Telemedicine Services Provided to Medicare Beneficiaries by Otolaryngologists Between 2010 and 2018

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IMPORTANCE Clinicians are increasingly adopting telemedicine in an effort to expand patient access and efficiently deliver care. However, the extent to which otolaryngologists provide telemedicine services is unclear.

OBJECTIVE To characterize recent trends in the use of telemedicine by otolaryngologists to deliver care to Medicare beneficiaries.

DESIGN, SETTING, AND PARTICIPANTS A retrospective cross-sectional analysis was conducted between January 1, 2010, and December 31, 2018, using publicly available Medicare Physician/Supplier Procedure Summary data on physicians practicing in the field of otolaryngology and benchmark specialties (dermatology and psychiatry) that provided telemedicine services to Medicare beneficiaries.

MAIN OUTCOMES AND MEASURES Primary outcomes were the mean annual number of telemedicine services delivered per active physician and mean annual payment per active physician for these services. Secondary outcomes included the number, setting, and complexity of telemedicine services.

RESULTS Between 2010 and 2018, otolaryngologists provided 2127 total telemedicine services (7 unique service types) to Medicare beneficiaries and received $88,574 in total payment for these services. During this period, the mean number of telemedicine services increased at a compound annual growth rate (CAGR) of 11.0%, and the mean Medicare payment per otolaryngologist increased at a CAGR of 21.8%. In comparison, telemedicine use during this period generally increased at a higher rate in the fields of dermatology (mean number of services per active physician at CAGR of 13.0%; mean Medicare payment per active physician at CAGR of 12.5%) and psychiatry (mean number of services per active physician at CAGR of 25.8%; mean Medicare payment per active physician at CAGR of 26.6%). In 2018, outpatient evaluation and management visits accounted for most telemedicine services provided (337 of 353 [95.5%]) and the payments received ($17,542.13 of $18,470.47 [95.0%]) by otolaryngologists. In contrast, physicians in other specialties also provided substantial portions of telemedicine services in the inpatient (psychiatry, 18,403 of 198,478 [9.3%]; dermatology, 231 of 1034 [22.3%]) and skilled nursing facility settings (psychiatry, 14,690 of 198,478 [7.4%]; dermatology, 46 of 1034 [4.4%]).

CONCLUSIONS AND RELEVANCE This study suggests that the extent to which otolaryngologists used telemedicine to deliver care to Medicare beneficiaries between 2010 and 2018 was rare. Although there was relative growth in the use of telemedicine by otolaryngologists during this period, absolute growth remained low. Policy makers and provider organizations should support otolaryngologists in the adoption of telemedicine technologies, especially while coronavirus disease 2019 (COVID-19) viral suppression efforts necessitate prolonged restriction of physical clinic throughput.
Telemedicine is broadly defined as the remote exchange of medical information using communication technologies (Table 1) to support and enable long-distance health care. In recent years, advances in technology and payment reform have facilitated increasing clinical adoption of telemedicine. Between 2015 and 2019, the estimated proportion of physicians delivering video-based telemedical care increased more than 4-fold (from 5% to 22%). In addition, telemedical care has expanded to include remote detection of heart rate irregularities using consumer electronics, remote monitoring of blood glucose levels and teleconsultation for insulin adjustments, and telehabilitation after total hip replacement.

Within the field of otolaryngology, telemedicine technology has been applied to deliver preoperative and postoperative care to patients receiving cochlear implants, remotely evaluate voice disorders, perform overnight free flap examinations, and triage nasal bone injuries. Furthermore, the US military and Alaskan Native Health Services currently operate robust and long-standing teleotolaryngology programs that have been shown to improve patient access and facilitate longitudinal care. However, to our knowledge, most published research describing telemedicine within otolaryngology is predominantly limited to pilot and feasibility studies that lack information on scaling, sustainability, and reimbursement.

As a result of the coronavirus disease 2019 (COVID-19) pandemic, many otolaryngologists have begun delivering telemedicine services to support patient access to care while preventing illness transmission, particularly among vulnerable populations such as elderly individuals. Nonetheless, the extent to which otolaryngologists provide such care remains unclear. We therefore sought to examine recent trends in telemedicine payments and use among Medicare beneficiaries in the field of otolaryngology.

**Methods**

We performed a retrospective cross-sectional analysis of telemedicine services provided to Medicare beneficiaries between January 1, 2010, and December 31, 2018, using publicly available Physician/Supplier Procedure Summary data. This study analyzed publicly available Centers for Medicare & Medicaid Services (CMS) data and therefore did not require review by the Human Research Protections Program at Massachusetts Eye and Ear Infirmary.

**Study Cohort**

We included the following 3 specialties in our analysis: otolaryngology (provider specialty code 04), dermatology (provider specialty code 07), and psychiatry (provider specialty code 26). We chose psychiatry as a benchmark specialty because physicians in this field are widely considered to be at the forefront of telemedicine adoption. We chose dermatology as a benchmark specialty because we anticipated that dermatology would fall between otolaryngology and psychiatry on the spectrum of telemedicine adoption. Although dermatology potentially has a lower barrier to the adoption of telemedicine as a result of non-invasive and easily digitized physical examinations, dermatology also possesses similarities to the practice of otolaryngology with applications including preoperative patient video consultations, real-time intraoperative video consultations with pathologists, and postprocedural monitoring.

**Study Variables**

For each included specialty in each study year, we extracted the total number of allowed telemedicine services, total allowed telemedicine service charges (eg, Medicare payment), and total number of telemedicine service types (as defined by Healthcare Common Procedure Coding System codes). We

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**Key Points**

**Question** To what extent do otolaryngologists use telemedicine to deliver care to Medicare beneficiaries?

**Findings** In this cross-sectional analysis of telemedicine utilization between 2010 and 2018, otolaryngologists provided 2127 telemedicine services to Medicare beneficiaries and received $88 574 in payments for these services. During this period, the mean number of telemedicine services increased at a compound annual growth rate of 11.0%, and the mean Medicare payment per otolaryngologist for these services increased at a compound annual growth rate of 21.8%.

**Meaning** Otolaryngologists rarely used telemedicine to deliver care to Medicare beneficiaries; although there was relative growth in the use of telemedicine by otolaryngologists during this period, absolute growth remained low.

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**Table 1. Examples of Telemedicine Modalities and Applications**

<table>
<thead>
<tr>
<th>Modality</th>
<th>Explanation</th>
<th>Example</th>
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<tbody>
<tr>
<td>Store and forward</td>
<td>Transmission of recorded health history (eg, prerecorded videos and digital images) through a secure electronic communications system to a practitioner, who uses the information to evaluate the case or render a service outside of a real-time or live interaction</td>
<td>Intraoperative pathologic examination (permanent sections) Skin examinations for dermatology review Radiology review of imaging from remote hospitals</td>
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<tr>
<td>Live video conferencing</td>
<td>A 2-way interaction between a person (patient, caregiver, or clinician) and a clinician using audiovisual telecommunications technology, performed in real time</td>
<td>Video conferencing between primary care clinicians and specialists Live patient examinations that are limited owing to remote barriers</td>
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<tr>
<td>Remote monitoring</td>
<td>Use of digital technologies to collect medical and other forms of health data from individuals in one location and electronically transmit that information securely to health care professionals in a different location for assessment and recommendations</td>
<td>Monitoring of vital signs in intensive care units Cardiac monitoring from home for patients with heart conditions</td>
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<tr>
<td>Mobile health</td>
<td>The provision of health care services and personal health data via mobile devices, such as cell phones and tablet computers</td>
<td>A mobile app allowing a secure exchange of information, enabling patients to communicate health-related issues remotely</td>
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*Nonexhaustive list.*
identified telemedicine services using Healthcare Common Procedure Coding System modifiers (95, GQ, and GT) and place of service code (02; introduced in 2018). We normalized annual total service counts and Medicare payments by the number of active physicians in each specialty using Association of American Medical College physician specialty data reports. We used linear interpolation or extrapolation to estimate the number of active physicians in years without reports (2010, 2012, 2014, 2016, and 2018).

We categorized telemedicine services based on Healthcare Common Procedure Coding System codes as follows (eTable in the Supplement): inpatient services (initial consultations, codes G0425-G0427; follow-up visits, codes 99231-99233), skilled nursing facility services (codes 99307-99310), outpatient evaluation and management services (new patients, codes 99201-99205; established patients, codes 99211-99215), and other services (eg, pharmacologic management and smoking cessation [eTable in the Supplement]). We additionally categorized outpatient evaluation and management services provided by otolaryngologists according to complexity as follows: low (CMS levels I-II, codes 99201-99202 and 99211-99212), moderate (CMS level III, code 99203 and 99213), and high (CMS levels IV-V, codes 99204-99205 and 99214-99215).

Statistical Analysis
We used descriptive statistics to characterize the total number of allowed telemedicine services provided by otolaryngologists during the study period, Medicare payment for these services, and number of unique service types provided. For each study year, we estimated the mean number of telemedicine services per active physician (eg, otolaryngologist), the mean Medicare payment for telemedicine services per otolaryngologist, and the proportion of telemedicine services and payment. We adjusted all payment amounts by annual rates of change in the work relative value unit conversion factor to reflect 2018 Medicare dollars. We then calculated compound annual growth rates (CAGRs) to describe trends in the use of telemedicine services.

For the year 2018, we additionally characterized the distribution of telemedicine service types provided by otolaryngologists. We focused this subset analysis on 2018 because the data were the most recent available and therefore most representative of practice patterns before the COVID-19 pandemic. We replicated all analyses for services provided by psychiatrists and dermatologists for comparison.

We performed all analyses using the pandas 3.0 open source library in Python 3. We visualized the data using the pandas and matplotlib libraries.

Results
Between 2010 and 2018, otolaryngologists provided 2127 total telemedicine services to Medicare beneficiaries and received $88 574 in total payment (Table 2). In comparison, telemedicine use during this period was higher in the fields of dermatology (results relative to otolaryngology) and psychiatry (results relative to otolaryngology). Among outpatient evaluation and management services that were associated with telemedicine also increased similarly, at a CAGR of 9.8% (Figure 1). During this period, the mean number of telemedicine services per active physician increased at a CAGR of 13.0% for dermatology (118.2% relative to otolaryngology) and 25.8% for psychiatry (234.6% relative to otolaryngology) (Table 2).

The mean Medicare payment for telemedicine services per otolaryngologist increased at a CAGR of 21.8% (Table 2) between 2010 ($0.41 per otolaryngologist) and 2018 ($1.93 per otolaryngologist) (Figure 2). The percentage of otolaryngology payments that were associated with telemedicine also increased similarly, at a CAGR of 18.4%. During this period, the mean Medicare payment for telemedicine services per active physician increased at a CAGR of 12.5% for dermatology (57.3% relative to otolaryngology) and 26.6% for psychiatry (122.0% relative to otolaryngology) (Table 2).

Distribution of Telemedicine Services
In 2018, outpatient evaluation and management visits accounted for most telemedicine services provided (337 of 353 [95.5%]) and payments received ($17 542.13 of $18 470.47 [95.0%]) by otolaryngologists. Among outpatient evaluation and management visits, approximately two-thirds (233 of 337 [69.1%]) were for established patients and the remainder were for new patients (104 of 337 [30.9%]). Nearly two-thirds of otolaryngologist services were provided by otolaryngologists (results relative to otolaryngology) and 26.6% for psychiatry (122.0% relative to otolaryngology) (Table 2).
patient evaluation and management visits (new patients, 67 of 104 [64.4%]; established patients, 152 of 233 [65.2%]) were low complexity (ie, CMS level I or II). The remainder of out-patient evaluation and management visits were largely (new patient, 34 of 104 [32.7%]; established patient, 59 of 233 [25.3%]) high complexity (ie, CMS level IV or V) (Figure 3).

In contrast, approximately two-thirds of telemedicine services provided by psychiatrists (124,547 of 198,478 [62.8%]) and dermatologists (704 of 1034 [68.1%]) were outpatient evaluation and management visits. Physicians in these fields provided substantial portions of telemedicine services in the inpatient (psychiatry, 18,403 of 198,478 [9.3%]; dermatology, 231 of 1034 [22.3%]) and skilled nursing facility settings (psychiatry, 14,690 of 198,478 [7.4%]; dermatology, 46 of 1034 [4.4%]).

Discussion

Our findings demonstrate that otolaryngologists infrequently used telemedicine in the care of Medicare beneficiaries between 2010 and 2018, particularly compared with the field of psychiatry. Although there was relative growth in the use of telemedicine by otolaryngologists during this period, absolute growth in the use of telemedicine remained low. Telemedicine services provided by otolaryngologists predominately consisted of low-complexity outpatient evaluation and management visits. In contrast, dermatologists and psychiatrists commonly provided care in the inpatient and skilled nursing facility settings. Although both dermatology and psychiatry are thought to have low barriers for telemedicine adoption, we found the use of telemedicine in dermatology to be especially low compared with psychiatry.

To our knowledge, our study is the first to empirically assess telemedicine use across the field of otolaryngology. Our findings are consistent with those of prior research suggesting that otolaryngologists may consider outpatient evaluation and management to be the most feasible initial application of telemedicine within the field.26,27 For example, one institution reported using telemedicine for patients with head and neck cancer with a mean 10-minute wait time and 95% patient satisfaction score.26 Most telemedicine visits (70%) at this clinic were postoperative encounters. Another institution performed telemedicine visits for postoperative patients after parathyroid surgery to reduce the burden of patient travel time and transportation costs.27 In addition to visit complexity, diseasespecific factors may facilitate or prevent the adoption of telemedicine. For example, whereas facial nerve examinations may readily be transmitted via electronic video, laryngeal conditions often require endoscopic examination for diagnosis.28

There are several important factors underlying the overall rare use of telemedicine within otolaryngology to date. First, in contrast to the field of psychiatry, physical examination is often a necessary and critical component for patient diagnosis and management within the field of otolaryngology. In addition to the physical examination, endoscopic procedures are often essential, although technological advances have improved remote electronic sharing of examinations, minimizing the need for repeat endoscopic procedures.29 Second, otolaryngologists may fear the potential for litigation, given their unfamiliarity and uncertainties with telemedical examination. Despite this potential concern, to our knowledge, previous literature has not identified any cases of medical malpractice associated with direct-to-consumer telemedicine services.30 Third, completely substituting face-to-face care with telemedicine services may be financially infeasible for otolaryngologists, as Medicare and private payers have historically implemented more restrictive and less remunerative coverage policies for telemedicine.31

However, coverage policies for telemedicine are rapidly evolving as a result of the COVID-19 pandemic. In March 2020, the US Congress passed the Coronavirus Aid, Relief, and Economic Security (CARES) Act,32 which expanded coverage and relaxed requirements for the provision of telemedicine services to Medicare beneficiaries. For example, clinicians (including nonphysicians such as speech language pathologists
and physical therapists) may now receive Medicare payment for telephone-based services and visits with nonestablished patients.\(^{16,33}\) Furthermore, CMS subsequently implemented (temporary) payment parity policies to reimburse telephone-based services at rates equivalent to those for face-to-face services.\(^{34}\) Private payers are adopting similar policies (eg, waiving patient copayments for telehealth visits) during the COVID-19 pandemic period as well.\(^ {35,36}\) Moving forward, CMS and private payers should consider maintaining expanded coverage for telemedicine services, such as relaxed geographical restrictions and payment parity,\(^ {37}\) particularly if viral suppression efforts necessitate prolonged restriction of physical clinic throughput.

For practices with existing infrastructure to deliver telemedicine services, there are several strategies to help facilitate the transition to virtual care, such as triaging existing appointments for telemedicine appropriateness, initially performing telephone call visits while patients and clinicians adjust to video-based technologies, and creating documentation templates that convey nuances of the telemedicine encounter.\(^ {38}\) For practices without such infrastructure, the Federal Communications Commission is now offering funding (maximum, $1 million per provider organization) to support the purchase of telecommunication services and equipment necessary to deliver virtual care.\(^ {39}\) Otolaryngologists must now consider how best to navigate this period of punctuated equilibrium in the delivery of virtual care and advocate for telemedicine policies that should be permanently adopted to further promote efficient telemedicine care.

**Limitations**

Our study has some limitations. We examined telemedicine use among Medicare beneficiaries, who may not be generalizable to younger, commercially insured populations. In particular, this population also does not account for military telemedicine use, which has previously been demonstrated to be successful.\(^ {13}\) Furthermore, this study was a cross-sectional study and may therefore underestimate current telemedicine use among otolaryngologists. Finally, the data analyzed do not allow for clinician-level analysis. Further investigation is necessary to understand how physician characteristics (eg, location or years in practice) are associated with telemedicine use within otolaryngology.

**Conclusions**

Otolaryngologists rarely used telemedicine to deliver care to Medicare beneficiaries between 2010 and 2018. Although there was relative growth in the use of telemedicine by otolaryngologists during this period, absolute growth remained low. Policy makers and provider organizations should support otolaryngologists in the adoption of telemedicine technologies, especially while COVID-19 viral suppression efforts necessitate prolonged restriction of physical clinic throughput.


