Appointment Non-attendance for Telehealth Versus In-Person Primary Care Visits at a Large Public Healthcare System

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BACKGROUND: Appointment non-attendance has clinical, operational, and financial implications for patients and health systems. How telehealth services are associated with non-attendance in primary care is not well-described, nor are patient characteristics associated with telehealth non-attendance.

OBJECTIVE: We sought to compare primary care non-attendance for telehealth versus in-person visits and describe patient characteristics associated with telehealth non-attendance.

DESIGN: An observational study of electronic health record data.

PARTICIPANTS: Patients with primary care encounters at 23 adult primary care clinics at a large, urban public healthcare system from November 1, 2019, to August 31, 2021.

MAIN MEASURES: We analyzed non-attendance by modality (telephone, video, in-person) during three time periods representing different availability of telehealth using hierarchal multiple logistic regression to control for patient demographics and variation within patients and clinics. We stratified by modality and used hierarchal multiple logistic regression to assess for associations between patient characteristics and non-attendance in each modality.

KEY RESULTS: There were 1,219,781 scheduled adult primary care visits by 329,461 unique patients: 754,149 (61.8%) in-person, 439,295 (36.0%) telephonic, and 26,337 (2.2%) video visits. Non-attendance for telephone visits was initially higher than that for in-person visits (adjusted odds ratio 1.04 [95% CI 1.02, 1.07]) during the early telehealth availability period, but decreased later (0.82 [0.81, 0.83]). Non-attendance for video visits was higher than for in-person visits during the early (4.37 [2.74, 6.97]) and later (2.02 [1.95, 2.08]) periods. Telephone visits had fewer differences in non-attendance by demographics; video visits were associated with increased non-attendance for patients who were older, male, had a primary language other than English or Spanish, and had public or no insurance.

CONCLUSIONS: Telephonic visits may improve access to care and be more easily adoptable among diverse populations. Further attention to implementation may be needed to avoid impeding access to care for certain populations using video visits.

KEY WORDS: Telehealth; Primary care; Non-attendance; No show.

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INTRODUCTION

Appointment non-attendance is associated with poorer clinical outcomes, suboptimal resource utilization, and lost revenue.[1] Telehealth visits—herein referring to synchronous audio-only or audio-video episodes of care between patients and clinicians for acute, chronic, or preventive care—may alleviate barriers to attendance such as distance, travel time, need for caregiving support, time off from work, or other competing commitments.[1, 2] However, they may not address other reasons for non-attendance and may introduce new barriers related to technology access and literacy.

Prior studies of non-attendance for telehealth visits have been mixed.[3–6] Many are from single sites with relatively small and homogenous patient populations.[3–6] Whether telehealth visits are associated with non-attendance and whether there are certain patient characteristics associated with nonattendance for telehealth visits are not well-described. During the coronavirus disease pandemic, many health systems newly began offering telehealth services, allowing the study of telehealth usage at a previously unprecedented scale.

We aimed to (1) compare primary care appointment non-attendance for telehealth versus in-person visits at a large, urban public healthcare system; and (2) describe patient characteristics associated with non-attendance. We hypothesized that telehealth visits would have lower non-attendance than in-person visits and that older age, non-White race, and non-English primary language would be associated with non-attendance in telehealth. These hypotheses are based on the notion that while some barriers to primary care attendance in safety-net settings[1,2] may potentially be alleviated by telehealth, previously

identified demographic differences in telehealth participation[3, 5, 7, 8] (which may be systemic in nature) may persist.

METHODS

In this observational study, we used electronic health record (EHR) data from November 1, 2019, to August 31, 2021, from 23 adult primary care clinics at New York City Health + Hospitals—a network of hospital- and community-based clinical sites. We include all adult primary care visits scheduled with physicians, nurse practitioners, and physician assistants.

The primary outcome was appointment non-attendance, identified by visit status and absent encounter billing codes in the EHR.

We classified encounters as audio-only telehealth (telephone visit), audio-video telehealth (video visit), or in-person. Visit modality was determined based on the type of visit scheduled and billing codes for completed visits. The scheduled visit type was used to classify visits that were not completed. Billing codes were used to identify the actual modality used for completed visits; for example, visits scheduled as video visits but billed as completed using audio-only were counted as telephone visits. Completed telephone visits were identified by Current Procedural Terminology (CPT) codes 99441–99443. Completed video visits were identified by the presence of a GT or 95 modifier on CPT codes for in-person evaluation and management or preventive services (such as 99201–99205, 99211–99215, 99381–99397).

We report the proportion of encounters that resulted in non-attendance by modality. We used a chi-squared test to assess for differences in average appointment non-attendance between telehealth and in-person modalities. We used a p-value of <0.05 to determine statistical significance.

We describe the percentage of completed telehealth visits that were scheduled as one visit type and completed via another modality.

Since attitudes and experiences with telehealth may have changed over time, we analyzed three time periods representing intervals prior to widespread telehealth implementation (November 2019–February 2020; "pre-telehealth period"), initial telehealth implementation with mandated restrictions for in-person visits (March 2020–June 2020; "telehealth transition period"), and optional use of telehealth with the removal of in-person volume restrictions (July 2020–August 2021; "elective telehealth period").

During the pre-telehealth period, patients were able to schedule in-person appointments via their local clinic, a centralized scheduling contact center for the health system, or via the patient portal. Telephone and video visits were not widely available at a system level, though select sites may have been conducting pilots of telehealth services. During the telehealth transition period, all visits (in-person, telephone, video) were scheduled via local clinics or the contact center with a mandate for telehealth visits with exceptions granted on case-by-case bases by clinic staff; patient portal scheduling was disabled. Finally, during the elective telehealth period, clinic and contact center scheduling continued for all visit types, and patient portal scheduling was reactivated with patients now being able to schedule in-person, telephone, or video revisits via the patient portal. Less than 5% of all visits in any time period were scheduled via the patient portal.

For telephone visits, no applications were required by patients or clinicians. Sessions were generally conducted by regular mobile or landline calling. For video visits, patients were asked to log into the patient portal via a mobile application or website to access the visit; clinicians joined the video session through an integrated platform in the EHR. During the telehealth transition period, patients could typically only join video visits via the patient portal. During the elective telehealth period, in the case of a malfunction or issues with patient portal access, clinicians could choose to email patients (via the EHR) or text patients (via a non-integrated video platform) a link to join a video instance directly without going through the patient portal. If clinicians are unable to connect with the patient by video, they are asked to call them by telephone.

To compare non-attendance between modalities while controlling for differences in patient characteristics (age, sex, race/ethnicity, preferred language, insurance, number of Elixhauser comorbidities[9]), we used hierarchal multiple logistic regression for each time period with random effects of patients and clinics to account for clustering within patients and clinics.

Finally, to assess demographic associations with non-attendance by modality, we stratified by visit modality and used hierarchal multiple logistic regression with patient characteristics for each time period, again accounting for clustering within patients and clinics.

We used Stata SE, version 15 (StataCorp), for all analyses. This study was exempt from full review by the Biomedical Research Alliance of New York institutional review board. We followed the Strengthening the Reporting of Observational Studies in Epidemiology reporting guidelines for cross-sectional studies.

RESULTS

There were 1,219,781 scheduled adult primary care visits by 329,461 unique patients. The median patient age was 56 years old (interquartile range 43–66 years old). Most patients were female (57.6%) and non-White (33.3% Black, 33.7% Hispanic, 6.8% Asian, 15.9% something else), with 42.4% preferring a language other than English as their primary language (Table 1). A majority of patients had

Table 1 Patient Demographics (*N*=329,461)

Demographic	*N* (%)
Age, years	
18–44	119,727 (36.3)
45–64	136,658 (41.5)
≥65	73,076 (22.2)
Female	189,689 (57.6)
Race/ethnicity	
White	33,833 (10.3)
Black	109,618 (33.3)
Hispanic	111,126 (33.7)
Asian	22,377 (6.8)
Something else	52,507 (15.9)
Primary language	
English	189,995 (57.7)
Spanish	114,522 (34.8)
Something else	24,944 (7.6)
Insurance	
Commercial	52,792 (16.0)
Medicaid	152,052 (46.2)
Medicare	53,057 (16.1)
Other	2,017 (0.6)
Uninsured	69,543 (21.1)
Elixhauser comorbidity count	
0	105,053 (31.9)
1	84,162 (25.6)
≥2	140,246 (42.6)
Number of visits scheduled	
1	97,174 (29.5)
2–5	154,635 (46.9)
≥6	77,652 (23.6)

public insurance (46.2% Medicaid, 16.1% Medicare), and 42.6% had two or more comorbidities (Table 1). Of scheduled adult primary care visits, 754,149 (61.8%) were in-person, 439,295 (36.0%) were telephonic, and 26,337 (2.2%) were video visits.

Overall non-attendance was 26.5%, 25.7%, and 35.6% for in-person, telephonic, and video visits, respectively ($p<0.001$ for all pairwise comparisons).

During the pre-telehealth period, there were 209,198 (99.3%) in-person visits with an average non-attendance of 27.1% (Fig. 1). Telehealth visits were not a widely available option during this period, but there were 1385 (0.7%) telephonic and 7 (0.0%) video visits with an average non-attendance of 85.6% and 0.0%, respectively. These were related to telehealth pilot programs at select primary care sites independent of central efforts to implement telehealth across the health system. Of completed visits scheduled as telephone visits, 97.8% were completed as telephone visits and 2.2% were completed as in-person visits. During the telehealth transition period, there were 52,697 (28.4%) in-person and 132,713 (71.5%) telephonic visits with average non-attendance of 36.5% and 35.2% (Fig. 1; $p<0.001$ for in-person versus telephonic visit non-attendance). Video visits were introduced at a system level later in this period, and there were 98 (0.1%) video visits with an average non-attendance of 67.3% ($p<0.001$ for video versus in-person and video versus telephonic visit non-attendance). Of completed visits scheduled as telephone visits, 99.9% were completed as telephone visits and 0.1% were completed as in-person visits. In contrast, of completed visits scheduled as video visits, only 9.6% were completed as video visits; 65.6% were completed as telephone visits, and 24.8% were completed as in-person visits. During the elective telehealth period, there were 492,254 (59.8%) in-person, 305,197 (37.1%) telephonic, and 26,232 (3.2%) video visits with average non-attendance of 25.2%, 21.2%, and 35.5% (Fig. 1; $p<0.001$ for all pairwise comparisons of non-attendance). Of completed visits scheduled as telephone visits, 99.9% were conducted as telephone visits and 0.1% were conducted as in-person visits. Of completed visits scheduled as video visits, 50.9% were completed as video visits, 48.9% were conducted as telephone visits, and 0.2% were conducted as in-person visits.

After controlling for demographic factors and accounting for patient and clinic variation, during the telehealth transition period, there were higher odds of non-attendance for telephonic visits (adjusted odds ratio 1.04 [95% CI 1.02, 1.07]) and video visits (4.37 [2.74, 6.97]) compared with in-person visits. In the elective telehealth period, telephonic visits had lower odds of non-attendance compared with in-person visits (0.82 [0.81, 0.83]) and video visits had higher odds of non-attendance (2.02 [1.95, 2.08]) compared with in-person visits.

For demographic associations with non-attendance, during the pre-telehealth period, patients who were male, Black, and had public, other, or no insurance were more likely to no-show for in-person visits compared with patients who were female, White, or had commercial insurance; patients who were older than 45 years, Asian, spoke a language other than English as their primary language, and had more comorbidities were less likely to no-show for in-person visits compared with patients who were 18–44 years old, White, spoke English as a primary language, or had no comorbidities (Table 2).

During the telehealth transition period, factors associated with non-attendance for in-person visits in the pre-telehealth period generally became more attenuated. Non-attendance for telephone visits had fewer differences by demographic groups compared with in-person visits; for example, differences by age, Black, Hispanic, and other race/ethnicity (but not Asian) became non-significant (Table 3). Video visits did not have a sufficient sample size for statistical inference.

During the elective telehealth period, relative non-attendance for in-person visits for patients who were older, non-White, or uninsured trended towards lower non-attendance compared with the pre-telehealth period. Meanwhile, relative non-attendance for in-person visits for patients who were male, had a primary language other than English, public or other insurance, or more comorbidities trended towards higher non-attendance compared with the pre-telehealth period. Non-attendance for telephone visits remained as having fewer differences by demographic compared with in-person visits. Non-attendance for video visits was more likely among patients who were older, male, had a primary language other than English or Spanish, and who had public or no insurance compared with patients who were 18–44 years old, female, spoke English as a primary language, or who had

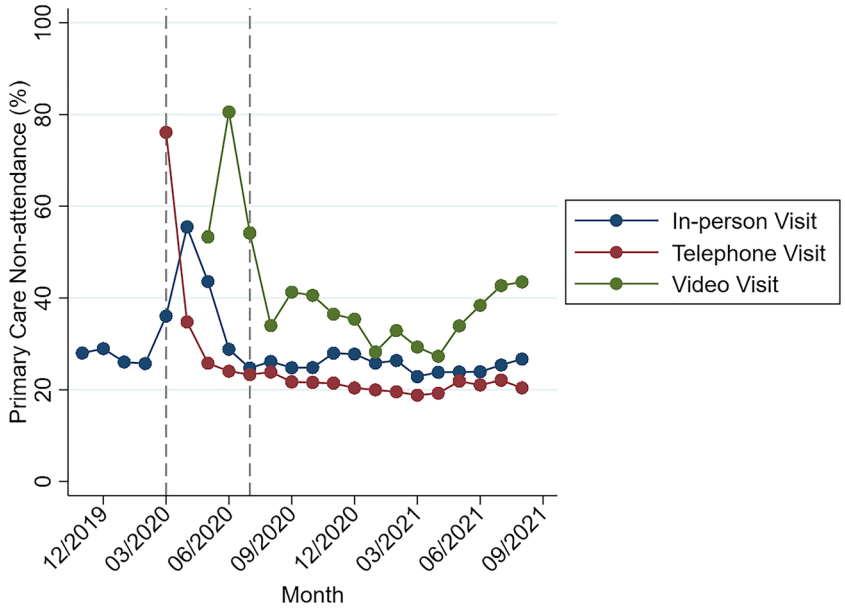

Fig. 1 Average monthly non-attendance rate for telehealth and in-person visits. The vertical lines demarcate the three time periods for pre-telehealth, telehealth transition, and elective telehealth periods. Non-attendance rates for telehealth visits during the pre-telehealth period when they were not standard offerings are not shown.

commercial insurance; patients identifying as Asian or other race/ethnicity and with more comorbidities had relatively lower non-attendance compared with patients who were White or with no comorbidities (Table 4).

Table 2 Associations of Demographic Factors with Primary Care Non-attendance by Visit Modality, Pre-telehealth Period

	In-person visit (*N* =209,198)	Telephone visit (*N* =1385)	Video visit (*N* =7)
Demographic	**Adjusted odds ratio (95% confidence interval) of non-attendance**		
Age, years			
18–44	Ref.	—	—
45–64	0.81 [0.78, 0.83]	—	—
≥65	0.81 [0.77, 0.84]	—	—
Sex			
Female	Ref.	—	—
Male	1.21 [1.18, 1.24]	—	—
Race/ethnicity			
White	Ref.	—	—
Black	1.13 [1.08, 1.18]	—	—
Hispanic	0.93 [0.87, 1.00]	—	—
Asian	0.59 [0.55, 0.63]	—	—
Something else	0.95 [0.91, 1.00]	—	—
Primary language			
English	Ref.	—	—
Spanish	0.69 [0.64, 0.73]	—	—
Something else	0.69 [0.66, 0.73]	—	—
Insurance			
Commercial	Ref.	—	—
Medicaid	1.49 [1.43, 1.54]	—	—
Medicare	1.26 [1.20, 1.33]	—	—
Other	1.16 [1.01, 1.33]	—	—
Uninsured	1.92 [1.85, 2.00]	—	—
Elixhauser comorbidity count			
0	Ref.	—	—
1	0.29 [0.28, 0.30]	—	—
≥2	0.21 [0.20, 0.22]	—	—

DISCUSSION

In this study, comparing non-attendance rates for telehealth and in-person adult primary care visits at a large, urban public healthcare system, we found that telephone visits had similar or lower non-attendance than in-person visits, but video visits had higher non-attendance than in-person and telephone visits. For completed visits, compared with visits scheduled as telephone visits, visits scheduled as video visits had significantly higher rates of discordance between scheduled visit type and modality of completion. Telephone visits had fewer differences in non-attendance by demographic, while video visits were associated with increased non-attendance even for groups that had relatively lower non-attendance for in-person visits.

Our findings support the notion that telephone visits may be more easily adopted by patients than video visits and may improve access to care in a safety-net population. Though comparisons of raw non-attendance rates across modalities showed that telephone visits consistently had lower non-attendance, after adjusting for demographic factors and patient- and clinic-level variation, we found that telephone visits had a marginally higher odds of non-attendance compared with in-person visits during the telehealth transition period. This may reflect initial friction related to patients and clinicians both learning how to engage in care by telephone. Another consideration is that since in-person visits during the telehealth transition period were restricted, remaining in-person visits may have been of a different complexity or acuity than telehealth visits and may have had relatively lower no-show rates. But after the initial adoption, telephone visits had the lowest non-attendance of all modalities. Furthermore, the relative accessibility of telephone visits compared with video visits is

Table 3 Associations of Demographic Factors with Primary Care Non-attendance by Visit Modality, Telehealth Transition Period

	In-person visit (*N*=52,697)	Telephone visit (*N* =132,713)	Video visit (*N* =98)
Demographic	**Adjusted odds ratio (95% confidence interval) of non-attendance**		
Age, years			
18–44	Ref.	Ref.	—
45–64	0.87 [0.83, 0.92]	1.01 [0.98, 1.05]	—
≥65	0.97 [0.90, 1.04]	1.03 [0.98, 1.07]	—
Sex			
Female	Ref.	Ref.	—
Male	1.11 [1.06, 1.15]	1.19 [1.16, 1.23]	—
Race/ethnicity			
White	Ref.	Ref.	—
Black	0.93 [0.87, 1.00]	1.03 [0.98, 1.09]	—
Hispanic	0.83 [0.74, 0.94]	1.06 [0.98, 1.15]	—
Asian	0.61 [0.55, 0.68]	0.84 [0.78, 0.90]	—
Something else	0.93 [0.86, 1.01]	1.01 [0.95, 1.06]	—
Primary language			
English	Ref.	Ref.	—
Spanish	0.94 [0.85, 1.05]	0.88 [0.81, 0.95]	—
Something else	0.98 [0.91, 1.07]	0.97 [0.92, 1.02]	—
Insurance			
Commercial	Ref.	Ref.	—
Medicaid	1.82 [1.71, 1.94]	1.08 [1.04, 1.13]	—
Medicare	1.51 [1.38, 1.64]	0.92 [0.88, 0.97]	—
Other	1.28 [1.02, 1.60]	1.14 [1.00, 1.29]	—
Uninsured	2.10 [1.97, 2.25]	1.43 [1.38, 1.50]	—
Elixhauser comorbidity count			
0	Ref.	Ref.	—
1	0.44 [0.41, 0.46]	0.57 [0.55, 0.59]	—
≥2	0.33 [0.31, 0.35]	0.47 [0.45, 0.49]	—

reflected in the percentages of completed telehealth visits scheduled as one visit type but completed via another modality: approximately 98–99% of completed visits scheduled as telephone visits were completed via telephone, versus only approximately 10% (in the telehealth transition period) to approximately 51% (in the elective telehealth period). Most completed visits that were scheduled as video visits but completed via a different modality were completed as telephone visits. This may also support the idea of increasing payor coverage for audio-only visits to increase access to care, but future work would need to evaluate the outcomes of audio-only visits. Currently, few studies have evaluated the efficacy of video visits[10, 11] and even fewer of audio-only visits[12]. Potential tradeoffs between accessibility and quality are important for stakeholders to consider when deciding which modalities to allocate resources towards.

Higher non-attendance for video visits relative to telephone and in-person visits highlights challenges in the implementation and dissemination of this modality. Particularly, disparities in age, sex, race/ethnicity, and language may warrant additional attention for the design of telehealth services. Prior studies have shown that patients who are older, male, or who have limited English proficiency may be less inclined to participate in telehealth and that there are racial and ethnic differences in telehealth participation even before the pandemic.[7, 8] One study found that patients with limited English proficiency who have used video visits before may be no less likely than patients without limited English proficiency to use video visits over telephone visits, suggesting that helping these patients use video visits for the first time may facilitate future use.[8] Requirements for accessing video visits via the EHR's patient portal (which may only be available in limited lan-

Table 4 Associations of Demographic Factors with Primary Care Non-attendance by Visit Modality, Elective Telehealth Period

	In-person visit (*N*=492,254)	Telephone visit (*N* =305,197)	Video visit (*N* =26,232)
Demographic	**Adjusted odds ratio (95% confidence interval) of non-attendance**		
Age, years			
18–44	Ref.	Ref.	Ref.
45–64	0.78 [0.76, 0.80]	0.94 [0.91, 0.97]	1.11 [1.01, 1.23]
≥65	0.70 [0.68, 0.72]	1.01 [0.97, 1.06]	1.33 [1.14, 1.56]
Sex			
Female	Ref.	Ref.	Ref.
Male	1.30 [1.28, 1.33]	1.34 [1.31, 1.37]	1.58 [1.44, 1.72]
Race/ethnicity			
White	Ref.	Ref.	Ref.
Black	0.94 [0.91, 0.97]	1.05 [1.00, 1.09]	1.14 [0.97, 1.34]
Hispanic	0.86 [0.81, 0.90]	0.95 [0.89, 1.02]	1.19 [0.93, 1.53]
Asian	0.53 [0.50, 0.55]	0.71 [0.67, 0.75]	0.42 [0.34, 0.51]
Something else	0.87 [0.83, 0.90]	0.98 [0.94, 1.03]	0.75 [0.63, 0.89]
Primary language			
English	Ref.	Ref.	Ref.
Spanish	0.74 [0.70, 0.77]	0.99 [0.93, 1.05]	1.25 [0.99, 1.57]
Something else	0.81 [0.78, 0.84]	1.05 [1.00, 1.10]	1.93 [1.62, 2.31]
Insurance			
Commercial	Ref.	Ref.	Ref.
Medicaid	1.51 [1.47, 1.55]	1.16 [1.12, 1.20]	1.31 [1.17, 1.47]
Medicare	1.50 [1.44, 1.56]	1.12 [1.07, 1.17]	1.97 [1.64, 2.36]
Other	1.26 [1.13, 1.40]	1.14 [1.00, 1.31]	1.46 [0.78, 2.72]
Uninsured	1.67 [1.62, 1.72]	1.43 [1.37, 1.49]	1.60 [1.39, 1.85]
Elixhauser comorbidity count			
0	Ref.	Ref.	Ref.
1	0.36 [0.35, 0.37]	0.50 [0.49, 0.52]	0.41 [0.36, 0.46]
≥2	0.27 [0.27,0.28]	0.40 [0.39, 0.41]	0.28 [0.25, 0.32]

guages) or lack of interpreter services integration may introduce systematic influence over video visit participation. Other barriers that may contribute to this observed difference may be related to technology access and literacy[7], trust, or individual or cultural expectations around medical care. Clinician engagement may also be an influential factor as well; if video visits are cumbersome to conduct during a busy clinic day, clinicians may be less inclined to connect with patients using video or perform secondary outreach by phone. During the telehealth transition period, over a quarter of completed visits scheduled as video visits were completed as in-person visits, suggesting potential lapses in communication or instruction around video visits that could also have contributed to non-attendance. Each barrier may require different interventions to address. Our findings contrast with prior literature that shows lower non-attendance for video visits, though studies differed in setting and patient demographics.[3–5]

Finally, certain demographic groups had consistent trends in non-attendance across all time periods and visit modalities. Patients who were male or had public, other, or no insurance generally had higher non-attendance compared with patients who were female or who had commercial insurance. Patients who were Asian or who had more comorbidities generally had lower non-attendance compared with patients who were White or who had no comorbidities. Many of these trends echo previously observed differences, for example, in non-attendance seen among male patients[13, 14] and those with more comorbidities[13] in primary care. Higher non-attendance for publicly insured or uninsured patients has been reported in several clinical settings[15–17], as has lower non-attendance for Asian patients.[16] Ultimately, patients in groups with persistent differences in nonattendance may contrast with comparator groups in their perceived need for medical care, self-perception of health, competing demands, financial status, education level, and medical trust, as well as general experiences with systemic barriers in the design of healthcare services.[1, 2] Other demographic groups, for example, patients who were older, Black or Hispanic, and who have a primary language other than English, had shifting trends in non-attendance for in-person visits between the pre-telehealth and elective telehealth periods. This may reflect the emergence of preferences or aversions for service modalities aftercare experiences during the pandemic. These observed differences may be opportunities for additional outreach or service redesign for patients with high non-attendance and to learn more about enabling factors for patients with lower non-attendance.

Limitations

We were unable to control for appointment scheduling lead time, which has been associated with attendance. We were also unable to control for visit complexity or urgency, which may have affected non-attendance (particularly for in-person visits) during the telehealth transition period. Since in-person visits were restricted during this period, it is possible these visits were reserved for more complex or acute cases and non-attendance rates may have been artificially lower. There was a relatively low proportion of video visits during the study period, though the absolute number was sufficient for statistical inference, and it reflects a period of ongoing growth in video visit utilization. The study of a steady state at higher video visit utilization may yield different results. A large proportion of completed visits scheduled as video visits were completed via another modality (and thus counted as attended visits for the completed modality rather than the scheduled modality). This may skew the representation of the receipt of intended services (i.e. the scheduled visit type), but since a medical service was still received, we felt it was appropriate to count it towards the completion of the used visit modality. Our data are from a single urban health system and may not be generalizable to other settings; however, it is a large system with many locations and diverse patients. The sample interval was during a global pandemic, which may not be reflective of non-pandemic behavior.

CONCLUSIONS

Telephonic visits have lower non-attendance rates than in-person and video visits, thus perhaps increasing access to care, and may be more easily adopted among diverse populations as a telehealth modality compared with video visits. Video visits may have higher non-attendance rates than in-person and telephone visits in certain populations, particularly older patients and those who may require language services, and further work is needed to implement more equitable means of accessing remote care.

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