68.9%) lived <20 miles from their provider's office, and few patients (12.0%) lived >50 miles from their provider's office.

Patient responses to the survey are presented in **Table 2**. Patients cited an overall satisfaction with telemedicine between "satisfied" and "very satisfied" (4.49 of 5 [best possible answer]).

Patients felt "no negative impact" to a "minor negative impact" on their care by not seeing their provider face-to-face (1.86 of 5 [best possible answer, 1]). Similarly, patients felt no negative impact to a minor negative impact on their care due to a lack of physical examination (1.95 of 5). On average, patients felt no negative impact to a minor negative impact on their ability to access their provider (1.46 of 5). The majority (78.8%) of patients felt that their provider had all the information needed to make a diagnosis and treatment.

Nearly two-thirds of patients (210, 64.6%) indicated that they were "very satisfied" with the telemedicine encounter.

<p>1. What is your main reason for your doctor's visit today?</p> <p>Hearing      Ear      Nose      Sinus Mouth      Throat      Dizzy      Other: _____</p> <p>2. How satisfied are you about today's experience with telehealth?</p> <p>1. Very dissatisfied 2. Dissatisfied 3. Neither satisfied nor dissatisfied 4. Satisfied 5. Very satisfied</p> <p>3. Do you feel your care was negatively impacted by not seeing your healthcare provider face-to-face?</p> <p>1. No negative impact 2. Minor negative impact 3. Neutral 4. Moderate negative impact 5. Major negative impact</p> <p>4. Your healthcare provider was unable to physically touch you to perform an examination. Do you feel this negatively impacted your care?</p> <p>1. No negative impact 2. Minor negative impact 3. Neutral 4. Moderate negative impact 5. Major negative impact</p>	<p>5. Do you feel telemedicine negatively impacted your ability to access your healthcare provider?</p> <p>1. No negative impact 2. Minor negative impact 3. Neutral 4. Moderate negative impact 5. Major negative impact</p> <p>6. Do you feel the healthcare provider had all the information needed to make a diagnosis and treatment plan?</p> <p>1. Yes 2. No</p> <p>7. What is your age?</p> <p>18-29    30-39    40-49    50-59    60-69    70-79 80-89    90+</p> <p>8. What is your gender?</p> <p>Male                      Female Prefer Not to Answer</p> <p>9. What is your home zip code?</p> <p>10. How far away from your provider's office do you live?</p> <p>&lt;10 miles                      21-50 miles                      51-100 miles                      &gt;100 miles</p>
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**Figure 1.** Patient satisfaction survey.

Those patients who did not rate their experience as very satisfied (n = 115, 35.4%) reported an average satisfaction score of 3.56 of 5, corresponding to “neutral” or “satisfied.” Patients demonstrating lower satisfaction scores perceived a minor negative impact to neutral impact on their care from a lack of face-to-face interaction (score, 2.49 of 5 [best possible answer, 1]), as compared with no negative impact to a minor negative impact (score, 1.52 of 5) in very satisfied patients. Patients in the lower satisfaction group felt that their provider had all the information needed to make a diagnosis and treatment plan less frequently (n = 74, 64.3%) than the “very satisfied” cohort (n = 182, 86.7%).

Patients were given the opportunity to make comments or provide general, open-ended feedback. A total of 66 patients provided comments: 10 felt that telemedicine should continue after the resolution of COVID-19; 7 commented on increased access to care; and 4 remarked that they had difficulty hearing.

**Table 3** details the characteristics of the provider population. A total of 25 otolaryngologists completed the survey. The length of time that providers had been in practice varied, with the majority reporting <5 years of experience (n = 9, 36%). The majority of respondents were male (n = 17, 68%) and between the ages of 30 and 39 years (n = 13, 52%). Most providers practiced at Ochsner Medical Center (n = 18, 72%). All otolaryngology subspecialties were reflected in the survey, with the exception of sleep surgery. The largest proportion of respondents represented general otolaryngology (n = 9, 36%).

Results of the provider survey are presented in **Table 4**. On average, providers responded that they were “neither satisfied nor dissatisfied” to “satisfied” (3.44 of 5 [best possible answer, 5]) with telemedicine. Providers felt a “neutral impact” on decision making because of the lack of physical touch or examination during these encounters (3.12 of 5 [best possible answer, 1]). Providers were “slightly” to

<p>1. How satisfied are you about the experience with telemedicine?</p> <ol style="list-style-type: none"> <li>1. Very dissatisfied</li> <li>2. Dissatisfied</li> <li>3. Neither satisfied nor dissatisfied</li> <li>4. Satisfied</li> <li>5. Very satisfied</li> </ol> <p>2. Do you think your decision-making was negatively impacted by being unable to touch the patient for an exam?</p> <ol style="list-style-type: none"> <li>1. No negative impact</li> <li>2. Minor negative impact</li> <li>3. Neutral</li> <li>4. Moderate negative impact</li> <li>5. Major negative impact</li> </ol> <p>3. Are you worried or concerned about reimbursement related to telemedicine?</p> <ol style="list-style-type: none"> <li>1. Not at all concerned</li> <li>2. Slightly Concerned</li> <li>3. Somewhat concerned</li> <li>4. Moderately concerned</li> <li>5. Extremely concerned</li> </ol> <p>4. Are you concerned about an increased risk of malpractice and/or misdiagnosis due to telemedicine?</p> <ol style="list-style-type: none"> <li>1. Not at all concerned</li> <li>2. Slightly Concerned</li> <li>3. Somewhat concerned</li> <li>4. Moderately concerned</li> <li>5. Extremely concerned</li> </ol> <p>5. Consider your most recent patient encounter with telemedicine. If you were seeing this patient in your office, how likely would you have been to perform a procedure (e.g. endoscopy, microscopy) during this visit?</p> <ol style="list-style-type: none"> <li>1. Not very likely</li> <li>2. Not likely</li> <li>3. Neutral</li> <li>4. Likely</li> <li>5. Very likely</li> </ol>	<p>6. Consider your most recent patient encounter with telemedicine. Did the patient have an at-home interface (e.g. video otoscope, video tongue blade) to transmit images to you before or during the visit?</p> <ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol> <p>7. For which patients would you consider offering a telemedicine encounter [select all that apply]?</p> <ol style="list-style-type: none"> <li>1. New patients</li> <li>2. Established patients</li> <li>3. Postoperative visits</li> <li>4. None</li> </ol> <p>8. How many years have you been in practice?</p> <p>0-5    6-10    11-15    16-20    21-25    26+</p> <p>9. What is your age?</p> <p>30-39    40-49    50-59    60-69    70-79 80+</p> <p>10. What is your gender?</p> <p>male    female    Prefer not to say</p> <p>11. What is the zip code of your clinic?</p> <p>12. What is your subspecialty?</p> <ol style="list-style-type: none"> <li>1. General otolaryngology</li> <li>2. Rhinology</li> <li>3. Neurotology/otology</li> <li>4. Pediatric Otolaryngology</li> <li>5. Laryngology</li> <li>6. Head and Neck Surgical Oncology</li> <li>7. Facial Plastics</li> <li>8. Sleep Surgery</li> </ol>
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**Figure 2.** Provider satisfaction survey.

“somewhat concerned” about reimbursement (2.28 of 5 [best possible answer, 1]) and increased risk for malpractice and misdiagnosis (2.56 of 5). Most providers felt a “likely chance” that they would have performed a procedure (eg, flexible laryngoscopy) if the encounter had been face-to-face (3.84 of 5). A total of 96% (n = 24) of providers stated that patients did not have access to an at-home interface (eg, video otoscope). The majority of providers felt a role for telemedicine going forward (n = 24, 96%), with 40% (n = 10) responding that it would be appropriate for all patients, including new, established, and postoperative patients.

**Table 5** shows a multivariable logistic regression model with patient characteristics as the independent variables and with highest satisfaction with the telehealth visit (“very satisfied”) as the dependent variable. Variance inflation factors <2 indicated no concern of multicollinearity. High satisfaction was consistent across age groups, sex, reason for visit, and clinic location.

Patients reporting a distance from their provider of 21 to 50 miles demonstrated an association with decreased overall satisfaction (odds ratio, 0.44; 95% CI, 0.24-0.82;  $P = .01$ ) when compared with patients 0 to 20 miles and  $\geq 50$  miles from their provider.

## Discussion

Our study shows that patients had an overall positive experience with telemedicine, with only minor negative impacts related to not being able to meet with their providers in person, not receiving a physical examination, or feeling that there was a limited ability to access providers. Current literature has shown that telemedicine has multiple benefits to patients and providers. According to a study by Doshi et al, “healthcare systems leveraging telemedicine for patient care will gain several advantages, including workforce sustainability, reduction of provider burnout, limitation of provider exposure, and reduction of personal protective equipment

**Table 1.** Characteristics of Patient Study Population (N = 325).

	No. (%)
Age, y	
18-39	102 (31.4)
40-59	148 (45.5)
60-89	75 (23.1)
Sex	
Female	162 (49.8)
Male	163 (50.2)
Distance from provider's office, mi	
≤20	224 (68.9)
21-50	62 (19.1)
>50	39 (12.0)
Site	
Fort Belvoir	145 (44.6)
Walter Reed	61 (18.8)
Ochsner	119 (36.6)
Reason for visit	
Ear	99 (30.5)
Head and neck	57 (17.5)
Nose	59 (18.2)
Sinus	84 (25.8)
Other	26 (8.0)

(PPE) waste.”<sup>6</sup> Sandberg et al found telemedicine to have many benefits outside the context of a global pandemic; their study showed that patients had “opportunities for more frequent contact . . . and increased accessibility by those frequently underserved.”<sup>7</sup>

## Satisfaction

In several studies, patients have reported high satisfaction with telemedicine consults.<sup>8-10</sup> Made et al used a questionnaire to assess patient satisfaction; on a 6-point scale, surveyed patients had an average rating of 5.7, corresponding to high satisfaction.<sup>8</sup> Similarly, Mishra et al used a questionnaire among a cohort of 34 patients after undergoing thyroidectomy and parathyroidectomy and found that all patients reported telemedicine satisfaction as “very high” or “excellent.”<sup>9,10</sup>

Our study found that high levels of satisfaction persisted across age groups. Van den Brink et al had a similar finding in which an older population with decreased computer literacy was not deterred from telemedicine.<sup>11</sup> These patients reported increased access to care, which improved their feeling of security and quality of life as compared with a control group.<sup>11</sup>

Several patients who completed our survey remarked that telemedicine should continue even after the COVID-19 pandemic has subsided. In a study examining telemedicine consultation where general practitioners performed endoscopic examinations that were later forwarded to otolaryngologists, most patients were satisfied with telemedicine and open to further teleconsultations from otolaryngologists.<sup>12</sup> This may be due to feeling more connected and engaged during these visits, as described by Stalfors et al. In a direct comparison between face-to-face encounters and telemedicine for patients with head and neck cancer, the face-to-face group reported that it felt “as if everybody was talking about me, but not to me.”<sup>9</sup>

The results of the patient survey found high levels of satisfaction across all chief complaints. Data from Van den Brink et al study corroborate this, showing that patients

**Table 2.** Patient Responses to Telehealth Survey.

	Less than very satisfied (n = 115)	Very satisfied (n = 210)	All (N = 325)
Overall satisfaction			
Mean (SD)	3.56 (0.786)	5.00 (0.00)	4.49 (0.834)
Median [min, max]	4.00 [1.00, 4.00]	5.00 [5.00, 5.00]	5.00 [1.00, 5.00]
Impact on care from lack of face-to-face contact			
Mean (SD)	2.49 (1.21)	1.52 (0.908)	1.86 (1.12)
Median [min, max]	3.00 [0.00, 5.00]	1.00 [1.00, 5.00]	1.00 [0.00, 5.00]
Impact on care from lack of physical examination			
Mean (SD)	2.64 (1.40)	1.57 (0.987)	1.95 (1.26)
Median [min, max]	3.00 [0.00, 5.00]	1.00 [1.00, 5.00]	1.00 [0.00, 5.00]
Impact on ability to access provider			
Mean (SD)	1.87 (1.23)	1.24 (0.732)	1.46 (0.986)
Median [min, max]	1.00 [1.00, 5.00]	1.00 [1.00, 5.00]	1.00 [1.00, 5.00]
Provider able to make diagnosis and treatment plan, No. (%)			
No	41 (35.7)	28 (13.3)	69 (21.2)
Yes	74 (64.3)	182 (86.7)	256 (78.8)

**Table 3.** Characteristics of Provider Study Population (N = 25).

	No. (%)
Site	
Fort Belvoir	1 (4.0)
Walter Reed	6 (24.0)
Ochsner	18 (72.0)
Years in practice	
0-5	9 (36.0)
6-10	4 (16.0)
11-15	4 (16.0)
16-20	4 (16.0)
21-25	0 (0)
≥26	4 (16)
Age, y	
30-39	13 (52.0)
40-49	7 (28.0)
50-59	1 (4.0)
60-69	4 (16.0)
Sex	
Male	17 (68.0)
Female	8 (32.0)
Subspecialty	
General otolaryngology	9 (36.0)
Rhinology	4 (16.0)
Neurotology/otology	3 (12.0)
Pediatric otolaryngology	4 (16.0)
Laryngology	2 (8.0)
Head and neck surgical oncology	1 (4.0)
Facial plastics	1 (4.0)
Sleep surgery	0 (0)
Multiple	1 (4.0)

with head and neck complaints had high odds of being very satisfied with their encounter.<sup>11</sup>

Providers had a less enthusiastic response to telemedicine, corresponding to an answer between “satisfied” and “neither satisfied nor dissatisfied.” Similar results were seen in studies by Van Den Brink et al and Whitten et al.<sup>13,14</sup> The former study used an electronic information system to provide telemedicine communications between patients with head and neck cancer and general practitioners involved on a multidisciplinary team. With this form of telemedicine, the general practitioners’ satisfaction rating was 5.6 of 10. While our study did not use this model, it still demonstrated a level of reluctance toward telemedicine. There are many potential reasons for providers to look unfavorably upon telemedicine. Telemedicine reduces the interpersonal interactions that a face-to-face encounter has. Counseling changes as providers can no longer rely on facial and body language cues to ensure that patients understand information they are receiving. There were likely technical and logistic issues; many departments did not have a strong telemedicine infrastructure prior to the current pandemic. This may have led to more time

troubleshooting as opposed to patient care. Interestingly, 76% of providers would have been likely or very likely to perform a procedure had they seen the patient in person; this likely affected providers’ satisfaction as telemedicine limited their resources for evaluation. Many providers likely are concerned about reimbursement; without the ability to code for a comprehensive physical examination, the value of telemedicine encounters will likely reflect that if telemedicine continues.

### Concordance

In our study, all encounters followed a synchronous model, meaning that both parties were present at the time of the encounter, as opposed to recording patient information and forwarding it to the provider. The majority of patients (78.8%) reported that they felt that their provider was able to provide a diagnosis and treatment plan; similarly, the average response to impact on care due to a lack of physical examination corresponded to “no negative impact” to “minor negative impact.” Despite having no physical examination, patients reported receiving adequate workup and treatment. In a study by Smith et al in a pediatric otolaryngology practice, surgical decision making was the same for 93% of synchronous telemedicine appointments as compared with face-to-face appointments.<sup>15</sup> Similarly, Sclafani et al demonstrated high rates of diagnostic concordance with synchronous telemedicine (85%).<sup>16</sup> There are conflicting data with concordance rates based on an asynchronous model.<sup>17</sup> Per Wu et al, using clinical context in asynchronous telemedicine encounters increased concordance from 94.4% to 100%.<sup>18</sup>

Given that there are conflicting data about diagnostic concordance in the literature,<sup>16-18</sup> this may contribute to provider fear for malpractice or misdiagnosis. Providers reported an average response of 2.56 of 5 when asked about their concern for malpractice, corresponding to “slightly concerned” to “somewhat concerned.” However, the average response to impact on decision making was neutral, suggesting that physical examination may have been used as confirmatory rather than eliciting the diagnosis. Additionally, the likelihood of performing a procedure had an average response between “neutral” and “likely,” again possibly indicating the use of these tests for confirmation.

### Reimbursement

Prior to this study, it was hypothesized that the change to reimbursement with telemedicine visits would be a significant concern for providers. Providers reported an average answer of “slightly concerned” to “somewhat concerned” (2.28 of 5). Prior to the COVID-19 public health emergency, Medicare and other payer policies were considered a roadblock for telemedicine,<sup>19</sup> likely because, for telemedicine encounters, Medicare typically provides payment for fee-for-service consultations.<sup>19</sup> However, since March 30, 2020, the Centers for Medicare and Medicaid Services have changed its policies such that Medicare will make payment for

**Table 4.** Provider Responses to Telehealth Survey (N = 25).

	Mean ± SD or No. (%)		Mean ± SD or No. (%)
<b>Satisfaction</b>	3.44 ± 1.12	<b>Concern for malpractice/misdiagnosis</b>	2.56 ± 1.53
1. Very dissatisfied	2 (8.0)	1. Not at all concerned	9 (36.0)
2. Dissatisfied	3 (12.0)	2. Slightly concerned	5 (20.0)
3. Neither satisfied nor dissatisfied	5 (20.0)	3. Somewhat concerned	3 (12.0)
4. Satisfied	12 (48.0)	4. Moderately concerned	4 (16.0)
5. Very satisfied	3 (12.0)	5. Extremely concerned	4 (16.0)
<b>Impact on decision making</b>	3.12 ± 1.27	<b>Likelihood of performing a procedure</b>	3.84 ± 1.14
1. No negative impact	2 (8.0)	1. Not very likely	0 (0)
2. Minor negative impact	8 (32.0)	2. Not likely	6 (24.0)
3. Neutral	4 (16.0)	3. Neutral	0 (0)
4. Moderate negative impact	7 (28.0)	4. Likely	11 (44.0)
5. Major negative impact	4 (16.0)	5. Very likely	8 (32.0)
<b>Concern for reimbursement</b>	2.28 ± 1.28	<b>Patient ability to transmit images prior to encounter</b>	
1. Not at all concerned	9 (36.0)	Yes	1 (4.0)
2. Slightly concerned	7 (28.0)	No	24 (96.0)
3. Somewhat concerned	3 (12.0)		
4. Moderately concerned	5 (20.0)		
5. Extremely concerned	1 (4.0)		
		<b>Preferred encounters for telemedicine</b>	
New patients, established patients	6 (24.0)	Established patients, postoperative	3 (12.0)
New patients, established patients, postoperative	10 (40.0)	Postoperative	4 (16.0)
Established patients	1 (4.0)	None	1 (4.0)

**Table 5.** Multivariable Logistic Regression Model of Patient Characteristics (Independent Variables) and Highest Satisfaction With the Telehealth Visit (Dependent Variable).<sup>a</sup>

Characteristic	OR	95% CI	P value
Site			
Fort Belvoir	Ref		
Walter Reed	0.53	0.27-1.06	.07
Ochsner Hospital	0.80	0.44-1.45	.46
Age, y			
18-39	Ref		
40-59	1.13	0.65-1.94	.66
60-89	1.70	0.86-3.41	.13
Male	0.63	0.38-1.04	.07
Reason for visit			
Ear	Ref		
Head and neck	1.21	0.59-2.49	.61
Nose	1.35	0.68-2.76	.40
Sinus	1.48	0.78-2.83	.23
Other	2.64	0.98-8.02	.07
Distance from provider, mi			
<20	Ref		
21-50	0.44	0.24 0.82	.01
>50	1.10	0.51-2.45	.82

Abbreviations: OR, odds ratio; Ref, reference.

<sup>a</sup>The reference group for the dependent variable is defined as a response <5 on question 2 (satisfaction); the highest satisfaction score is 5.

virtual services with relaxed requirements.<sup>20</sup> Because of these policy changes, Medicare beneficiaries may receive needed services from otolaryngologists without risking exposure.<sup>20</sup>

It is possible that the Medicare policy has affected the level of concern that providers have for reimbursement, though it is unclear how telemedicine reimbursement will be affected once the public health emergency has subsided. Additionally, 2 of the sites where providers were surveyed are military hospitals (Walter Reed and Fort Belvoir Community Hospital). At these institutions, all patients have insurance through Tricare, and these providers do not receive reimbursement through Medicare; it is likely this also lowered the average level of concern for this survey question.

### Limitations

Our study had multiple limitations. Patients were surveyed during the government shutdown, when nonurgent medical visits were canceled. Patient bias may have been introduced when the alternative to telemedicine was no medical appointment. Some patients performed the survey up to 1 month after their encounter; this introduces recall bias when compared with the group of patients who were surveyed soon after their appointment. There was likely also participant bias; patients who participated may have been influenced to give answers to appease the physicians performing the survey. This was mitigated by telling each patient that the survey was

confidential. The treating providers did not survey their patients. The sample size of the provider satisfaction survey was fairly small ( $n = 25$ ), which is also a limitation. The majority of respondents (72%) to the provider survey were from the nonmilitary practice, as compared with 35.7% civilian respondents for the patient survey. This is the result of a limited number of military providers at Fort Belvoir Community Hospital and Walter Reed National Military Medical Center as compared with the civilian counterpart, Ochsner Medical Center.

Fort Belvoir Community Hospital and Walter Reed National Military Medical Center are military hospitals that primarily serve active duty service members, retirees, and dependents. This means that the 206 patients and 7 providers surveyed from these locations represent a niche community, which may not apply to the civilian population. At these locations, all patients have Tricare insurance; thus, concern for reimbursement may differ as compared with civilian counterparts. Patient expectations between military and civilian health systems remain unknown and warrant further study.

## Conclusions

The patient satisfaction survey demonstrated high levels of satisfaction with limited confounding factors, indicating that satisfaction was consistent across each demographic listed. Ear complaints were associated with the lowest satisfaction scores. Providers had lower levels of satisfaction as compared with patients, though telemedicine had a neutral effect on providers' decision making and caused a "slight" to "somewhat" higher concern for malpractice and misdiagnosis. Overall, telemedicine appears to be a viable option for patients and providers, though further study is necessary to elicit which patients are at high risk for poorer outcomes.

## Author Contributions

**Phoebe Elizabeth Riley**, conception, data analysis, drafting the manuscript, final approval; **Jakob L. Fischer**, conception, data analysis, drafting the manuscript, final approval; **Ryan E. Nagy**, conception, data analysis, drafting the manuscript, final approval; **Nora L. Watson**, conception, data analysis, drafting the manuscript, final approval; **Edward D. McCoull**, conception, data analysis, drafting the manuscript, final approval; **Anthony M. Tolisano**, conception, data analysis, drafting the manuscript, final approval; **Charles A. Riley**, conception, data analysis, drafting the manuscript, final approval.

## Disclosures

**Competing interests:** None

**Sponsorships:** None.

**Funding source:** None.

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