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Primary Care Appointment Completion Rates and Telemedicine Utilization Among Black and Non-Black Patients from 2019 to 2020

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Abstract

Objective: To understand how differences in primary care appointment completion rates between Black and non-Black patients changed in 2020 within the context of the COVID-19 pandemic and when telemedicine utilization peaked.

Materials and Methods: We conducted a retrospective cohort study using the electronic health record from January 1 to December 31, 2020, among all adults scheduled for a primary care appointment within a large academic medical center. We used mixed-effects logistic regression to estimate adjusted appointment completion rates for Black patients compared with those for non-Black patients in 2020 as compared with those in 2019 within four time periods: (1) pre-pandemic

(January 1, 2020, to March 12, 2020), (2) shutdown (March 13, 2020, to June 3, 2020), (3) reopening (June 4, 2020, to September 30, 2020), and (4) second wave (October 1, 2020, to December 31, 2020).

Results: Across 1,947,399 appointments, differences in appointment completion rates between Black and non-Black patients improved in all time periods: +1.4 percentage points pre-pandemic (95% confidence interval [CI]: +0.8 to +2.0), +11.7 percentage points during shutdown (95% CI: +11.0 to +12.3), +8.2 percentage points during reopening (95% CI: +7.8 to +8.7), and +7.1 percentage points during second wave (95% CI: +6.4 to +7.8) (all p-values <0.001). The types of conditions managed by primary care shifted during the shutdown period, but the remainder of 2020 mirrored those from 2019.

Discussion: Racial differences in appointment completion rates narrowed significantly in 2020 even as the mix of disease conditions began to mirror patterns observed in 2019.

Conclusions and Relevance: Telemedicine may be an important tool for improving access to primary care for Black patients. These findings should be key considerations as regulators and payors determine telemedicine's future.

Keywords: telemedicine, COVID-19, telehealth, vulnerable populations

Introduction

Greater primary care access has been associated with lower mortality rates and better population health outcomes.¹⁻³ Black Americans have lower life expectancy, a greater burden of chronic medical conditions, and have faced longstanding barriers to primary care.^{4,5} They are more likely to reside in areas with a low

supply of primary care providers, encounter insurance barriers, spend more time traveling to medical appointments, and have work or family obligations that limit their ability to complete scheduled appointments.^{6–11}

As cases of COVID-19 increased dramatically in March 2020, health systems around the country limited in-person clinic appointments and rapidly expanded audiovisual and audio-only telemedicine.¹² Facilitated by desires to minimize the spread of COVID-19, improved reimbursement rates, and regulatory waivers under the public emergency declaration, telemedicine largely replaced in-person primary care early in the pandemic.^{13,14} As 2020 continued, however, COVID-19 cases waned, the future of reimbursement policies and regulator waivers for telemedicine became uncertain, and the volume of telemedicine appointments began to decline from its peak.^{15,16} How telemedicine will be reimbursed and regulated after the public health emergency ends and to what degree providers will continue to offer telemedicine remains unknown.^{17,18}

Understanding how telemedicine has and can impact disparities in primary care access for Black patients is an important consideration.^{19,20} Evaluations early in the pandemic highlighted how fewer Black patients reported using telemedicine, especially audiovisual visits, relative to White patients.^{21,22} However, these early studies may not have captured the full picture. Despite differences in uptake, telemedicine has the potential to reduce racial disparities in primary care access by helping patients who previously faced barriers to in-person care (e.g., travel time and costs).

Alternatively, telemedicine could exacerbate disparities if access gains are limited to well-resourced patients (e.g., those who can access adequate broadband speeds or digital devices). How the addition of telemedicine, as an alternative to in-person care, affects health care access for Black patients has been understudied.

To better understand the relationship between telemedicine utilization and primary care access for Black patients, we used data from the University of Pennsylvania Health System (“Penn Medicine”) to estimate changes in primary care appointment completion rates, one measure of primary care access, among Black and non-Black patients during four distinct time periods in 2020, reflecting phases of the COVID-19 pandemic in our region, and compared with 2019 completion rates. To contextualize these findings, we analyzed telemedicine utilization and the types of conditions managed by primary care over the same time periods.

Materials and Methods

This is a retrospective cohort study that was determined to be exempt by the University of Pennsylvania Institutional Review

Board and was classified as quality improvement. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.²³

SETTING

Penn Medicine is a large regional academic medical center serving southeast Pennsylvania, New Jersey, and Delaware, with 6 acute care facilities and >60 primary care offices. Annually, Penn Medicine has ~1 million outpatient primary care encounters, serving >550,000 patients.

STUDY SAMPLE

Using the electronic medical record (EMR), we extracted data from all appointments for adults 18 years or older that were scheduled with a Penn Medicine primary care provider (i.e., internal medicine or family medicine, including physicians and advanced practice providers) between January 1, 2019, and December 31, 2020.

For 2020, we delineated four time periods of interest: (1) a “prepandemic” period between January 1, 2020, and March 12, 2020; (2) a “shutdown” period between March 13, 2020, and June 3, 2020, the time period when a regional stay-at-home orders and a federal public health emergency were declared¹³; (3) a “reopening” period between June 4, 2020, and September 30, 2020, when stay-at-home orders were lifted regionally and in-person appointments rebounded; and (4) a “second wave” period between October 1, 2020, and December 31, 2020, when COVID-19 cases and hospitalizations increased again in Philadelphia.²⁴ Corresponding 2019 calendar-based time periods (e.g., January 1 to March 12) were used as controls for the four time periods of interest in 2020.

STUDY VARIABLES

The primary outcome was whether a primary care appointment was completed as opposed to canceled or no show. All appointments, irrespective of in-person or telemedicine modality, are recorded in the EMR as either completed, canceled in advance (“canceled”), or no show. This designation is completed at the encounter level and a given patient may have had multiple encounters with different outcomes. The independent variables of interest were the race of the patient (Black or non-Black) and year that the appointment was scheduled. A secondary outcome was the share of completed appointments conducted through telemedicine in 2020, further categorized as audiovisual or audio only.

Telemedicine appointments were identified in the EMR using appointment types specific to telemedicine, and subclassified further using current procedural terminology (CPT) modifier codes into audiovisual (GT) or audio-only (GQ) appointments. At Penn Medicine, the EMR requires providers to

use a CPT modifier for all telemedicine appointments or the provider cannot submit the encounter for billing purposes, completing the encounter. Canceled or no-show appointments do not have an audiovisual or audio-only designation because the modifier code could only be applied to completed encounters after the visit.

Audiovisual appointments were conducted using a telemedicine platform either through a desktop browser, desktop application, or smartphone application that was transitioned to a web real-time communication (WebRTC) browser client starting on December 11, 2020. WebRTC does not require patients to have a desktop or smartphone application to conduct telemedicine appointments. Audio-only appointments could occur using the telemedicine platform or conventional telephone. Because few telemedicine appointments were scheduled in 2019 (<1%), we do not compare 2020 with 2019 telemedicine-specific appointment completion rates.

For each completed appointment, in person or telemedicine, the primary condition being treated was captured using the primary *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10-CM) diagnosis code for the appointment. The Clinical Classifications Software Refined (CCSR) tool from the Agency for Healthcare Research and Quality was used to aggregate ICD-10 codes into clinically meaningful diagnosis groups.²⁵ If the primary diagnosis code corresponded with the CCSR code for a general medical examination (e.g., ICD-10-CM Code Z00.00), the secondary diagnosis code was used.

STATISTICAL ANALYSIS

Mixed-effects logistic regression with robust standard errors was used to estimate primary care appointment completion rates for each time period (2019 and 2020), the change in appointment completion in 2020 relative to 2019, and differences by race. Separate models were used for each of the four time periods (prepandemic, shutdown, reopening, and second wave). A random effect was included to account for repeat appointments by patients.

To adjust for patient characteristics, models incorporated the following covariates, captured at the time of each scheduled appointment: patient’s age, female gender, Hispanic ethnicity, public insurance (i.e., Medicare or Medicaid), preferred language (English or non-English), household income derived from ZIP code median values, and Charlson Comorbidity Index score, calculated using diagnosis codes in the year before the scheduled appointment and binned into five categories.^{26,27} To account for clinic-level effects, an indicator for each clinic was included as a fixed effect. The month of the year was included as a covariate to account for time varying effects within each time period.

For each of the four time periods, we calculated telemedicine’s share of completed appointments by race. We further describe, by race, telemedicine’s share of completed appointments categorized by modality—audiovisual or audio only and, separately, by CCSR categorization of the top 20 most frequent primary conditions, by time period and race.

All statistical tests were two sided and *p*-value <0.05 was considered to be statistically significant. Stata, version 17.0 (StataCorp LLC), was used for analysis.

Results

In 2019 (Table 1), 260,966 (<0.01% were telemedicine) and 723,451 (<0.01% telemedicine) scheduled appointments for Black and non-Black patients, respectively, were identified. In 2020, we identified a total of 253,442 scheduled appointments (32.8% telemedicine) for Black patients and 709,540 scheduled appointments (25.3% telemedicine) for non-Black patients. Patient characteristics for these scheduled appointments were relatively stable across years.

Relative to 2019, the total number of completed visits for Black patients remained stable throughout 2020 (Fig. 1). For non-Black patients, completed visits dropped dramatically during the 2020 shutdown period relative to 2019, before slowly returning to baseline by June. Declines in completed in-person office visits were similar between the two groups as was the use of audiovisual telemedicine. Black patients completed a larger share of audio-only visits, with these visits accounting for sizable share of completed primary care appointments in 2020 compared with those in 2019 among Black patients.

Before the shutdown, Black patients completed 60–63% of appointments and non-Black patients completed 72–73% of appointments (Fig. 2). Higher no-show rates among Black patients accounted for most of the differences in completion rates relative to non-Black patients. During the shutdown period, in-person office visit completion rates for Black and non-Black patients dropped to 10% and 17%, respectively. After the introduction of telemedicine during the shutdown period, telemedicine visit completion rates were consistently >80% for both groups. After the shutdown period, in-person completion, canceled, and no-show rates for non-Black patients neared their 2019 levels. However, for Black patients, in-person completion increased and no shows decreased.

In the prepandemic 2020 period, the adjusted appointment completion rate for Black patients was +1.1 percentage points higher than that in 2019 (95% confidence interval [CI]: +0.6 to +1.6, *p*<0.001) (Table 2). For non-Black patients, there was a nonstatistically significant lower completion rates: –0.3 percentage points (95% CI: –0.6 to 0.0, *p*=0.06). Correspondingly,

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Table 1. Overview of Patient and Appointment Characteristics by Year

	BLACK PATIENTS		NON-BLACK PATIENTS	
	2019	2020	2019	2020
Appointment characteristics				
No. of scheduled appointments	260,966	253,442	723,451	709,540
Telemedicine, <i>N</i> (%)	34 (<0.01)	83,122 (32.8)	48 (<0.01)	179,710 (25.3)
Completed, <i>n</i> (%)	18 (52.9)	69,475 (83.6)	31 (64.6)	153,874 (85.6)
Canceled, <i>n</i> (%)	11 (32.4)	10,120 (12.2)	14 (29.2)	23,644 (13.2)
No show, <i>n</i> (%)	5 (14.7)	3,527 (4.2)	3 (6.3)	2,192 (1.22)
In person, <i>N</i> (%)	260,931 (99.9)	170,320 (67.2)	723,402 (99.9)	529,830 (74.7)
Completed, <i>n</i> (%)	159,256 (61.0)	92,005 (54.0)	525,365 (72.6)	328,451 (62.0)
Canceled, <i>n</i> (%)	66,156 (25.3)	61,489 (36.1)	172,001 (23.8)	184,345 (34.8)
No show, <i>n</i> (%)	35,519 (13.6)	16,826 (9.9)	26,036 (3.6)	17,034 (3.2)
Patient appointment characteristics				
Age, mean (SD)	53.0 (17.1)	53.3 (16.9)	54.4 (18.3)	54.8 (18.3)
Female, <i>n</i> (%)	182,196 (69.8)	177,525 (70.1)	425,883 (58.9)	416,495 (58.7)
Race, <i>n</i> (%)				
Black	260,966 (26.5)	253,442 (26.3)	–	–
Non-Black	–	–	723,451 (73.5)	709,540 (73.7)
White	–	–	620,539 (63.0)	607,999 (63.1)
Asian	–	–	36,211 (3.4)	35,190 (3.7)
Other	–	–	66,701 (6.8)	66,351 (6.9)
Hispanic ethnicity, <i>n</i> (%)	6,245 (2.4)	6,624 (2.6)	24,798 (3.4)	26,031 (3.7)
Insurance, <i>n</i> (%)				
Commercial	115,880 (44.4)	113,344 (44.7)	431,231 (59.6)	411,333 (56.0)
Medicaid	49,316 (18.9)	44,794 (17.7)	25,322 (3.5)	24,425 (3.4)
Medicare	78,209 (30.0)	73,679 (29.1)	211,538 (29.2)	215,872 (30.4)
Other	17,560 (6.7)	21,625 (8.5)	55,359 (7.7)	57,910 (8.2)
English as primary language, <i>n</i> (%)	258,400 (99.0)	250,861 (99.0)	704,167 (97.3)	689,501 (97.2)
ZIP code income $\leq 2 \times$ FPL ^a , <i>n</i> (%)	180,287 (69.1)	172,846 (68.2)	61,955 (8.6)	60,428 (8.5)
Charlson Comorbidity Index, <i>n</i> (%)				
0	88,201 (33.8)	82,707 (32.6)	355,583 (49.2)	340,892 (48.0)
1–4	134,243 (51.4)	131,860 (52.0)	323,510 (44.7)	321,705 (45.3)
5–8	31,812 (12.2)	32,099 (12.7)	39,178 (5.4)	41,038 (5.8)
9–12	6,053 (2.3)	6,034 (2.4)	4,869 (0.7)	5,523 (0.8)
≥ 13	656 (0.3)	742 (0.3)	310 (0.0)	382 (0.1)

Data are presented at the appointment level; therefore, patients with more than one appointment within a year are represented more than once.

^aHousehold income (i.e., family of four) is based on ZIP code-derived median incomes. In 2020, two times the FPL equated to \$52,400.

FPL, Federal Poverty Level; IQR, interquartile range; SD, standard deviation;

NARROWED RACIAL DIFFERENCES IN APPOINTMENT COMPLETION

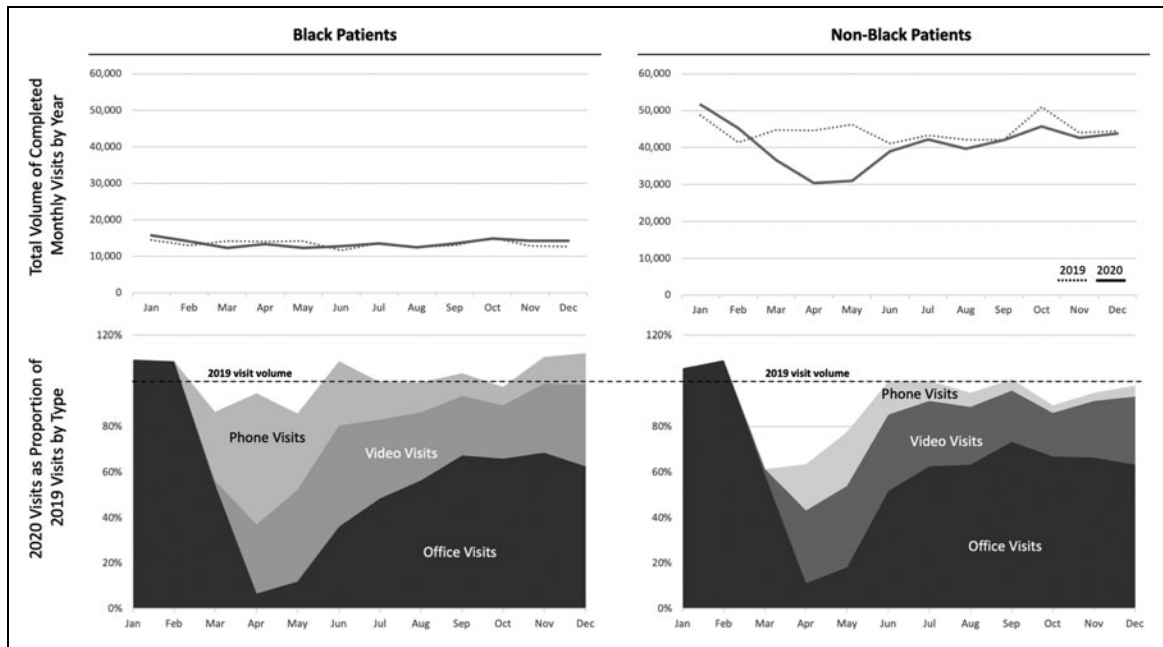


Fig. 1. Total volume and proportion of completed visits in 2020 compared with those in 2019 by Black versus non-Black race and visit type.

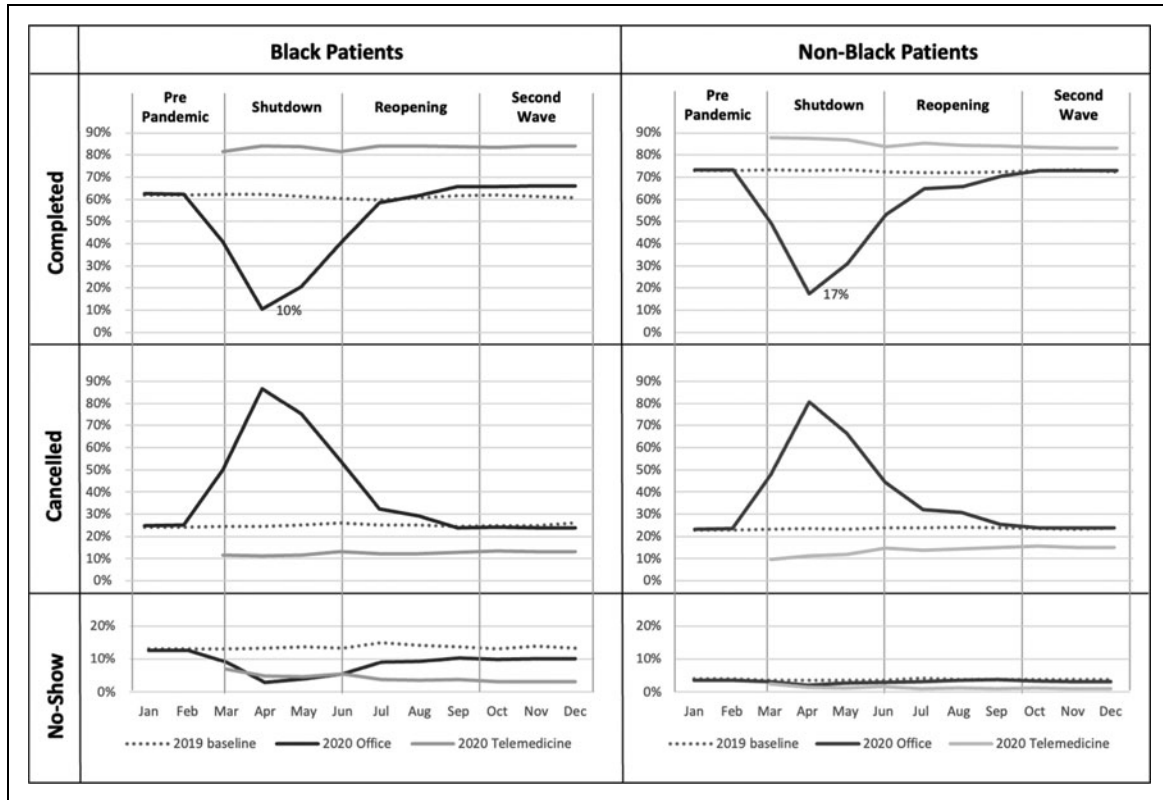


Fig. 2. Appointment status by visit type in 2020 as compared with 2019 baseline by race. Telemedicine appointments represented <1% of all appointments before the shutdown period that began on March 14, 2019, and are not shown.

Table 2. Change in Adjusted Appointment Completion Rates for Black and Non-Black Patients as Compared with 2019 Control

Time periods	BLACK PATIENTS	<i>P</i>	NON-BLACK PATIENTS	<i>P</i>	BLACK VERSUS NON-BLACK PATIENTS	
	PERCENTAGE POINT CHANGE (95% CI) ^a		PERCENTAGE POINT CHANGE (95% CI) ^a		DIFFERENCES IN PERCENTAGE POINT CHANGE (95% CI) ^a	<i>P</i>
Period 1: prepandemic, January 1 to March 12	+1.1 (+0.6 to +1.6)	<0.001	-0.3 (-0.6 to 0.0)	0.06	+1.4 (+0.8 to +2.0)	<0.001
Period 2: shutdown, March 13 to June 3	-8.5 (-9.0 to -7.9)	<0.001	-20.2 (-20.5 to -19.9)	<0.001	+11.7 (+11.0 to +12.3)	<0.001
Period 3: reopening, June 4 to September 30	+7.2 (+6.8 to +7.6)	<0.001	-1.0 (-1.2 to -0.8)	<0.001	+8.2 (+7.8 to +8.7)	<0.001
Period 4: second wave, October 1 to December 31	+8.2 (+7.5 to +8.8)	<0.001	+1.1 (+0.7 to +1.4)	<0.001	+7.1 (+6.4 to +7.8)	<0.001

^aMixed-effects logistic regression with robust standard errors was used to estimate primary care appointment completion rates for each time period (2019 and 2020), the change in appointment completion in 2020 relative to 2019, and differences by race. Separate models were used for each of the four time periods (prepandemic, shutdown, reopening, and second wave). A random effect was included to account for repeat appointments by patients. To adjust for patient characteristics, models incorporated the following covariates, captured at the time of each scheduled appointment: patient's age, female gender, Hispanic ethnicity, public insurance (i.e., Medicare or Medicaid), preferred language (English or non-English), household income derived from ZIP code median values, and Charlson Comorbidity Index score, calculated using diagnosis codes in the year before the scheduled appointment and binned into five categories. To account for clinic-level effects, an indicator for each clinic was included as a fixed effect. The month of the year was included as a covariate to account for time varying effects within each time period. CI, confidence interval.

the difference in percentage point change between Black and non-Black patients was +1.4 percentage points (95% CI: +0.8 to +2.0, $p < 0.001$).

In the shutdown period, the adjusted appointment completion rates were lower for both Black patients (-8.5 percentage points, 95% CI: -9.0 to -7.9, $p < 0.001$) and non-Black patients (-20.2 percentage points, 95% CI: -20.5 to -19.9, $p < 0.001$). This corresponded to a +11.7 percentage points (95% CI: +11.0 to +12.3, $p < 0.001$) narrowing in the completion rate difference between Black and non-Black completion rates compared with that in 2019.

In the reopening period, the completion rate for Black patients was +7.2 percentage points (95% CI: +6.8 to +7.6, $p < 0.001$) and that for non-Black patients was -1.0 percentage points (95% CI: -1.2 to -0.8, $p < 0.001$), narrowing the difference between Black and non-Black completion rates by +8.2 percentage points (95% CI: +7.8 to +8.7, $p < 0.001$). In the second wave period, the completion rate for Black patients was +8.2 percentage points higher (95% CI: +7.5 to +8.8, $p < 0.001$) and +1.1 percentage points (95% CI: +0.7 to +1.4, $p < 0.001$), narrowing the difference between Black and non-Black completion rates by +7.1 percentage points (95% CI: +6.4 to +7.8, $p < 0.001$).

Based on the primary diagnosis codes for completed primary care appointments, the shutdown period had more visit

diagnoses that corresponded to concerns related to COVID-19 (e.g., respiratory signs and symptoms, other respiratory infections, asthma, COVID-19, and sinusitis) (Fig. 3a). However, during the remaining two time periods of 2020 (i.e., the reopening and second wave period), the visit diagnoses were similar to those in 2019 (Fig. 3b).

Discussion

This study has three main findings. First, racial disparities in primary care appointment completion rates between Black and non-Black patients narrowed substantially during the shutdown period and this narrowing persisted for the remainder of 2020. Although there was statistically significant narrowing before the pandemic start, it was minimal as compared with the narrowing observed during the remainder of 2020. Second, telemedicine appointments, especially audio only, represented a larger share of completed primary care appointments in 2020 for Black patients relative to non-Black patients.

Third, although the types of conditions managed by primary care shifted during the shutdown, conditions managed for the remainder of 2020 mirrored those from the prior year, suggesting that the observed appointment completion rates were not explained by major shifts in diagnoses managed by primary care providers. Overall, these findings suggest that

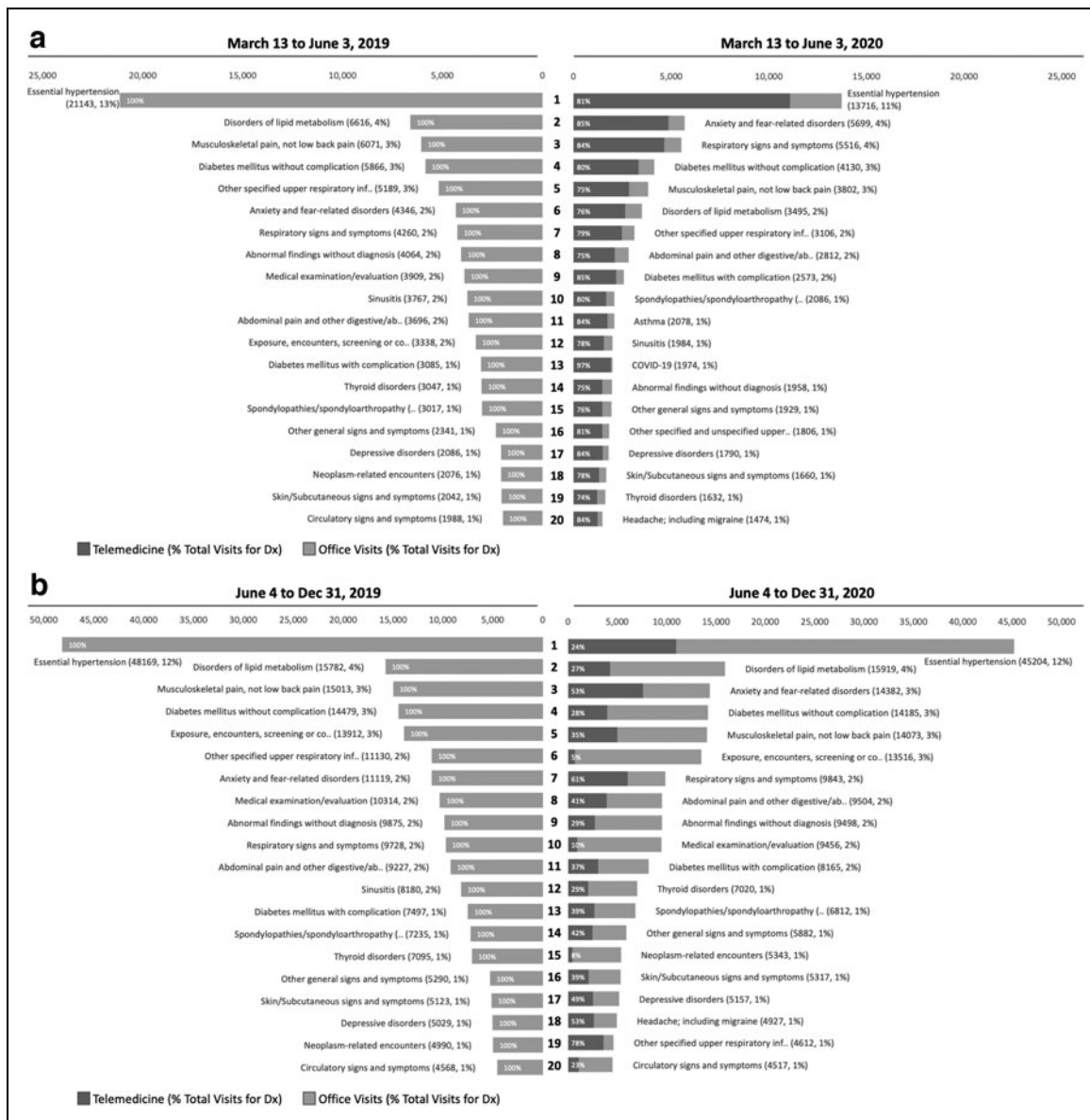


Fig. 3. (a) Top 20 primary diagnosis codes for completed visits in the 2020 shutdown period (March 13 to June 3) and corresponding 2019 time period with the share of telemedicine visits.^a CCSR diagnosis (total no. of completed visits with a diagnosis, %). ^aFor each completed appointment, in person or telemedicine, the primary condition being treated was captured using the primary ICD-10-CM diagnosis code for the appointment. The CCSR tool from the Agency for Healthcare Research and Quality (https://www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccs_refined.jsp) was used to aggregate ICD-10 codes into diagnosis groups. If the primary diagnosis code corresponded with the CCSR code for a general medical examination (e.g., ICD-10-CM Code Zoo.00), the secondary diagnosis code was used. **(b)** Top 20 primary diagnosis codes for completed visits in the 2020 resurgence and second wave periods (June 4 to December 31) and corresponding 2019 time periods with the share of telemedicine visits.^b CCSR diagnosis (total no. of completed visits with a diagnosis, %). ^bFor each completed appointment, in person or telemedicine, the primary condition being treated was captured using the primary ICD-10-CM diagnosis code for the appointment. The CCSR tool from the Agency for Healthcare Research and Quality (https://www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccs_refined.jsp) was used to aggregate ICD-10 codes into diagnosis groups. If the primary diagnosis code corresponded with the CCSR code for a general medical examination (e.g., ICD-10-CM Code Zoo.00), the secondary diagnosis code was used. CCSR, Clinical Classifications Software Refined; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification.

the adoption of telemedicine may help narrow disparities in primary care access among Black patients.

Early in the pandemic, studies evaluating the relationship between telemedicine and racial disparities had mixed findings. One study suggested that the shift to telemedicine risked widening racial disparities by exposing the digital divide—limited access to personal technology and broadband internet among predominantly Black and low-income communities.²⁸ These limitations could then translate to lower telemedicine use by groups of patients who already faced barriers to in-person primary care.

Indeed, some initial observations of lower uptake of telemedicine, particularly fewer audiovisual appointments among Black patients relative to non-Black patients early in the pandemic, highlighted the potential impact of the digital divide. Another study observed that Black race was independently associated with higher telemedicine utilization overall but negatively associated with the use of video visits (as compared with audio only).²¹ Our findings build on these studies by being more comprehensive, observing a longer study period and contextualize our findings by the conditions evaluated in person and using telemedicine.

Telemedicine could have narrowed racial disparities in appointment completion rates through several mechanisms. Telemedicine might alleviate the financial burdens of traveling to an in-person appointment. Similarly, telemedicine could have improved the convenience of primary care for Black patients, who spend more time traveling and waiting to be seen in providers' offices relative to non-Black patients.^{8,29} Telemedicine also facilitates appointments from patients' work or home, allowing patients to keep family or work obligations, needs that have disproportionately affected Black patients.^{9,11}

Similarly, patients who miss appointments often indicate that forgetting the date or time of an appointment is common reason for appointment no shows.¹¹ Telemedicine enables providers to directly call patients during scheduled appointment times. If the appointment was planned to be an audiovisual encounter, but the patient is not in an area conducive to this, the appointment can continue as a phone call without rescheduling. The relative flexibility of telemedicine compared with in-person office appointments may have been especially important for Black patients, who are more likely to be essential workers and work in low-wage jobs where, if they had their primary care appointment at work, audiovisual appointments may be more challenging.³⁰

Despite our promising findings, more work is needed to assess the full implications of increased telemedicine availability on access and equity for Black patients. Understanding

patient preferences with respect to telemedicine and the clinical value of a completed audio and video telemedicine appointment as compared with a traditional in-person office-based primary care remains important for future studies, especially in the context of racial disparities. In addition, there are multiple potential ways in which telemedicine could have limited access for marginalized patients despite its association with improved appointment completion rates.

For example, because providers had a set number of available appointments that were mixed between in person and telemedicine, increased use of telemedicine could theoretically have limited the availability of in-person appointments for Black patients who could not or did not want to utilize telemedicine.

Our findings should also be interpreted within our delivery context. In our setting, during this time period, patients and providers were able to freely decide between telemedicine and in-person appointments. This context differs from the extremes of standalone in-person or telemedicine-only primary care, both of which are likely to result in barriers to access due to their lack of flexibility. Although we cannot account for which modality is offered first or is encouraged by providers, our findings suggest that telemedicine's potential to improve access may depend upon a delivery system that includes equitable access to audio, audiovisual, and in-person office-based visits with the ability to switch between these modalities as clinically and logistically appropriate.

As regulatory and payment reforms continue to be debated, it will be critical to ensure that potential advances in health equity that occurred because of telemedicine's use during the COVID-19 pandemic are not lost. By the end of 2020, Penn Medicine, like other health systems, began to encourage in-person appointments, in part because of perceived clinical superiority of in person versus telemedicine by providers and patients, but also largely in response to financial incentives (e.g., reimbursed facility fees only obtainable for in-person visits) and uncertainty over telemedicine's reimbursement and regulatory future (e.g., interstate licensure rules).^{24,31}

This move away from telemedicine not only means that our findings may underestimate the potential impact of telemedicine on health equity, but also highlights the importance of regulatory and payment reform for telemedicine to consider equitable health care access as a critical dimension. Without ongoing efforts to improve access to technology (e.g., digital devices and broadband internet speeds) and a better understanding of the effect of reimbursement and regulatory impacts on telemedicine's use, health systems nationwide may abandon a potentially powerful tool for improving health equity before its full potential is realized.

LIMITATIONS

Our study has several additional limitations. First, the observational study design limits our ability to causally link the narrowing of racial disparities between Black and non-Black patients in appointment completion rates with telemedicine. Second, although our models control for patient demographics, we cannot adjust more broadly for the impacts that COVID-19 had on health care utilization and care-seeking behavior. Fears of contracting COVID-19 cannot be underestimated and are unobservable using our study design.

In this context, observed changes in appointment completion rates, disparities, and telemedicine usage may represent unmeasured patient and provider-level factors aside from the availability of telemedicine. Third, our findings are derived from a single health system with a single telemedicine approach and so may not be generalizable to other health systems. Fourth, our study cannot observe the reasons why some patients chose to seek no care at all nor why some patients used telemedicine less or more often, and whether these patterns occurred less or more often along lines of race.

Conclusion

Our study offers insights into how telemedicine may have the potential to improve access to primary care for traditionally marginalized populations, in particular Black patients. We observe that disparities in primary care appointment completion rates between Black and non-Black patients narrowed during the pandemic and telemedicine may have facilitated this narrowing of disparities. As the health care sector—policymakers, payers, providers, and patients—imagines and reimagines the role telemedicine may play in health care’s future, understanding whether and how it can be a mechanism for improving equity will be a critical dimension to consider.

Disclosure Statement

K.H.C. reported receiving personal fees from the Villanova School of Business; board membership for Intend Health Strategies (formerly Primary Care Progress, Inc.); consultancy fees from Verily, Inc.; an honoraria from the RAND Corporation; and nonfinancial support from Independence Blue Cross, Inc., that are outside of the submitted work. No other authors have conflicts of interest to disclose.

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