

The Changing Nature of Telehealth Use by Primary Care Physicians in the United States

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Abstract

Introduction: Prior to the COVID-19 pandemic, telehealth utilization was growing slowly and steadily, although differentially across medical specialties in the United States. The pandemic dramatically expanded physician use of telehealth, but our understanding of how much telehealth use has changed in primary care in the United States, the correlates of physician telehealth uptake, and the frequency with which primary care physicians intend to use telehealth after the pandemic are unknown. This paper is designed to assess these important questions. **Methods:** Using data from an original national survey of 625 primary care physicians conducted from May 14 to May 25, 2021, we investigate the frequency of physician telehealth use before and during the pandemic and intended use after the pandemic. We also assess the correlates of changes in telehealth use by physicians, comparing telehealth use before the pandemic to use during and after the pandemic. **Results:** The proportion of primary care physicians using telehealth often, jumped from 5.3% (95% CI 3.5, 7.0) before the pandemic to 46.2% (95% CI 42.3, 50.2) during the pandemic. More importantly, over 70% of physicians intended to use telehealth at least occasionally after the pandemic compared to just 18.7% before, with younger physicians, physicians without telehealth training in medical school, and Asian physicians most likely to increase their telehealth use long-term. **Discussion:** The COVID-19 pandemic has spurred expansion in telehealth use by primary care physicians that will continue to shape care delivery well beyond the pandemic. Policy change could be needed to facilitate this growth of telehealth long-term.

Keywords

telehealth, primary care, COVID, health policy, physician

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Introduction

COVID-19 has profoundly affected lives around the globe and led many individuals to interact with the health care system in new ways. Prior to the COVID-19 pandemic, telehealth utilization was growing slowly and steadily, although differentially across settings and medical disciplines.¹ While telehealth growth had been seen across specialties, hospitals have historically used telehealth at the highest rates as they have the greatest number of potential beneficial applications.^{1,2} The realities of the COVID-19 pandemic dramatically accelerated telehealth use, both in hospital settings where it has historically been used most often, and in outpatient settings where its adoption was far more uneven.³⁻⁶

Prior research has investigated clinician perceptions and utilization of telehealth before the pandemic across different disciplines, settings, and countries. Before COVID-19, the

majority of clinicians were open to using telehealth and saw the benefits of increased access to care.⁶⁻¹⁰ Importantly however, many clinicians simultaneously held concerns about maintaining standards of care, managing technical difficulties, the uncertainty of reimbursement, their lack of training in telehealth, and personal preferences for in-person care.⁶⁻¹⁰ On the other side of the healthcare equation, patients have shown strong preferences for virtual care that have outpaced physician willingness and readiness for telehealth for many years.¹

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The COVID-19 pandemic drastically shifted the health care landscape, with important implications for telehealth. To provide necessary care to patients during the pandemic, many physicians across disciplines increased their use of telehealth, aided in the United States by changes in state laws, federal statutes, and emergency orders expanding telehealth during the pandemic.¹¹ These telehealth authorities permitted new modes of telehealth delivery and enabled new types of providers to use telehealth to provide their services.^{11,12} Research on telehealth use during the COVID-19 pandemic has thus far explored the pandemic's impact on telehealth use in urology,^{13,14} oncology,¹⁵ neurosurgery,¹⁶ pediatrics,¹⁷ and psychiatry.¹⁸ This research has found that physicians across specialties have had an overall positive experience with telehealth services.¹³ However, concerns still remain about available training, logistics of implementation, reimbursement, and fear of missing significant clinical findings during virtual visits.¹³⁻¹⁸

Critically, research to this point has not yet sufficiently explored the impact of the pandemic on telehealth use in the setting where patients are most likely to interact with the health care system—primary care. While important work has investigated patient characteristics associated with telehealth use in primary care settings during the pandemic,¹⁹ research has yet to explore the impact of the pandemic on primary care physician uptake of telehealth in the United States. Studying telehealth use by primary care physicians is important because they are the physicians that individuals interact with the most in the health care system and, as such, telehealth changes in these physicians could have the potential to impact a much broader population. Furthermore, understanding changes in telehealth use in the primary care setting could be profoundly important for understanding access to preventive medicine in the context of the COVID-19 pandemic and beyond, especially for those with barriers to in-person care like those without transportation or with certain disabilities.

Studies from the primary care physician perspective in Lebanon,²⁰ Sweden,²¹ and Australia²² suggest a degree of reluctance to change practice patterns and an unwillingness to implement these services. However, our understanding of primary care physician behavior related to telehealth in the United States during the pandemic is underdeveloped. Furthermore, research has not sufficiently explored how the experience of using telehealth during the pandemic might shape telehealth use by physicians after the pandemic. This study investigates both of these important topics. We rely on an original survey of primary care physicians across the United States to investigate the frequency of telehealth use before the pandemic, during the pandemic, and intended use after the pandemic. We then explore the correlates of physician use of telehealth before, during, and after the pandemic and identify predictors of increased telehealth use during and after the pandemic.

Methods

Our analysis of changes in telehealth use in primary care brought on by the COVID-19 pandemic relies on an original web-based survey administered to a national sample of physicians in the United States. Data collection was done by the survey research firm Dynata from May 14 to May 25, 2021. Dynata is a widely respected survey research firm regularly used in social science research and in research on physicians in particular.²³⁻²⁷ Dynata invited 737 primary care physicians (identified via responses to an initial inventory survey performed by the survey research firm) to participate in our survey from their large, online, opt-in sampling frame of potential survey participants. The survey was 15 min long and participating physicians were provided an incentive by Dynata for participating in the study. Of the 737 physicians invited to our study, 625 of them self-identified as primary care physicians working in internal medicine, family medicine, or as general practitioners. These 625 physicians serve as the sample for our study. The 112 physicians who were invited but not included were excluded due to their lack of self-identification as a primary care physician.

While our sample of physicians is national in scope, it is technically a non-probability sample. Importantly, our analysis in Table 1 shows that our sample closely mirrors population benchmarks for primary care physicians along a number of different dimensions. Using benchmarks from the American Medical Association Masterfile made available by the American Association of Medical Colleges, as well as income data from Wilcox 2021, we find that our sample is similar to critical population benchmarks for primary care physicians.²⁸⁻³¹ Our sample approximates population benchmarks for the proportion of primary care physicians who are Asian, Hispanic, and for physician salary. We do see minor deviations between our sample and population benchmarks for race and gender—undersampling Blacks and women and oversampling Whites and men. Importantly, these differences are small in magnitude and our study provides the best data to date to investigate changes in telehealth use among primary care physicians in the US.

Outcome Measures

For our analysis of changes in telehealth use in primary care, we rely on 3 questions from our survey designed to capture physician telehealth use. The first asked how often physicians incorporated telehealth into their regular practice before the pandemic with response options for never, rarely, occasionally, and often. The second question replicated the first focusing on telehealth use “since the COVID-19 pandemic started.” The final question asked physicians how often they expected to incorporate telehealth into their

Table 1. Comparison of Primary Care Physician Sample to National Benchmarks.

Variable	Physician survey (%)	National benchmark (%)	Benchmark source
Female (N=182)	30.3	39.5	AMA Physician Masterfile via AAMC 2018
Hispanic (N=57)	9.5	7.6	AAMC 2018
Black (N=17)	2.8	7.3	AAMC 2018
Asian (N=135)	22.4	21.1	AAMC 2018
White (N=408)	67.8	61.4	AAMC 2018
Mean income	\$200 000-249 999	\$242 000	Medscape 2021
Mean age	54	N/A	N/A

Source: Authors' analysis of original survey data from survey of primary care physicians. National benchmarks for gender and race were obtained from the Association of American Medical Colleges (AAMC) publicly available physician workforce data for 2018.²³⁻²⁵ AAMC notes that physician sex was obtained from the AMA Physician Masterfile and that data on race was obtained from a variety of sources. Data on physician income was obtained from the Medscape 2021 Physician Salary Report as detailed by Wilcox 2021.²⁶ Our survey data includes physicians specializing in family medicine, internal medicine, and general practice; these categories were used for national benchmarks as well.

This table compares demographic characteristics from our sample of primary care physicians with population benchmarks for primary care physicians.

regular practice after the COVID-19 pandemic using the same scale. These 3 ordinal measures serve as the first 3 dependent variables in our analysis and multivariate models using these measures rely on ordered logistic regression. In addition, we developed 2 measures to capture increases in telehealth use—one comparing telehealth use during the pandemic to use before the pandemic and another comparing expected telehealth use after the pandemic to telehealth use before the pandemic. For each of these items, respondents were given a 1 if they used telehealth more during (or after) the pandemic relative to before the pandemic and a 0 in all other circumstances. Given the binary nature of these measures, multivariate models using these dependent variables rely on binary logistic regression.

Explanatory Measures

While we begin our analysis by descriptively studying telehealth use before, during, and after the pandemic, we also investigate the correlates of telehealth use and predictors of increased telehealth use during and after the pandemic. For these multivariate analyses, our models include several key independent variables. Specifically, we include measures to capture whether or not physicians were trained in the use of telehealth in medical school as well as separate binary measures to capture whether our physicians worked in a hospital, worked in a small practice (solo or 2-physician practice), or worked for a larger group practice. Our models also account for the physician's panel size and the proportion of payments that a physician receives that are fee-for-service.

In addition, we include a standard 7-point measure to account for political ideology. Including ideology is vital in the context of this study because prior research suggests that conservative Americans are less likely to perceive the pandemic as serious and because conservative physicians

have displayed different patterns in practice in previous research.^{23,32-34} As such, conservative physicians may be less inclined to increase their use of telehealth because they see less of a need to change their practice patterns to protect themselves or patients. Beyond these key independent variables, our models also include demographic measures to account for physician sex, binary measures to account for Black, Asian, and Hispanic physician race/ethnicity, age (intervalized in years), and income (based on a 10-point scale).

In addition, we account for geography using binary measures to capture US Census regions as well as rurality. Rurality was derived by tying physician zip codes to rural-urban commuting area (RUCA) codes and coding the measure such that metropolitan areas were coded as zeros and non-metropolitan areas were coded as ones.³⁵ Finally, we include a dichotomous measure to capture whether each physician has had COVID-19, accounting for the possibility that physicians who have had the virus may view the pandemic more seriously and choose to use telehealth more often. This is particularly important in light of evidence that almost 20% of primary care physicians in the United States believe that the pandemic was exaggerated by the media, suggesting that perceptions of the pandemic's seriousness could indeed vary across physicians.³⁶ We also ran robustness checks that included measures for patient pool demographic characteristics (ie, proportion of patients from different genders, races, ethnicities, and insurance statuses) but excluded them from final models due to their lack of significance. Differences between our total sample of 625 and samples observed in our results reflect missing observations on some measures. 614 of 625 physicians answered our key telehealth questions and on explanatory measures, the highest degrees of missingness are observed for income and region with 582 and 581 observations, respectively.

Table 2. Change in Telehealth Use Among Primary Care Physicians Due to COVID-19.

Frequency of use	Before COVID-19	During COVID-19	After COVID-19
Often	5.3% (3.5, 7.0)	46.2% (42.3, 50.2)	26.2% (22.8, 29.7)
Occasionally	13.4% (10.8, 16.1)	34.4% (30.7, 38.1)	46.6% (42.6, 50.5)
Rarely	24.9% (21.6, 28.4)	11.7% (9.2, 14.2)	16.3% (13.4, 19.2)
Never	54.6% (50.7, 58.5)	5.9% (4.1, 7.8)	9.1% (6.9, 11.4)
Missing	1.8% (0.7, 2.8)	1.8% (0.7, 2.8)	1.8% (0.7, 2.8)

Source: Authors' analysis of original survey data from survey of primary care physicians.

The numbers in parentheses present 95% confidence interval for each category of telehealth use.

Results

To begin our study of changes in telehealth use by primary care physicians over the course of the pandemic, we analyzed the frequency of telehealth use by our sample before, during, and after the pandemic in Table 2. We found that before the pandemic, only 5.3% of primary care physicians incorporated telehealth into their regular practice “often,” with 79.5% of primary care physicians either “never” or “rarely” using telehealth. Unsurprisingly, the pandemic saw a dramatic shift in physician behavior. Amid the pandemic, 46.2% of primary care physicians “often” incorporated telehealth into their practice, another 34.4% “occasionally” incorporated it, and only 5.9% of primary care physicians “never” used telehealth. Perhaps most importantly, our results suggest that over a quarter (26.2%) of primary care physicians intended to continue to use telehealth “often” in their regular practice after the pandemic—a 21% increase over before the pandemic. Furthermore, 72.8% of primary care physicians intended to use telehealth at least “occasionally” after the pandemic as compared to 18.7% before the pandemic—a 54.1% increase.

It is also important to understand which primary care physicians have been most likely to use telehealth frequently before, during, and after the pandemic. We explored that question in Table 3, which relies on ordered logistic regression given the ordinal nature of the dependent variable. There in Model 1, we show that the most important predictor of frequent telehealth use before the pandemic was receiving telehealth-related training in medical school. Physicians who received telehealth training were 8.09 times more likely to frequently use telehealth before the pandemic. In addition, physicians in the South and Midwest were 1.69 and 2.15 times more likely respectively to use telehealth than physicians in the Northeast. Conversely, Model 1 shows that female physicians, physicians with large patient panels, and physicians who saw a larger proportion of patients in a fee-for-service context were less likely to use telehealth before the pandemic.

In Model 2, we investigated the correlates of frequent telehealth use by primary care physicians during the pandemic.

There we found a different pattern of results than in Model 1, with none of the same predictors impacting telehealth use during the pandemic. In Model 2, we found that frequent telehealth use during the pandemic was significantly higher among younger physicians while telehealth use was less frequent among primary care physicians working in hospitals.

In Model 3, which explored the predictors of intended frequency of telehealth use after the pandemic, we once again found that younger physicians were significantly more likely to intend to use telehealth frequently after the pandemic. In addition, we found that Asian primary care physicians and physicians in the West Census region were significantly more likely to intend to use telehealth frequently after the pandemic. On the other hand, physicians working in hospitals and those with large patient panels were significantly less likely to intend to use telehealth frequently after the pandemic. Notably, across all 3 models we found no evidence that conservative ideology, Black or Hispanic racial/ethnic status, income, having had COVID-19, working in a small or group practice, or rurality influenced telehealth use.

Next, in Table 4, we investigated the correlates of physicians increasing their telehealth use during the pandemic and after the pandemic relative to before the pandemic. In Model 4, which explored telehealth use during versus before the pandemic, we found that relative to before the pandemic, physicians without telehealth training were more likely to use telehealth during the pandemic while those working in hospitals and those working in small practices were significantly less likely to increase their telehealth use. Model 5 allows us to explore increases in intended telehealth use after the pandemic relative to telehealth use before the pandemic. There, we found that physicians without telehealth training, Asian physicians, and physicians seeing a higher proportion of fee-for-service patients were significantly more likely to intend to increase telehealth use after the pandemic relative to before the pandemic. We also found that physicians in hospitals were less likely to increase telehealth use relative to pre-pandemic levels.

Table 3. Predictors of Physician Telehealth Use Before, During, and After the COVID-19 Pandemic.

Variables	Model 1	Model 2	Model 3
	Pre-COVID telehealth use	During COVID telehealth use	Post-COVID telehealth use
Female	0.65** (0.44-0.97)	1.31 (0.89-1.93)	1.28 (0.89-1.86)
Age	0.99 (0.98-1.01)	0.98*** (0.96-0.99)	0.98** (0.96-0.99)
Conservative	0.99 (0.88-1.11)	0.95 (0.85-1.06)	0.98 (0.87-1.09)
Hispanic	0.81 (0.44-1.50)	0.62* (0.35-1.09)	0.71 (0.40-1.26)
Black	1.35 (0.54-3.39)	1.70 (0.65-4.47)	1.17 (0.46-2.99)
Asian	0.82 (0.54-1.25)	1.21 (0.80-1.85)	1.61** (1.07-2.43)
Income	0.99 (0.90-1.08)	1.01 (0.93-1.10)	0.99 (0.91-1.08)
Had COVID	0.72 (0.41-1.27)	1.27 (0.74-2.18)	0.83 (0.50-1.39)
Telehealth training	8.09*** (3.64-17.97)	1.01 (0.47-2.20)	1.53 (0.71-3.33)
Panel size	0.91** (0.83-0.99)	0.97 (0.88-1.06)	0.91** (0.84-0.99)
Prop. fee for service	0.87*** (0.80-0.96)	0.97 (0.88-1.06)	1.00 (0.91-1.09)
Works in hospital	0.94 (0.49-1.81)	0.21*** (0.11-0.40)	0.34*** (0.19-0.64)
Works in small practice	1.30 (0.75-2.23)	0.61* (0.36-1.03)	0.80 (0.48-1.33)
Works in group practice	1.18 (0.72-1.93)	1.21 (0.75-1.96)	1.41 (0.88-2.25)
Midwest region	1.40 (0.83-2.39)	0.73 (0.44-1.19)	1.12 (0.69-1.83)
South region	1.69** (1.05-2.75)	1.00 (0.64-1.57)	1.12 (0.72-1.74)
West region	2.15*** (1.31-3.53)	1.49 (0.91-2.44)	1.71** (1.07-2.75)
Rural	0.69 (0.37-1.28)	0.64 (0.37-1.11)	0.60* (0.40-1.07)
Observations	536	536	536
Pseudo R ²	.05	.06	.05

Confidence intervals in parentheses. Results based on ordered logit models using odds ratios. Quantities in parentheses indicate 95% confidence interval. The reference group for region is the Northeast.

P* < .10. *P* < .05. ****P* < .01.

Table 4. Predictors of Change in Telehealth Use During and After COVID-19 Pandemic.

Variables	Model 4	Model 5
	Pre vs during COVID telehealth increase	Pre vs post COVID telehealth increase
Female	1.25 (0.72-2.16)	1.53* (0.93-2.51)
Age	1.01 (0.98-1.03)	0.99 (0.97-1.02)
Conservative	0.98 (0.84-1.15)	0.94 (0.82-1.08)
Hispanic	1.14 (0.50-2.61)	1.25 (0.59-2.62)
Black	—	2.16 (0.55-8.50)
Asian	1.71* (0.94-3.12)	1.74** (1.01-3.01)
Income	1.02 (0.91-1.15)	0.98 (0.88-1.09)
Had COVID	1.64 (0.75-3.59)	1.09 (0.57-2.10)
Telehealth training	0.14*** (0.06-0.36)	0.14*** (0.06-0.36)
Panel size	1.00 (0.89-1.13)	1.01 (0.90-1.13)
Prop. fee for service	1.04 (0.92-1.18)	1.13** (1.02-1.27)
Works in hospital	0.20*** (0.08-0.46)	0.46** (0.21-0.98)
Works in small practice	0.37** (0.17-0.82)	0.61 (0.31-1.20)
Works in group practice	1.07 (0.49-2.32)	1.08 (0.57-2.03)
Midwest region	0.74 (0.37-1.50)	0.99 (0.52-1.87)
South region	0.63 (0.34-1.17)	0.59* (0.34-1.02)
West region	1.03 (0.52-2.06)	1.06 (0.57-1.97)
Rural	1.51 (0.62-3.66)	0.96 (0.47-1.96)
Constant	3.93 (0.49-31.38)	4.63 (0.71-30.14)
Observations	519	536
Pseudo R ²	.12	.09

Confidence intervals in parentheses. Results based on binary logit models using odds ratios. Quantities in parentheses indicate 95% confidence interval. The variable for Black physicians is excluded from Model 4 because every Black physician in our sample increased their use of telehealth from before the pandemic to during the pandemic, leaving no variation for the model to analyze. The reference group for region is the Northeast.

P* < .10. *P* < .05. ****P* < .01.

Discussion

The COVID-19 pandemic has transformed the face of US health care, changing the way that many Americans interact with physicians. For the first time, our analysis provides a sense of the scope of the change in telehealth utilization by primary care physicians in the United States. We provide evidence that primary care physicians not only met the needs of the moment, increasing their use of telehealth during the pandemic to treat patients while limiting the spread of the virus, but more importantly, that for many physicians, this change of practice is here to stay. Over 70% of primary care physicians intend to use telehealth at least occasionally after the COVID-19 pandemic compared to just 18.7% of physicians before.

Our analysis suggests that while telehealth use in the primary care setting was largely limited before the pandemic to those with prior training and those in the South and West—where project ECHO may have increased participation in rural communities,³⁷⁻³⁹ the pandemic has spurred innovation in care delivery, with younger physicians, Asian physicians, and those without formal training in medical school leading the change. While some of these trends were expected—for example younger physicians who are more comfortable with technology being more likely to adopt telehealth—other findings like Asian physicians being significantly more likely to increase their telehealth use are less easily explained. Exploring why these groups varied in their telehealth uptake would be a valuable direction for future research.

The finding that those without telehealth training in medical school were more likely to increase their telehealth use both during and after the pandemic relative to before the pandemic is especially noteworthy. It could reflect the fact that those with prior training were less likely to increase use in the face of the pandemic because they were already using it widely and had less room for growth. Alternatively, it could reflect the fact that those without formal training may have been less aware of any potential risks of telehealth use and behaved differently than those with training in the face of the pandemic. Investigating this unexpected pattern of results is a valuable direction for additional research.

Critically, for these gains in access to be maintained long-term, policy change may be needed. Many of the policies put in place at the state and federal levels that allow physicians to practice and be reimbursed via telehealth were only put in place for the pandemic.¹⁰ If physicians intend to continue to use telehealth after the pandemic, further policy change at the state and federal levels may be needed to make these changes permanent.^{11,40} Our findings suggest that primary care physicians would likely be

supportive of such a policy change, and that policymakers could help to cement the new prominence of telehealth in primary care by taking action.

Although our analysis provides important new information about primary care physician use of telehealth before, during, and after the pandemic, it is important to recognize that our study has several limitations. First, we must acknowledge that our analysis relies on self-reports of prior and current telehealth use as well as future projections of telehealth use. If physician self-reports are inaccurate, or physicians are unable to correctly project their telehealth use in the future, our findings could be biased. In addition, while we demonstrate that our sample closely mirrors population benchmarks in Table 1, it is nonetheless important to acknowledge that our study relies on a non-probability sample of primary care physicians. To the extent that our sample varies from population benchmarks on observed or unobserved characteristics, our findings could vary from those observed among primary care physicians nationally.

Our analysis is also limited in its reliance on relative measures of telehealth use. The number of visits that one physician characterizes as “often” could be the same number of telehealth visits that another physician would characterize as “occasionally.” Our analysis is unable to capture objective differences in use to overcome this issue. Critically however, we rely on survey questions using these response options to minimize cognitive burden from survey participants and because our primary interest is less in whether “often” means the same thing to 2 different doctors than to the same doctor at multiple points in time which is less subject to the noted limitation.⁴¹ Next, while there are several practice-level factors which could influence telehealth adoption, our survey of physicians was unable to capture practice level characteristics. As such, exploring the impact of practice-level measures on telehealth use by primary care physicians is an important direction for future research. Finally, it is necessary to acknowledge that our data was collected in May of 2021 and key findings presented could have changed over the course of the pandemic or moving forward in the continued fight against COVID-19.

Despite these issues, our analysis represents an important step forward of our understanding of telehealth use in the primary care setting in the United States. Telehealth use was relatively rare in primary care before the pandemic, increased dramatically during the pandemic out of need, and is projected to continue to be used widely after the pandemic. This shift in mode of practice could have profound implications for physicians and patients in the years ahead and change the face of healthcare in the United States.

Appendix

Table AI. Proportion of Primary Care Physicians That Have Used Different Types of Telehealth.

Telehealth type	Proportion of physicians using telehealth type
Video visits	78.7% (75.5, 81.9)
Audio only	70.7% (67.1, 74.3)
E-consultation with another provider	18.4% (15.4, 21.4)
Remote monitoring	14.4% (11.6, 17.2)
Store and forward	2.7% (1.4, 4.0)
None of the above	5.8% (3.9, 7.6)

Source: Authors' analysis of original survey data from survey of primary care physicians.

The numbers in parentheses present 95% confidence interval for each category of telehealth use. Physicians were asked "What types of telehealth have you used in your practice? Select all that apply."

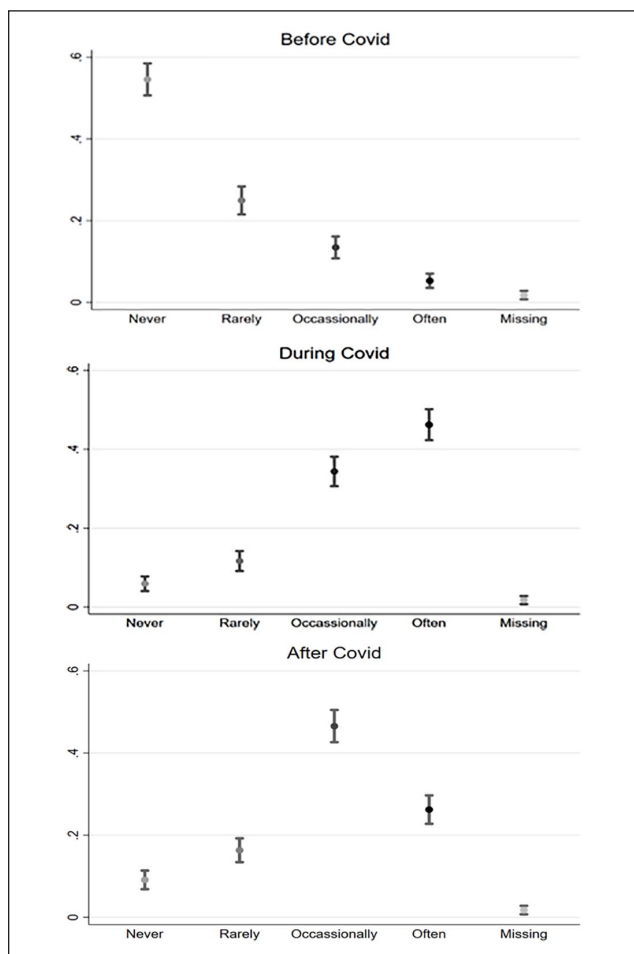


Figure AI. Reported use of telehealth before, during, and after COVID.

Source: Authors' analysis of original survey data from survey of primary care physicians.

Y-axis reflects the proportion of physicians selecting each response option for telehealth participation frequency before, during, and after COVID-19.

Author Contributions

All authors were involved in the conceptualization of the manuscript, the design of the survey, and its administration. TC was responsible for the analysis of the data. TC led the drafting of the manuscript with assistance from CM, CS, and JS. All authors provided revisions to manuscript drafts and guidance throughout the analysis and paper writing process.

Declaration of Conflicting Interests

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Institutional Review Board

This research was approved by the institutional review board at Texas A&M University.

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