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Socioeconomic Disparities in Patient Use of Telehealth During the Coronavirus Disease 2019 Surge

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IMPORTANCE The coronavirus disease 2019 (COVID-19) pandemic required the rapid transition to telehealth with the aim of providing patients with medical access and supporting clinicians while abiding by the stay-at-home orders.

OBJECTIVE To assess demographic and socioeconomic factors associated with patient participation in telehealth during the COVID-19 pandemic.

DESIGN, SETTING, AND PARTICIPANTS This cohort study included all pediatric and adult patient encounters at the Department of Otolaryngology–Head & Neck Surgery in a tertiary care, academic, multisubspecialty, multisite practice located in an early hot spot for the COVID-19 pandemic from March 17 to May 1, 2020. Encounters included completed synchronous virtual, telephone, and in-person visits as well as visit no-shows.

MAIN OUTCOMES AND MEASURES Patient demographic characteristics, insurance status, and 2010 Census block level data as a proxy for socioeconomic status were extracted. Univariate and multivariate logistic regression models were created for patient-level comparisons.

RESULTS Of the 1162 patients (604 females [52.0%]; median age, 55 [range, 0-97] years) included, 990 completed visits; of these, 437 (44.1%) completed a virtual visit. After multivariate adjustment, females (odds ratio [OR], 1.71; 95% CI, 1.11-2.63) and patients with preferred provider organization insurance (OR, 2.70; 95% CI, 1.40-5.20) were more likely to complete a virtual visit compared with a telephone visit. Increasing age (OR per year, 0.98; 95% CI, 0.98-0.99) and being in the lowest median household income quartile (OR, 0.60; 95% CI, 0.42-0.86) were associated with lower odds of completing a virtual visit overall. Those patients within the second (OR, 0.53; 95% CI, 0.28-0.99) and lowest (OR, 0.33; 95% CI, 0.17-0.62) quartiles of median household income by census block and those with Medicaid, no insurance, or other public insurance (OR, 0.47; 95% CI, 0.23-0.94) were more likely to complete a telephone visit. Finally, being within the lower 2 quartiles of proportion being married (OR for third quartile, 0.49 [95% CI, 0.29-0.86]; OR for lowest quartile, 0.39 [95% CI, 0.23-0.67]) was associated with higher likelihood of a no-show visit.

CONCLUSIONS AND RELEVANCE These findings suggest that age, sex, median household income, insurance status, and marital status are associated with patient participation in telehealth. These findings identify vulnerable patient populations who may not engage with telehealth, yet still require medical care in a changing health care delivery landscape.

Supplemental content

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Coronavirus disease 2019 (COVID-19) has affected millions worldwide and resulted in at least 135 000 deaths in the US.[1] As the pandemic swept through the US, governors initiated executive orders prohibiting nonessential in-person work, including medical care. With such orders in place, traditional in-person clinic evaluations were limited to patients with time-sensitive conditions. For patients without time-sensitive conditions, medical centers quickly shifted to telehealth.

Detroit, Michigan, became an early COVID-19 epicenter, and the area's minority population was disproportionately affected, in both infection and mortality.[2] The US Black population's mortality was twice that of other races/ethnicities,[3] and because Detroit's population is more than 78% Black,[4] the health systems in Detroit prepared to dedicate most of their resources to caring for patients with COVID-19. By March 17, 2020, with 3631 confirmed COVID-19 cases in the state of Michigan,[5] Henry Ford Health System (HFHS) made the decision to move all nonessential ambulatory care to telehealth or postponement until after the surge. The Department of Otolaryngology–Head & Neck Surgery at HFHS was an early adopter of telehealth before COVID-19. As such, the department was able to quickly convert from in-person encounters to telehealth and telephone-only visits. By May 1, 2020, the COVID-19 surge curve started to flatten[5] and the department returned to seeing more patients in the clinic.

In response to physical distancing guidelines and stay-at-home orders, the Centers for Medicare & Medicaid Services (CMS) and most commercial payers modified billing restrictions, allowing for the expansion of telehealth and telephone services early in the COVID-19 pandemic.[6] These CMS and commercial payer modifications were intended to ameliorate access-to-care issues predicated by state-level restrictions on care during the pandemic. The current study examines demographic and socioeconomic factors in the use of telehealth services within the otolaryngology department at a large, urban tertiary care center in an epicenter of a worldwide COVID-19 pandemic.

Key Points

Question What demographic and socioeconomic factors were associated with patient participation in telehealth during the coronavirus disease 2019 (COVID-19) pandemic surge?

Findings In a cohort study of 1162 patients at a large, urban tertiary care center in the Midwest, age, sex, median household income, insurance status, and marital status were associated with patient participation in telehealth during the COVID-19 pandemic surge.

Meaning Similar characteristics that are associated with inequitable access to in-person medical care are also associated with inequitable access to telehealth; a focus on vulnerable patient populations in a changing landscape is necessary to provide timely and essential medical care.

Methods

This retrospective cohort study was approved by the HFHS institutional review board with a waiver for informed consent granted based on minimal risk and retrospective nature. The cohort consisted of patients receiving care in the otolaryngology department within an urban tertiary care center from March 17 until May 1, 2020. All patients with scheduled encounters with otolaryngologists or advanced practice clinicians were included. Demographic information, including the patient's age, self-reported sex and race/ethnicity, and primary insurer, were extracted from the electronic medical record system. We obtained US 2010 Census block level data based on the geocoded information from the residential addresses as a proxy for the patients' socioeconomic status (SES), which included the proportion of adults with at least a high school diploma (educational level), median household income, proportion of married adults (marital status), proportion of English-speaking households, proportion of employed adults (employment level), and proportion of households living above the federal poverty level in that patient's zip code.[7] These markers were divided into quartiles to facilitate statistical analysis (eTable in the Supplement).

Patients were considered to have completed a virtual visit if at least 1 virtual visit was completed, regardless of status of any other visit types completed. A virtual visit was defined as a synchronous interaction through technology requiring both audio and visual input. Patients were considered to have completed a telephone visit (audio input only) if at least 1 telephone visit was completed and no virtual visit was completed. Patients were considered to have completed an in-person visit if at least 1 in-person visit was completed without completion of a virtual or telephone visit. Patient visits were considered no-show if the patient did not complete their scheduled appointment and did not complete another visit type.

Statistical Analysis

Continuous variables were compared using the Kruskal-Wallis test. Categorical variables were compared using the χ^2 test. Effect size was determined using η^2 for continuous variables and Cramer V for categorical variables. To determine 95% CIs, 10 000 bootstrap resamples were used. The interpretation of the Cramer V effect size depended on the degrees of freedom (*df*) for each comparison.[8] For example, in comparisons with 5 *df*, a Cramer V of 0.04 or less was considered a minimal effect; 0.05 to 0.12, a small to medium effect; 0.13 to 0.22, a medium to large effect; and greater than 0.22, a large effect. Univariate and multivariate logistic regression models were created for the following patient-level comparisons: (1) completion of a virtual visit compared with other visit type to identify demographic and SES factors associated with the ability to adopt telehealth; (2) completion of a virtual visit compared with a telephone visit to identify individuals without time-sensitive issues who were unable to access virtual care but were able to access care

through other means; and (3) completion of virtual or telephone visits compared with no-show visits because patients with in-person visits were assumed to have time-sensitive issues that could not be addressed adequately using telehealth. All patient demographic, insurance, and SES variables were candidates for inclusion in the final models. Forward and backward stepwise variable selection was performed to create the most parsimonious multivariate model for each comparison. All statistical analyses were completed using Stata/IC, version 14.2 (StataCorp LLC).

Results

Of the 1162 patients seen in the 1334 encounters included in the study (604 females [52.0%] and 558 males [48.0%]; median age, 55 [range, 0-97] years), 990 (85.2%) completed in-person, virtual, or telephone visits (**Table 1**). Of these 990 patients, 437 (44.1%) completed virtual visits, 409 (41.3%) completed in-person visits, and 144 (14.5%) completed telephone visits. During the first week of the COVID-19 surge in southeast Michigan, in-person encounters were more common (137 [74.1%]); however, as the surge continued, virtual encounters dramatically increased (**Figure**). By the fifth week, almost half of the encounters were virtual (91 [49.2%]). When analyzing patient characteristics by visit type, insurance type had a medium to large effect size, whereas all other characteristics except age had a small to medium effect size (Table 1).

Virtual Compared With All Other Visits

On univariate analysis (**Table 2**), females (odds ratio [OR], 1.34; 95% CI, 1.06-1.70) and patients with preferred provider organization (PPO) insurance (OR, 1.37; 95% CI, 1.01-1.87) were more likely to complete a virtual visit than any other visit type. However, older patients (OR per year of age, 0.98; 95% CI, 0.98-0.99) and those with Medicare insurance (OR, 0.59; 95% CI, 0.42-0.83) were less likely to complete a virtual visit. In addition, patients in the lowest quartile of median household income (OR, 0.58; 95% CI, 0.42-0.82), lowest quartile of households above poverty level (OR, 0.56; 95% CI, 0.39-0.80), lowest quartile of proportion being married (OR, 0.64; 95% CI, 0.45-0.90), and lowest quartile of educational level (OR, 0.66; 95% CI, 0.47-0.94) were less likely to complete a virtual visit.

After multivariate adjustment for age, sex, insurance type, and median household income (Table 2), female patients continued to be more likely to complete a virtual visit than other visit types (OR, 1.43; 95% CI, 1.11-1.84). However, increasing age (OR per year of age, 0.98; 95% CI, 0.98-0.99) and lowest quartile of median household income (OR, 0.60; 95% CI, 0.42-0.86) were independently associated with lower odds of completing a virtual visit compared with other visit types.

Virtual Compared With Telephone Visits

On univariate analysis (**Table 3**) comparing virtual with telephone visits, females (OR, 1.54; 95% CI, 1.05-2.24) and patients with PPO insurance (OR, 2.61; 95% CI, 1.46-4.65) were more likely to complete a virtual visit. However, with each year increase in age (OR, 0.96; 95% CI, 0.95-0.97), patients were less likely to complete a virtual visit. In addition, virtual visits were less likely to be completed by patients with Medicare insurance (OR, 0.48; 95% CI, 0.30-0.79), in the second (OR, 0.53; 95% CI, 0.30-0.93) and lowest (OR, 0.55; 95% CI, 0.31-0.98) quartiles of employment rate, in the lowest quartile of proportion being married (OR, 0.55; 95% CI, 0.32-0.92), in the lowest quartile of median household income (OR, 0.36; 95% CI, 0.21-0.63), in the lowest quartile of educational level (OR, 0.61; 95% CI, 0.36-1.05), and in the lowest quartile of households above the federal poverty line (OR, 0.43; 95% CI, 0.25-0.74).

After multivariate adjustment for age, sex, insurance type, and median household income (Table 3), increasing patient age (OR per year, 0.96; 95% CI, 0.94-0.97), female sex (OR, 1.71; 95% CI, 1.11-2.63), and PPO insurance (OR, 2.70; 95% CI, 1.40-5.20) continued to be independently associated with higher likelihood of completion of virtual visits. Furthermore, Medicaid, no insurance, or other public insurance (OR, 0.47; 95% CI, 0.23-0.94) as well as the second (OR, 0.53; 95% CI, 0.28-0.99) and lowest (OR, 0.33; 95% CI, 0.17-0.62) quartiles of median household income were independently associated with lower likelihood of completion of a virtual visit.

Virtual or Telephone Visit Compared With No-shows

On univariate analysis of virtual or telephone visits compared with visit no-shows (**Table 4**), Black patients (OR, 0.68; 95% CI, 0.46-0.99), patients with Medicaid, no insurance, or other public insurance (OR, 0.51; 95% CI, 0.31-0.83), those in the third (OR, 0.53; 95% CI, 0.31-0.90) and lowest (OR, 0.42; 95% CI, 0.25-0.70) quartiles of median household income census blocks, and those in the third (OR, 0.58; 95% CI, 0.34-0.99) and lowest (OR, 0.42; 95% CI, 0.25-0.71) quartiles of households above the federal poverty line census blocks were less likely to complete a virtual or a telephone visit. Furthermore, patients in the third (OR, 0.48; 95% CI, 0.28-0.82) and lowest (OR, 0.37; 95% CI, 0.22-0.62) quartiles of proportion being married, in the lowest quartile of employment rate (OR, 0.47; 95% CI, 0.28-0.78), and in the lowest quartile of educational level (OR, 0.38; 95% CI, 0.23-0.63) were less likely to complete a virtual or telephone visit. After multivariate adjustment for insurance type and proportion being married (Table 4), the lower 2 quartiles of proportion being married continued to be independently associated with lower likelihood of completing a virtual or telephone visit compared with no-show (OR for third quartile, 0.49 [95% CI, 0.29-0.86]; OR for lowest quartile, 0.39 [95% CI, 0.23-0.67]).

Discussion

This study examined demographic and socioeconomic factors associated with the use of telehealth services within the Department of Otolaryngology–Head & Neck Surgery

Table 1. Patient Characteristics Based on Visit Type From March 17 to May 1, 2020

Characteristic	Visit type[a]				Effect size (95% CI)[b]
	Virtual (n = 437)	Telephone (n = 144)	In-person (n = 409)	No-show (n = 172)	
Age, median (range), y	49 (0-89)	62 (0-90)	57 (0-97)	52 (0-95)	0.01 (0.00-0.02)
Sex					
Male	190 (43.5)	78 (54.2)	205 (50.1)	85 (49.4)	0.07 (0.01-0.14)
Female	247 (56.5)	66 (45.8)	204 (49.9)	87 (50.6)	
Race					
White	254 (58.1)	80 (55.6)	275 (67.2)	90 (52.3)	0.10 (0.06-0.12)
Black	110 (25.2)	38 (26.4)	82 (20.0)	59 (34.3)	
Other	73 (16.7)	26 (18.1)	52 (12.7)	23 (13.4)	
Insurance type					
HMO	131 (30.0)	43 (29.9)	119 (29.1)	43 (25.0)	0.14 (0.08-0.17)
PPO	159 (36.4)	20 (13.9)	123 (30.1)	38 (22.1)	
Medicare	78 (17.8)	53 (36.8)	106 (25.9)	47 (27.3)	
Medicaid, none, or other public	59 (13.5)	27 (18.8)	51 (12.5)	42 (24.4)	
Unknown	10 (2.3)	1 (0.7)	10 (2.4)	2 (1.2)	
Educational level quartile[c]					
Lowest	87 (19.9)	39 (27.1)	86 (21.0)	61 (35.5)	0.08 (0.04-0.08)
Third	92 (21.1)	36 (25.0)	96 (23.5)	36 (20.9)	
Second	126 (28.8)	31 (21.5)	100 (24.4)	37 (21.5)	
Highest	120 (27.5)	33 (22.9)	109 (26.7)	28 (16.3)	
Missing	12 (2.7)	5 (3.5)	18 (4.4)	10 (5.8)	
Median household income quartile					
Lowest	87 (19.9)	43 (29.9)	81 (19.8)	57 (33.1)	0.11 (0.06-0.12)
Third	98 (22.4)	31 (21.5)	103 (25.2)	47 (27.3)	
Second	112 (25.6)	37 (25.7)	91 (22.2)	25 (14.5)	
Highest	128 (29.3)	27 (18.8)	115 (28.1)	33 (19.2)	
Missing	12 (2.7)	6 (4.2)	19 (4.6)	10 (5.8)	
Employment rate quartile[d]					
Lowest	97 (22.2)	38 (26.4)	87 (21.3)	58 (33.7)	0.08 (0.04-0.10)
Third	104 (23.8)	31 (21.5)	91 (22.2)	31 (18.0)	
Second	113 (25.9)	46 (31.9)	93 (22.7)	46 (26.7)	
Highest	111 (25.4)	24 (16.7)	120 (29.3)	27 (15.7)	
Missing	12 (2.7)	5 (3.5)	18 (4.4)	10 (5.8)	
Marriage quartile[e]					
Lowest	89 (20.4)	45 (31.3)	92 (22.5)	58 (33.7)	0.07 (0.03-0.10)
Third	114 (26.1)	25 (17.4)	85 (20.8)	46 (26.7)	
Second	99 (22.7)	35 (24.3)	101 (24.7)	33 (19.2)	
Highest	123 (28.1)	34 (23.6)	113 (27.6)	25 (14.5)	
Missing	12 (2.7)	5 (3.5)	18 (4.4)	10 (5.8)	
English-speaking quartile[f]					
Lowest	111 (25.4)	30 (20.8)	105 (25.7)	32 (18.6)	0.09 (0.04-0.10)
Third	91 (20.8)	31 (21.5)	102 (24.9)	40 (23.3)	
Second	113 (25.9)	30 (20.8)	95 (23.2)	38 (22.1)	
Highest	110 (25.2)	48 (33.3)	89 (21.8)	52 (30.2)	
Missing	12 (2.7)	5 (3.5)	18 (4.4)	10 (5.8)	
Quartile of households above FPL					
Lowest	78 (17.8)	43 (29.9)	95 (23.2)	53 (30.8)	0.09 (0.03-0.10)
Third	115 (26.3)	31 (21.5)	76 (18.6)	46 (26.7)	
Second	113 (25.9)	36 (25.0)	112 (27.4)	36 (20.9)	
Highest	119 (27.2)	28 (19.4)	108 (26.4)	27 (15.7)	
Missing	12 (2.7)	6 (4.2)	18 (4.4)	10 (5.8)	

Abbreviations: FPL, federal poverty line; HMO, health maintenance organization; PPO, preferred provider organization.

[a] Unless otherwise indicated, data are expressed as number (percentage) of participants. Percentages have been rounded and may not total 100.

[b] Based on η^2 test. Cramer V of 0.04 or less indicates minimal effect; 0.05 to 0.12, small to medium effect; 0.13 to 0.22, medium to large effect; and greater than 0.22, large effect.

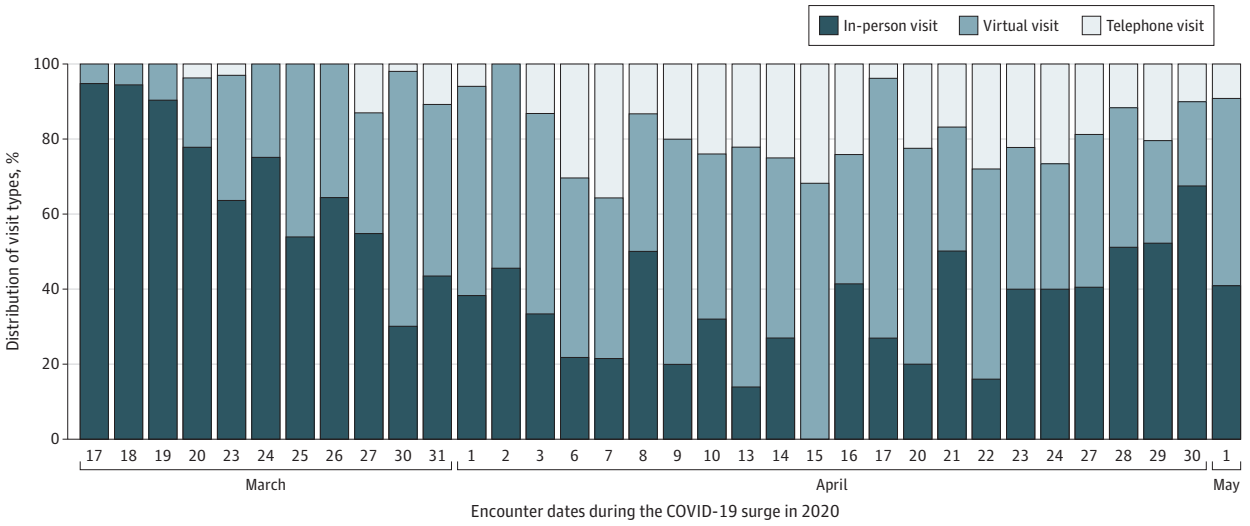
[c] Indicates proportion of individuals 25 years or older completing high school or obtaining a general equivalency diploma or higher education.

[d] Indicates proportion of individuals 16 years or older currently employed.

[e] Indicates proportion of individuals 18 years or older declaring a married status.

[f] Indicates proportion of individuals 5 years and older with the ability to speak English.

Figure. Percentage Distribution of Types of Visits During the Coronavirus Disease 2019 (COVID-19) Surge



at a large, urban tertiary care center in an epicenter of a worldwide COVID-19 surge. From March 17 to May 1, 2020, most patients were seen via virtual visit because care was severely limited owing to COVID-19 population restrictions.[9] Telehealth was viewed as an acceptable alternative to in-person visits because telehealth had been used in otolaryngology during natural disasters, such as after Hurricane Katrina.[10] By accessing otolaryngological care through telehealth during the pandemic, clinicians may be able to provide recommendations for further workup or treatment or to triage patients as appropriate. Although telehealth can be applied to a diverse population of patients, disparities continue to exist in the engagement of telehealth, similar to in-person health care delivery.

Before the COVID-19 pandemic, most studies related to telehealth concerned patients in rural and underserved areas.[11-13] As technology advanced and more insurance products reimbursed for telehealth, clinicians developed pilot studies to determine the feasibility of widespread adoption of video visits in place of in-person visits.[14,15] However, the COVID-19 pandemic resulted in telehealth being necessary for providing real-time medical care. During the COVID-19 pandemic, studies related to telehealth in otolaryngology have focused on the patient's willingness to engage[16,17] or the patient's satisfaction.[18] The present analyses compared synchronous virtual visits with all other types of medical encounters, examining the associations between patient demographics and SES markers and engaging in otolaryngological care during a time when in-person visits were reserved for patients with time-sensitive conditions.

The analysis found that female patients and those with PPO insurance were more likely to engage in virtual visits. Kontos et al[19] suggested that women often assume the role of health care liaison for their family members, resulting in women being more likely to search for a health care clinician online, communicate with a clinician via email or the internet, and track their personal health information online. The present study's findings reflect these health care–seeking traits. In addition, those living in areas in which marriage was less common had the highest probability of not showing for an appointment. Studies have shown that marital status correlates with no-show rates for in-person visits,[20] treatment-seeking behaviors,[21] and overall survival[22]; however, no study has investigated the association of marriage with uptake of telehealth. The potential lack of accountability and encouragement that may be provided by a significant other may account for why unpartnered patients may forgo medical care, either via telehealth or in person.

The present study found that age was associated with accessing otolaryngological care during the COVID-19 surge, specifically that increasing age was associated with a lower likelihood of completing a virtual visit compared with all other visit types. Age is a known factor associated with use of and comfort with information and communication technologies, including using health information, and this is believed to be owing to age-related motivational factors rather than difficulties accessing technology.[23] In addition, previous research has demonstrated that if older adults received training in use, they developed more willingness or motivation to use the advanced technology.[17] Thus, telehealth initiatives should include patient education and training to foster patient access and acceptance, especially targeting older patients. However, ability to use the technology may not be the only issue affecting older adults' engagement in telehealth. Access to home broadband internet is another factor to consider because in 2019, only 59% of those older than 65 years were likely to have home broadband compared with 77% to 79% of those younger than 64 years.[24] Therefore, future telehealth programs aimed at targeting older adults should consider internet access as a potential barrier to accessing care.

Table 2. Univariate and Multivariate Analysis of Virtual Visit Compared With All Other Visits

Covariate	Virtual vs other visit, OR (95% CI)	
	Univariate	Multivariate
Age	0.98 (0.98-0.99)	0.98 (0.98-0.99)
Sex		
Male	1 [Reference]	NA
Female	1.34 (1.06-1.70)	1.43 (1.11-1.84)
Race		
White	1 [Reference]	NA
Black	1.08 (0.81-1.43)	NA
Other	1.27 (0.90-1.78)	NA
Insurance		
HMO	1 [Reference]	NA
PPO	1.37 (1.01-1.87)	1.35 (0.98-1.86)
Medicare	0.59 (0.42-0.83)	0.81 (0.56-1.18)
Medicaid, none, or other public	0.77 (0.53-1.13)	0.70 (0.46-1.07)
Educational level quartile[a]		
Highest	1 [Reference]	NA
Second	1.06 (0.76-1.48)	NA
Third	0.78 (0.55-1.10)	NA
Lowest	0.66 (0.47-0.94)	NA
Median household income quartile		
Highest	1 [Reference]	NA
Second	0.83 (0.59-1.16)	0.86 (0.60-1.22)
Third	0.79 (0.57-1.10)	0.81 (0.57-1.41)
Lowest	0.58 (0.42-0.82)	0.60 (0.42-0.86)
Employment rate quartile[b]		
Highest	1 [Reference]	NA
Second	0.94 (0.67-1.31)	NA
Third	1.05 (0.74-1.48)	NA
Lowest	0.82 (0.58-1.15)	NA
Marriage quartile[c]		
Highest	1 [Reference]	NA
Second	0.82 (0.58-1.15)	NA
Third	1.02 (0.73-1.43)	NA
Lowest	0.64 (0.45-0.90)	NA
English-speaking quartile[d]		
Highest	1 [Reference]	NA
Second	1.19 (0.85-1.67)	NA
Third	0.90 (0.64-1.28)	NA
Lowest	1.14 (0.82-1.60)	NA
Quartile of household incomes above FPL		
Highest	1 [Reference]	NA
Second	0.84 (0.60-1.17)	NA
Third	1.03 (0.73-1.44)	NA
Lowest	0.56 (0.39-0.80)	NA

Abbreviations: FPL, federal poverty line; HMO, health maintenance organization; NA, not applicable; OR, odds ratio; PPO, preferred provider organization.

[a] Indicates proportion of individuals 25 years or older completing high school or obtaining a general equivalency diploma or higher education.

[b] Indicates proportion of individuals 16 years or older currently employed.

[c] Indicates proportion of individuals 18 years or older declaring a married status.

[d] Indicates proportion of individuals 5 years or older with the ability to speak English.

Table 3. Univariate and Multivariate Analysis of Virtual Visit Compared With Telephone Visit

Covariate	Virtual vs telephone visit, OR (95% CI)	
	Univariate	Multivariate
Age	0.96 (0.95-0.97)	0.96 (0.94-0.97)
Sex		
Male	1 [Reference]	NA
Female	1.54 (1.05-2.24)	1.71 (1.11-2.63)
Race		
White	1 [Reference]	NA
Black	0.91 (0.58-1.42)	NA
Other	0.88 (0.53-1.48)	NA
Insurance		
HMO	1 [Reference]	NA
PPO	2.61 (1.46-4.65)	2.70 (1.40-5.20)
Medicare	0.48 (0.30-0.79)	1.02 (0.58-1.78)
Medicaid, none, or other public	0.72 (0.41-1.27)	0.47 (0.23-0.94)
Educational level quartile[a]		
Highest	1 [Reference]	NA
Second	1.12 (0.64-1.94)	NA
Third	0.70 (0.41-1.21)	NA
Lowest	0.61 (0.36-1.05)	NA
Median household income quartile		
Highest	1 [Reference]	NA
Second	0.56 (0.32-1.00)	0.53 (0.28-0.99)
Third	0.70 (0.39-1.25)	0.76 (0.40-1.43)
Lowest	0.36 (0.21-0.63)	0.33 (0.17-0.62)
Employment rate quartile[b]		
Highest	1 [Reference]	NA
Second	0.53 (0.30-0.93)	NA
Third	0.73 (0.40-1.32)	NA
Lowest	0.55 (0.31-0.98)	NA
Married quartile[c]		
Highest	1 [Reference]	NA
Second	2.3 (0.46-1.34)	NA
Third	1.43 (0.71-2.24)	NA
Lowest	0.55 (0.32-0.92)	NA
English-speaking quartile[d]		
Highest	1 [Reference]	NA
Second	1.64 (0.97-2.78)	NA
Third	1.28 (0.75-2.18)	NA
Lowest	1.61 (0.95-2.73)	NA
Quartile of household incomes above FPL		
Highest	1 [Reference]	NA
Second	0.73 (0.42-1.29)	NA
Third	0.87 (0.49-1.54)	NA
Lowest	0.43 (0.25-0.74)	NA

Abbreviations: FPL, federal poverty line; HMO, health maintenance organization; NA, not applicable; OR, odds ratio; PPO, preferred provider organization.

[a] Indicates proportion of individuals 25 years or older completing high school or obtaining a general equivalency diploma or higher education.

[b] Indicates proportion of individuals 16 years or older currently employed.

[c] Indicates proportion of individuals 18 years or older declaring a married status.

[d] Indicates proportion of individuals 5 years or older with the ability to speak English.

In late March 2020, to adapt to government restrictions, CMS, state Medicaid, and commercial insurers waived typical regulations associated with telehealth. Centers for Medicare & Medicaid Services began reimbursing for telephone visits and reimbursed telephone and virtual visits at a level equivalent to in-person visits. With these waivers, clinicians were able to offer scheduled telephone visits along with virtual visits, as well as offer virtual visits on platforms familiar to patients. The present study found that patients in areas with lower median household incomes, who had Medicaid or no insurance, and who were older were more likely to engage in telephone visits. Although virtual care is the preferred method of clinician assessment, these patients were less likely to access this preferred method; however, they were still able to receive care from a clinician via telephone visits. This allowed for evaluation and triage or treatment, thereby increasing equity of care and supporting continued reimbursement for telephone visits by insurers.

Perhaps these patients are also likely to be those with lower access to stable internet, with insufficient cellular data for virtual visits, or without smartphones that would allow completion of virtual visits. Kontos et al[19] found that patient educational level rather than income might be a better measurement of SES in technology use and health communication. However, the percentage of households above the federal poverty line, not educational level, was the only SES marker in the present study that emerged as independently associated with virtual visits. Owing to high data requirements of these virtual visit portals, a patient would need either a smartphone or a tablet or a computer with broadband service. Previous research,[25] however, has found that 29% of adults living with annual household incomes less than $30 000 do not have smartphones, 44% do not have home broadband, and 46% do not have computers. This may be a driving force behind why patients with lower income levels had difficulty accessing virtual care.[25]

Strengths and Limitations

The present study relied on a proxy for patient SES, using census-level and not patient-level data. Thus, inferences of patients' educational and income levels were made based on their residence rather than patient-specific data. Although census-level data are a common proxy for patient-level data, variability within the census block can be wide, making some estimates of patient SES less accurate than patient-level data. In addition, patients might have also presented to the clinic because they were not able to access virtual visits, and this would skew the data. Finally, encounters labeled as a no-show omitted those that were canceled or rescheduled by the patient or clinician before the appointment date. This may introduce a sampling bias because patients who were unable to access telehealth may be at higher risk for canceling or rescheduling their appointments. Therefore, the disparities demonstrated in the present study may underestimate the true magnitude of the issue.

Despite these limitations, this study is a large cohort study demonstrating that SES markers associated with accessing in-person health care extend to telehealth as well.

Table 4. Univariate and Multivariate Analysis of Virtual Visit or Telephone Visit Compared With No-show Visit

	Virtual or telephone visit vs no-show, OR (95% CI)	
Covariate	Univariate	Multivariate
Age	1.00 (0.99-1.01)	NA
Sex		
Male	1 [Reference]	NA
Female	1.14 (0.81-1.60)	NA
Race		
White	1 [Reference]	NA
Black	0.68 (0.46-0.99)	NA
Other	1.16 (0.70-1.93)	NA
Insurance		
HMO	1 [Reference]	NA
PPO	1.16 (0.72-1.89)	1.21 (0.74-2.00)
Medicare	0.69 (0.43-1.10)	0.42 (0.43-1.11)
Medicaid, none, or other public	0.51 (0.31-0.83)	0.63 (0.37-1.07)
Education level quartile[a]		
Highest	1 [Reference]	NA
Second	0.78 (0.45-1.33)	NA
Third	0.65 (0.38-1.12)	NA
Lowest	0.38 (0.23-0.63)	NA
Median household income, quartile		
Highest	1 [Reference]	NA
Second	0.64 (0.37-1.11)	NA
Third	0.53 (0.31-0.90)	NA
Lowest	0.42 (0.25-0.70)	NA
Employment rate quartile[b]		
Highest	1 [Reference]	NA
Second	0.69 (0.41-1.17)	NA
Third	0.87 (0.49-1.54)	NA
Lowest	0.47 (0.28-0.78)	NA
Marriage quartile[c]		
Highest	1 [Reference]	NA
Second	0.65 (0.37-1.14)	0.64 (0.36-1.15)
Third	0.48 (0.28-0.82)	0.49 (0.29-0.86)
Lowest	0.37 (0.22-0.62)	0.39 (0.23-0.67)
English-speaking quartile[d]		
Highest	1 [Reference]	NA
Second	1.24 (0.77-1.99)	NA
Third	1.00 (0.62-1.61)	NA
Lowest	1.45 (0.88-2.38)	NA
Quartile of household incomes above FPL		
Highest	1 [Reference]	NA
Second	0.76 (0.44-1.32)	NA
Third	0.58 (0.34-0.99)	NA
Lowest	0.42 (0.25-0.71)	NA

Abbreviations: FPL, federal poverty line; HMO, health maintenance organization; NA, not applicable; OR, odds ratio; PPO, preferred provider organization.

[a] Indicates proportion of individuals 25 years or older completing high school or obtaining a general equivalency diploma or higher education.

[b] Indicates proportion of individuals 16 years or older currently employed.

[c] Indicates proportion of individuals 18 years or older declaring a married status.

[d] Indicates proportion of individuals 5 years or older with the ability to speak English.

However, the CMS waivers allowed the provision of telehealth across different populations, platforms, and media that were not an option before the COVID-19 pandemic, particularly the ability to provide telephone visits for care. These waivers likely allowed for the provision of care to more patients than could have been reached by virtual care alone. Because the present study included all patients who had an appointment scheduled from March 17 through May 1, 2020, we were able to capture the entire patient population of the multisubspecialty, tertiary care–centered otolaryngology practice. In addition, the department serves a very diverse patient population, from newborn to geriatric patients with all subspecialties, allowing for adequate representation of the general population.

Conclusions

Owing to the plethora of virtual visits during the COVID-19 pandemic, future studies should focus on the accuracy of the telemedicine diagnosis, the need for in-person follow-up visits owing to conditions not being easily assessed via telehealth, and improvements in accessibility for patients and clinicians. The present study points to the need to offer telephone-only telehealth options for patients to decrease health care disparities that exist for both in-person and virtual care because those in lower income and older populations were less likely to engage in care when only virtual care was offered and were more likely to engage in care offered by telephone. This should be considered by CMS and commercial payers as telehealth becomes increasingly integrated into medical practice to ensure equitable access to health care across the US population.

The present study explored demographic, insurance, and SES factors associated with patient access to otolaryngological telehealth services during the COVID-19 surge in March and April of 2020. The timely implementation of telehealth in an otolaryngology department, as well as the CMS waivers for care, allowed for patient care during the COVID-19 surge. Current findings identify and highlight that age, sex, median household income, insurance status, and marital status were associated with a patient's participation in telehealth. In the future, these findings can help clinicians focus on vulnerable patient populations who require access to specialty medical care in a changing landscape of telehealth.

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