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Original Investigation

Association of COVID-19 and the Prevalence of In-person Versus Telehealth Primary Care Visits and Subsequent Impacts on Tobacco Use Assessment and Referral for Cessation Assistance

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Abstract

Introduction: The COVID-19 pandemic dramatically altered patterns of healthcare delivery. Smoking remains an important risk factor for multiple chronic conditions and may exacerbate more severe symptoms of COVID-19. Thus, it is important to understand how pandemic-induced changes in primary care practice patterns affected smoking assessment and cessation assistance.

Aims and Methods: Electronic health record data from eight community health centers were examined from March 1, 2019 to February 28, 2022. Data include both telehealth (phone and video) and in-person office visits and represent 310 388 visits by adult patients. Rates of smoking assessment, provision of referral to counseling, and orders for smoking cessation medications were calculated. Comparisons by visit mode and time period were examined using generalized estimating equations and logistic regression.

Results: The proportion of telehealth visits was < 0.1% 1 year prior to COVID-19 onset and, 54.5% and 34.1% 1 and 2 years after. The odds of asking about smoking status and offering a referral to smoking cessation counseling were significantly higher during in-person versus telehealth visits; adjusted odds ratios (AOR) (95% CI) = 15.0 (14.7 to 15.4) and AOR (95% CI) = 6.5 (3.0 to 13.9), respectively. The interaction effect of visit type * time period was significant for ordering smoking cessation medications.

Conclusions: Telehealth visits were significantly less likely to include smoking status assessment and referral to smoking cessation counseling compared to in-person visits. Given that smoking assessment and cessation assistance do not require face-to-face interactions with health care providers, continued efforts are needed to ensure provision at all visits, regardless of modality.

Implications: The COVID-19 pandemic dramatically altered patterns of healthcare-seeking and delivery with a considerable rise in telehealth visits. This study examined 1 year prior to the onset of COVID-19 and 2 years after to evaluate the assessment of tobacco use and assistance with tobacco cessation and differences during in-person versus telehealth visits. Tobacco assessment was 15 times more likely during in-person versus telehealth visits in the 2 years post onset of COVID-19. Given that telehealth visits are likely to continue, ensuring that patients are regularly assessed for tobacco regardless of visit modality is an important concern for health systems.

Introduction

The COVID-19 pandemic brought about changes in the volume, modality, and content of primary care delivery. Overall, the number of primary care visits decreased; office-based visits substantially decreased and telehealth visits (ie, video and telephone visits) substantially increased.[1,2] Widespread limitations on in-person visits and hesitancy to attend such visits led many patients to delay seeking care for routine prevention and disease management. In addition, the content of primary care visits shifted from comprehensive care to acute care and immunization efforts. Several studies have shown declines in the receipt of preventive care, particularly colorectal, breast, and cervical cancer screening,[3–6] and particularly during telehealth visits.[2] However, less is known about how these changes have impacted tobacco use assessment and assistance during primary care visits since the onset of COVID-19.[7,8]

Tobacco use is the leading cause of preventable morbidity and mortality in the United States[9] and its impact has been exacerbated since the onset of COVID-19. During the pandemic, tobacco use in the United States increased and tobacco abstinence decreased.[10,11] While guidelines direct primary care providers to assess smoking status and offer assistance with quitting at every visit, the extent to which this is happening post-COVID-19 onset is unclear. In addition, since tobacco use disproportionately affects socioeconomically

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disadvantaged patients,[12,13] it is particularly important to examine the impact of telehealth implementation on addressing tobacco use in the community-based primary care clinics that serve this population. The purpose of this study is to examine tobacco use assessment and tobacco cessation support among primary care clinics pre- and post-onset of the COVID-19 pandemic and by telehealth visits.

Materials and Methods

This retrospective observational study of electronic health record (EHR) data included adults (≥18 years of age) with ≥1 primary care visit between March 2019—February 2022 to ≥1 of the eight community-based primary care clinics. Clinics are part of a health system in Northeast Ohio for which two-thirds of patients are uninsured or covered by Medicare or Medicaid and tobacco use prevalence is 23%. In 2017, these clinics adopted an ask-advise-connect approach to tobacco use.[14] Variables extracted from EHR discrete data fields include asking about any tobacco use ("Have you used tobacco in the past 30 days?"), brief advise to quit if using tobacco ("As a member of your health care team, we strongly recommend that you quit using tobacco.") and assessing readiness to quit in the next 30 days ("Are you considering quitting in the next 30 days?"). Referral to tobacco cessation counseling included an e-referral to the state tobacco quitline or to a health system-based Freedom from Smoking group counseling program. Tobacco cessation medication orders included nicotine replacement therapy, bupropion, and varenicline.

Three 1-year time periods were defined relative to the onset of the COVID-19 pandemic in the United States: March 2019—February 2020; March 2020- February 2021; March 2021—February 2022 and labeled pre-COVID-19 onset, 1 year- and 2 years-post COVID-19 onset. One-year time intervals were selected for 3 reasons: (1) one-year intervals are comparable in terms of the volume of visits per time period, (2) one-year intervals relative to the onset of the pandemic make it easier to generalize to other regions which had different waves of upsurge of COVID-19, and (3) this paper is focused on routine tobacco-related care delivered by primary care practices in the face of the COVID-19 onset and the 2 years after, rather than examining responses to specific increases and declines of people with the virus during the observational time periods.

During the study time period, there were a total of 407 039 visits. Visits conducted by non-advanced practice providers (n = 95 520), such as visits for immunizations or blood draws, were excluded from analysis because tobacco cessation is rarely addressed during these visits. The remaining 310 388 visits were classified as in-person or telehealth (ie, health care visits that were conducted by telephone or by video). Beginning in March 2020 and extending through 2023, insurers including Medicaid reimbursed the cost of telehealth visits at the same rate as in-person visits. Therefore, there were no limitations on using telehealth based on insurance type. The procedures used in this study were approved by the Institutional Review Board of the participating healthcare organization. (#IRB18-00813).

Analysis. Descriptive analyses report patient and visit characteristics, overall and for three time periods. The number of visits per month and the proportion of telehealth visits are displayed graphically. Rates of asking about tobacco status, providing brief advice, tobacco cessation medications, and referrals for tobacco cessation counseling to those who use tobacco are reported by time period and by in-person and telehealth visits. Differences in rates by visit type were tested using logistic regression analysis with generalized estimating equations methods to account for the clustering of patients within the clinic. We examine interaction effects of visit type * time period first, and then in the presence of no interaction, examine the effects of visit type on tobacco assessment and assistance outcomes. We report adjusted odds ratios (AOR) including patient characteristics that differ between time periods by 5% which was set as a clinically meaningful difference.

Results

As shown in Figure 1, the total number of visits remained somewhat steady, but the proportion of visits conducted via telehealth was less than 0.1% and increased rapidly after the onset of COVID-19 in March 2020. As shown in Table 1, the proportion of telehealth visits was 54.5% 1 year- and 38.1% 2 years post onset of COVID-19. Visit and patient characteristics across the three time periods by visit type are also shown in Table 1. Overall, 16.5% of encounters were by individuals who reported using tobacco. Visits were predominately attended by females and individuals aged 35–64 years. Nine percent of visits were by individuals who identified as Hispanic and 43.5% and 46.6% by individuals who identified as White and Black, respectively. The majority of visits were by those with Medicaid or Medicare insurance; only 30% of visits were by patients with commercial insurance. Characteristics are similar across time periods except for an increase in the proportion of patients who identify as Black and a decrease in the proportion of patients who identify as Hispanic/ Latino.

Table 2 shows the findings from the analyses of provision of tobacco assessment and assistance by visit type (in-person vs. telehealth) by time period. The interaction effect of time period by visit type was not significant for outcomes examined with the exception of tobacco cessation medications ordered (described below). Asking about tobacco use decreased from 64% pre-pandemic to 36% and 51% at 1- and 2-year post onset of COVID-19, respectively. No other indicators were significantly different by time period. Compared to telehealth visits, the rate of asking about tobacco status during in-person visits was significantly higher for the two time periods post-onset of COVID-19 (66.5% vs. 11.3% and 72.1% vs. 17.3%, respectively). The same pattern of association was observed for the pre-COVID time period, albeit with a very small number of telehealth visits. Figure 2 shows the impact of this difference in asking on the number of tobacco users identified over time for in-person visits versus telehealth visits. The odds of asking about tobacco status during an in-person visit were significantly higher than for telehealth (reference group) visits AOR (95% CI) = 15.0 (14.7 to 15.4), independent of the time period. Provision of brief advice to those who were identified during the visit as using tobacco was similar to in-person and telehealth visits. Assessing readiness to quit was significantly higher during in-person visits versus telehealth visits AOR (95% CI) = 6.5 (3.0 to 13.9) Offer of assistance in the form of referral to tobacco cessation counseling (ie, quitline or group class) was significantly higher during in-person versus telehealth visits AOR (95% CI) = 6.5 (3.0 to 13.9). Finally, the interaction effect of visit type * time period was

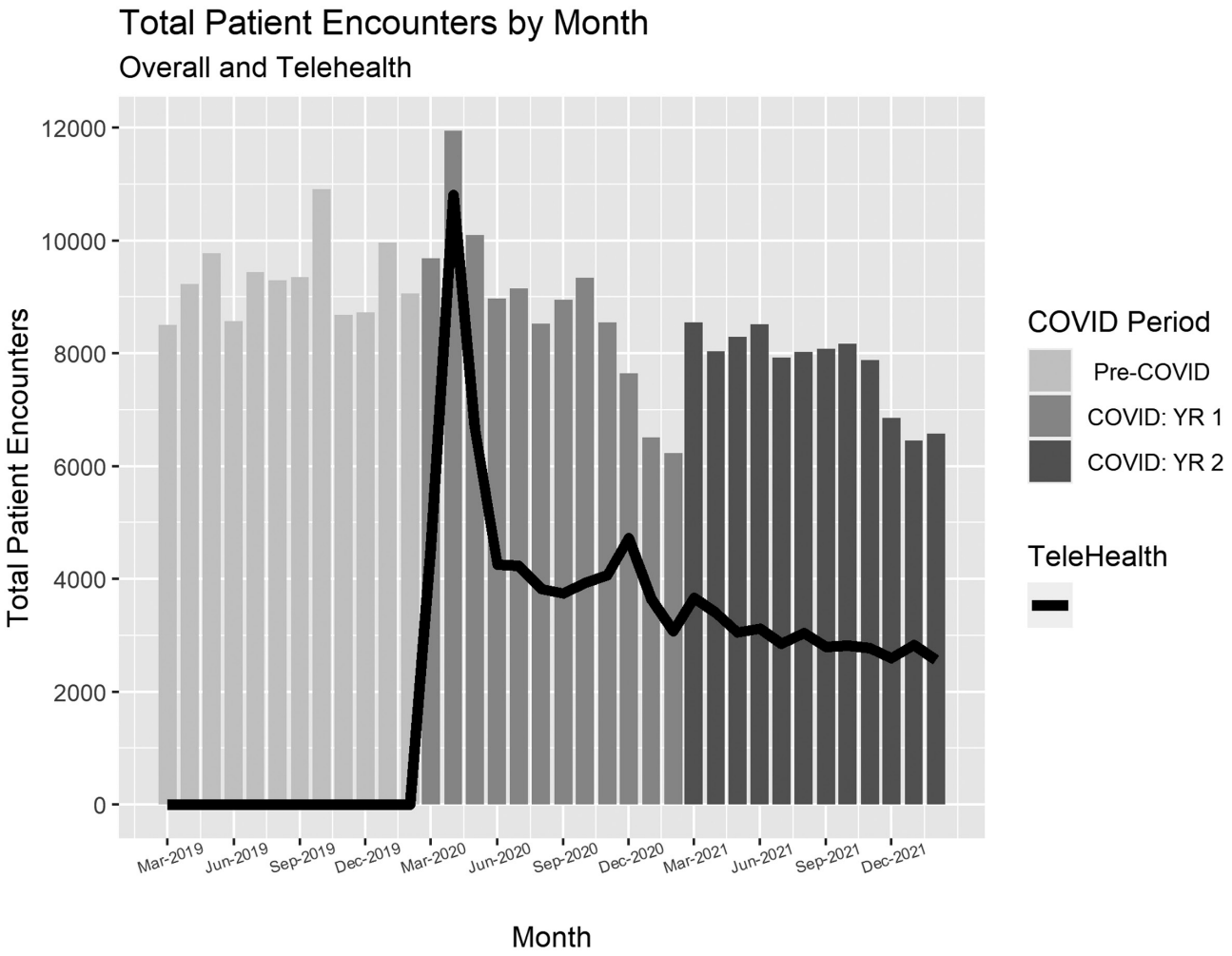

Figure 1. Number of visits by month and percent of telehealth visits.

significant for ordering tobacco cessation medications with the rate slightly increasing for in-person visits from 1-year to 2 years post onset of COVID-19 (7.4% vs. 8.5%) and decreasing for telehealth visits (6.6% vs. 3.9%). See Table 2.

Discussion

This study found that asking about tobacco status was 15 times more likely to occur during in-person visits compared to telehealth visits. Furthermore, among those asked and confirmed current tobacco use, the provision of a referral to tobacco cessation counseling was 6.5 times more likely for in-person versus telehealth visits. For most comparisons, the differences in outcomes were driven by visit type rather than time period with the caveat that pre-pandemic telehealth visits were rare. One explanation for the difference is that in-person office visits often have a clinical team member assess and document vital signs like blood pressure, weight, and smoking status prior to being seen by the clinician. It is likely that that step was not routinely happening for telehealth visits. In this study, we do not have data to inform how operations changed during telehealth visits. Others have noted that while staff would normally check vital signs and review medications at the start of in-person visits, telehealth visits during the early years of the pandemic staff were focused on helping patients engage with the technology of the telehealth platform.[15] A second explanation is that COVID-19 exacerbated primary care clinic staff shortages—due to individual and family sick leave, being deployed elsewhere in the health system or leaving the role permanently—and therefore the remaining staff may have felt too pressed for time to complete normal pre-visit assessments.[16] Our study adds to prior work that examined tobacco assessment and the provision of brief advice across similar time periods. This study found that rates of tobacco assessment at community health centers declined 50% between March and May of 2020 compared to pre-pandemic levels, and increased but remained 33.5% lower than pre-pandemic levels from June 2020 to June 2021; provision of tobacco cessation counseling likewise decreased 20.4% between March and May 2020, and increased but remained 2.5% lower than pre-pandemic levels from June 2020 to June 2021.[8] Our study adds a comparison of in-person versus telehealth visits by evaluating visit-level data such that tobacco assessment and assistance by both time period *and* visit type could be examined.

Our finding that patients who use tobacco are less likely to be identified as such in telehealth visits has substantial downstream consequences. If tobacco status is not assessed during a visit, then subsequent tobacco cessation treatment in the form of referral to counseling and orders for tobacco cessation medications are unlikely to occur. We found that rates of documentation of referral to tobacco counseling

Table 1. Patient and Visit Characteristics of Visits Overall and by Time Period*

Description	Category	Overall 310 388 (100.0%) Total	Pre-COVID 111 477 (35.9%) N(%)	COVID: Year 1 105 569 (34.0%) N(%)	COVID: Year 2 93 342 (30.1%) N(%)
Appointment type	Office visit	217 281(70.0%)	111 464(100%)	48 013(45.5%)	57 804(61.9%)
	Telehealth visit	93 107(30.0%)	13(0.0%)	57 556(54.5%)	35 538(38.1%)
Smoking status	Current smoker	51 234(16.5%)	24 636(22.1%)	12 181(11.5%)	14 417(15.4%)
	Former smoker	57 578(18.6%)	27 045(24.3%)	13 576(12.9%)	16 957(18.2%)
	Never smoked	96 954(31.2%)	45 074(40.4%)	23 603(22.4%)	28 277(30.3%)
	Not assessed	104 622(33.7%)	14 722(13.2%)	56 209(53.2%)	33 691(36.1%)
Sex	Male	97 612(31.4%)	34 703(31.1%)	33 143(31.4%)	29 766(31.9%)
	Female	212 769(68.6%)	76 774(68.9%)	72 423(68.6%)	63 572(68.1%)
Age in years	18–34	66 243(21.3%)	25 127(22.5%)	22 687(21.5%)	18 429(19.7%)
	35–64	175 008(56.4%)	62 442(56.0%)	59 911(56.8%)	52 655(56.4%)
	≥65	69 137(22.3%)	23 908(21.4%)	22 971(21.8%)	22 258(23.8%)
Race**	White	132 667(43.5%)	47 912(43.9%)	44 980(43.3%)	39 775(43.1%)
	Black	142 198(46.6%)	47 440(43.5%)	49 666(47.9%)	45 092(48.9%)
	Other	30 286(9.9%)	13 823(12.7%)	9142(8.8%)	7321(7.9%)
Hispanic**	Non-Hispanic	274 541(90.7%)	93 554(86.1%)	94 874(92.3%)	86 113(94.5%)
	Hispanic	28 034(9.3%)	15 071(13.9%)	7910(7.7%)	5053(5.5%)
Primary Insurance Class	Commercial	92 195(30.0%)	32 611(29.6%)	30 750(29.4%)	28 834(31.1%)
	Medicaid	111 259(36.2%)	39 802(36.1%)	38 682(37.0%)	32 775(35.4%)
	Medicare	82 804(26.9%)	29 289(26.6%)	27 670(26.4%)	25 845(27.9%)
	Self-Pay	21 010(6.8%)	8374(7.6%)	7458(7.1%)	5178(5.6%)
	Other	273(0.1%)	106(0.1%)	106(0.1%)	61(0.1%)

*All characteristics differ across the three time periods, $p < .001$.
**Difference greater than 5% between any two of the time points are noted as clinically meaningful.

Table 2. Association of Tobacco Assessment and Cessation Assistance by Visit Type and Time Period

Description	Visit type	Overall N = 310 388 N(%)	Pre-COVID N = 111 477 n(%)	COVID: Year 1 N = 105 569 N(%)	COVID: Year 2 N = 93 342 N(%)
Asked about tobacco status, % yes	In-person	217 281[a](66.9%)*	111 464(64.5%)	48 013(66.5%)	57 804(72.1%)
	Telehealth	93 107(13.6%)	13 (7.7%)	57 556(11.3%)	35 538(17.3%)
	Total	310 388(50.9%)	111 477(64.5%)	105 569(36.4%)	93 342(51.2%)
Patient reported tobacco use within the past 30 days (among those asked), % yes	In-person	145 469(27.7%)	71 847(29.1%)	31 937(26.4%)	41 685(26.4%)
	Telehealth	12 663(27.5%)	1(0.0%)	6510(28.2%)	6152(26.8%)
	Total	158 132(27.7%)	71 848(29.1%)	38 447(26.7%)	47 837(26.4%)
Brief advice (among current tobacco users), % yes	In-person	40 302(77.5%)	20 876(78.5%)[b]	8433(76.4%)	10 993(76.2%)
	Telehealth	3488(75.0%)		1837(76.2%)	1651(73.7%)
	Total	43 790(77.3%)	20 876(78.5%)	10 270(76.4%)	12 644(75.9%)
Ready to quit? % yes	In-person	40 302(24.3%)*	20 876(27.4%)[b]	8433(24.2%)	10 993(18.5%)
	Telehealth	3488(7.3%)		1837(11.9%)	1651(2.2%)
	Total	43 790(23.0%)	20 876(27.4%)	10 270(22.0%)	12 644(16.4%)
Referral to counseling, % yes	In-person	40 302(1.7%)*	20 876(2.2%)[b]	8433(1.1%)	10 993(1.5%)
	Telehealth	3488(0.2%)		1837(0.2%)	1651(0.2%)
	Total	**43 790(1.6%)**	**20 876(2.2%)**	**10 270 (0.9%)**	**12 644(1.3%)**
Smoking cessation medications, % yes	In-person	40 302(8.2%)**	20 876(8.3%)[b]	8433(7.4%)	10 993(8.5%)
	Telehealth	3488(5.4%)		1837(6.6%)	1651(3.9%)
	Total	43 790(7.9%)	20 876(8.3%)	10 270(7.3%)	12 644(7.9%)

*significant association for type of visit; **significant interaction effect of type of visit by time period.
[a]Numbers represent denominator for the cell, (%) represents % Yes.
[b]Analyses are limited to the 1 year and 2 year post COVID because of the lack of cases for telehealth visit in the pre-COVID onset time period.

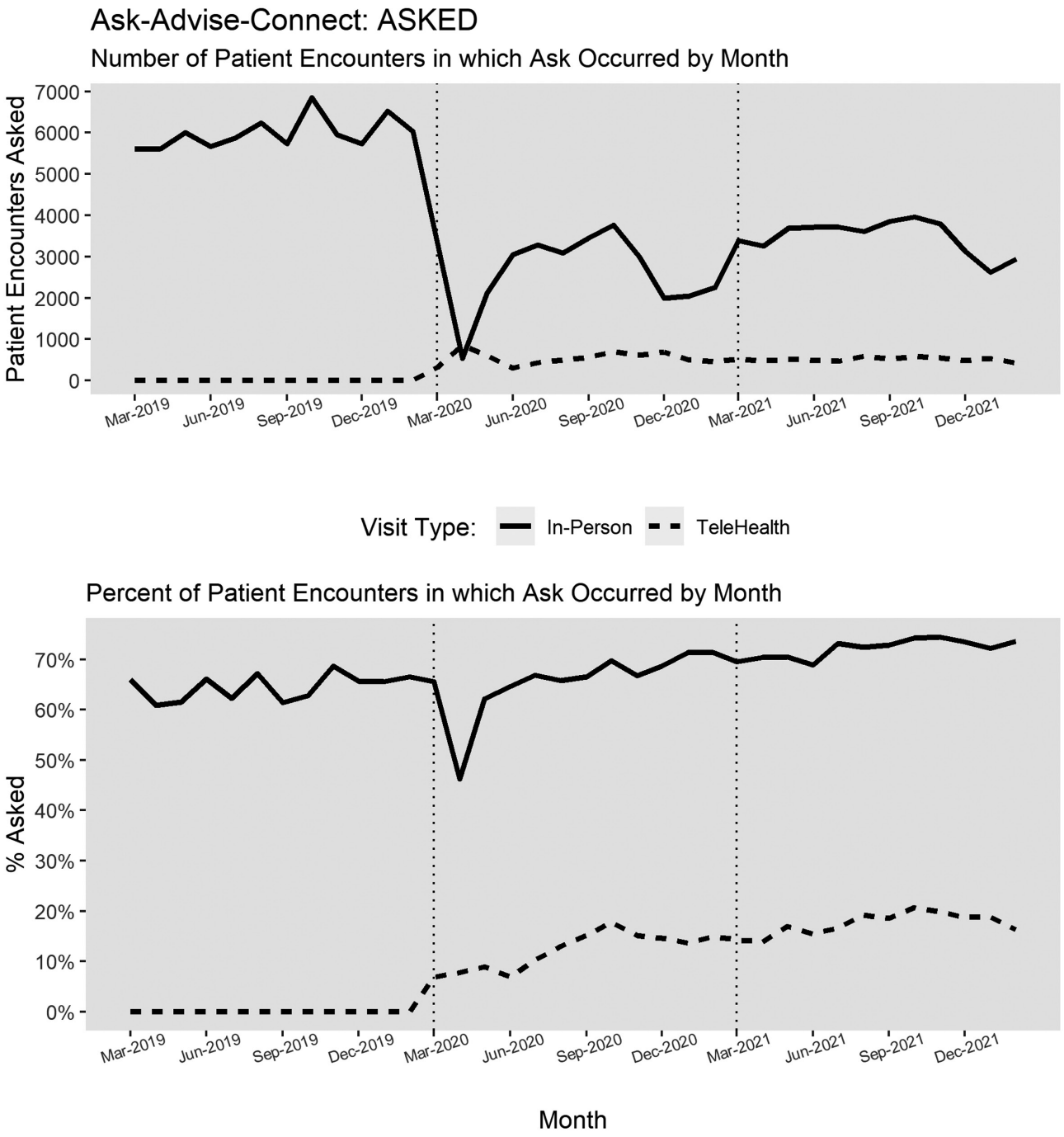

Figure 2. Line graphs for number and percent of encounters that patient was asked about tobacco use by visit type and time. Panel A: number of patient encounters in which ask occurred. Panel B: Percent of patient encounters in which ask occurred.

were very low overall, but provision of a referral to tobacco cessation counseling was more likely for in-person visits compared to telehealth visits. Furthermore, provision of tobacco cessation medications was less likely during telehealth visits than in-person visits, and this difference was larger in the second year post-onset of COVID-19. We interpret the tobacco cessation treatment findings with caution due to the overall infrequency of referrals to tobacco cessation counseling. Nonetheless, these findings highlight the importance of assessing tobacco status as the mouth of the funnel for subsequent tobacco cessation treatment. We estimate that the lower rates of asking about tobacco status during telehealth visits observed in this study resulted in missed opportunities to address tobacco and offer assistance among 13 000 patient visits.

Our findings are significant given the role tobacco use plays in contributing to multiple chronic conditions including at least 15 types of cancers.[17] In contrast to other types of cancer screening and prevention, tobacco assessment and referrals to cessation counseling and medications do not require face-to-face interaction with health providers. While the proportion of telehealth visits has declined to about 20% of primary care outpatient visits currently, because of the advantages and demand for telehealth visits,[18] it is highly likely that they will

continue to be offered. Therefore, ensuring that patients are regularly assessed for tobacco use regardless of visit modality is an important consideration for health systems. For example, health systems could set standards to routinely incorporate vital signs assessment into telehealth visit workflows.

Alternatively, given the continued shortage of clinical staff,[16] changing workflows may require alternative tobacco assessment and assistance strategies, such as outreach. Outreach approaches have been extensively used to improve patient completion of preventive health testing and might be particularly relevant for preventive services that do not require in-person primary care contact to deliver the service. For example, outreach approaches for mailed fecal immunochemical test kits and reminder letters for scheduling breast cancer screenings have been used to increase screening completion among patients.[19,20] Though less frequently used for preventive services that require behavior change, such as tobacco cessation, patient outreach can be an effective strategy. For instance, a recent study by Chung and colleagues[7] used a patient panel outreach approach to contact patients with chronic conditions who use tobacco during the COVID-19 pandemic. Findings indicate that tobacco cessation assistance in the form of cessation counseling or receipt of cessation medications increased 23% over the 21-month study time period. How to effectively integrate an outreach approach to address tobacco cessation within primary care clinics that complements current activities is an important issue to address.

The study findings should be interpreted in light of the following limitations. This study was conducted in one regionally located health system in the mid-western region of the United States. The patient population of this health system is demographically diverse, but also predominately government-insured (Medicaid/ Medicare). The findings might not generalize to other settings with different characteristics. Our analyses were limited to using EHR data to measure asking about tobacco use, advising to quit, referral for tobacco cessation counseling, and orders for tobacco cessation medications. While orders for referrals and medications are well documented in EHRs, tobacco assessment, and brief advice to quit may have happened but were not documented, resulting in an underreporting of these outcomes. However, if there was a systematic documentation bias for telehealth visits, one would expect it to affect both indicators; instead, we see a 15-fold difference for assessing and no difference for brief advice by type of visit, reducing the likelihood of documentation bias as an explanation of the observed findings. This study did not have access to data about other ways that telehealth and in-person visits differed, such as potential operational changes due to modality of visit. Such information could provide valuable insight into why observed rates of tobacco assessment were different for telehealth versus in-person visits. Finally, this is an observational study and other factors that we did not measure, such as changes in operational priorities over time, the impact of staffing shortages and turnover, and continued technical challenges of conducting telehealth visits, could contribute to the observed differences in tobacco assessment and treatment for telehealth versus in-person visits.

Conclusion

In conclusion, after the onset of COVID-19, there was a large upsurge in telehealth visits observed in primary care that was still above pre-pandemic rates 2 years later. Patients were less likely to have tobacco status assessed and less likely to receive tobacco cessation assistance during telehealth visits compared to in-person visits. These findings are significant given the association between tobacco use and multiple chronic medical conditions. Given the ability to conduct tobacco assessment and tobacco cessation assistance in the form of counseling and cessation medications without the need for face-to-face interactions, workflows that are feasible, effective, and sustainable are needed to ensure that patients are receiving these services regardless of the mode of delivery.

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Declaration of Interests

The authors of this manuscript have no conflicts of interests to declare.

Author Contributions

Susan Flocke (Conceptualization [lead], Formal analysis [equal], Funding acquisition [lead], Methodology [equal], Project administration [equal], Supervision [lead], Visualization [lead], Writing—original draft [lead], Writing—review & editing [lead]), Elizabeth Albert (Conceptualization [equal], Investigation [equal], Project administration [equal], Visualization [equal], Writing—original draft [equal], Writing—review & editing [equal]), Steven Lewis (Conceptualization [equal], Data curation [lead], Formal analysis [lead], Funding acquisition [Supporting], Methodology [equal], Visualization [equal], Writing—original draft [equal], Writing—review & editing [supporting]), Eileen Seeholzer (Conceptualization [equal], Funding acquisition [supporting], Methodology [supporting], Project administration [equal], Writing—original draft [supporting], Writing—review & editing [supporting]), and Steffani Bailey (Conceptualization [equal], Methodology [equal], Writing—original draft [equal], Writing—review & editing [equal]).

Data Availability

The data and analysis code that support the findings of this study are available from the authors upon reasonable request and with the permission of the MetroHealth Health System.

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