New Adopters of Telemedicine During the Coronavirus-19 Pandemic in Respondents to an Online Community Survey: The Case for Access to Remote Management Tools for Individuals with Chronic Obstructive Pulmonary Disease

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Citation: Boyce DM, Thomashow BM, Sullivan J, Tal-Singer R. New adopters of telemedicine during the coronavirus-19 pandemic in respondents to an online community survey: the case for access to remote management tools for individuals with chronic obstructive pulmonary disease. *Chronic Obstr Pulm Dis*. 2020; Published online December 8, 2020. doi: https://doi.org/10.15326/jcopdf.2020.0181

List of abbreviations

COVID-19

COPD

COPDF

List of keywords: COVID-19, COPD, Exacerbation, Telemedicine, Telehealth

Statement of funding support :Supported by COVID-19 research grants from AstraZeneca, GSK, Teva, Mylan, and Pfizer. The funders had no role in *1*) conception, design, or conduct of the surveys; *2*) collection, management, analysis, interpretation, or presentation of the data; or *3*) preparation, review, or approval of the manuscript.

Abstract

Objectives. To investigate telemedicine adoption, emergency room avoidance, and related characteristics of patients with chronic obstructive pulmonary disease (COPD) with and without exacerbations since the COVID-19 pandemic began.

Methods. We conducted the second of a series of online surveys via SurveyMonkey.com of people with COPD between May 1, 2020 and May 31, 2020. Frequency, percent, and Fisher's exact test (two-sided) were calculated using SPSS version 26.

Results. More than half of respondents (157, 64%), indicated that they started using telemedicine in 2020. Forty-seven percent of respondents had at least one exacerbation since January 1, 2020. Respondents who had at least one exacerbation in 2020 were more likely to start using telemedicine in 2020 than respondents who did not report any exacerbation in 2020 (75.7% versus 54.3%, $p < 0.001$). Respondents reporting a 2020 exacerbation indicated significantly higher avoidance of emergency healthcare since the pandemic began (27.8%) as compared to those who did not have an exacerbation in 2020 (10.1%), $p < 0.001$.

Conclusions. In response to social distancing and other COVID-19 precautions, people with COPD are avoiding traditional, in-person health care environments and turning to telemedicine to prevent and manage exacerbations. Further investigation is needed to identify best practices in and barriers to telemedicine in this population.

Published online December 8, 2020 doi: https://doi.org/10.15326/jcopdf.2020.0181

Introduction

Individuals with COPD are at high risk of morbidity and mortality from COVID-19 (1), but they are also at a risk of mortality and poor outcomes with high rates of healthcare resource utilization if their COPD exacerbations are untreated as recommended (2, 3). Telemedicine has potential as an effective tool for prevention and management of exacerbations in individuals with COPD (4). Telemedicine also allows for monitoring of patients during the vulnerable period following a hospitalized COPD exacerbation (2). In-home digital health apps such as the COPDF Pocket Consultant Guide can be used to improve self-management and prevent untreated COPD exacerbations (5). Improved tools for telehealth-administered pulmonary rehabilitation are comparable to in-person pulmonary rehab programs (6). However, COPD telehealth care is not standardized with few well-designed intervention trials. Aiming to assess the impact of COVID-19 on individuals with COPD and related chronic lung conditions, the COPD Foundation (COPDF) conducted two online community surveys which informed ongoing community webinars and programs (7).

Methods

Survey 1 (S1) was administered between March 29th and April 13th, 2020. Qualitative analysis of open-ended responses to S1informed the questions administered in Survey 2 (S2), administered between April 26th to May 31, 2020. Survey 3 (S3) was administered between August 14 and September 15, 2020. S1 respondents with COPD expressed extreme fear and anxiety about leaving the house for any reason, including healthcare-related visits, due to fear of being infected with COVID-19. As many healthcare providers in highly COVID-19 affected

Published online December 8, 2020 doi: https://doi.org/10.15326/jcopdf.2020.0181

areas cancelled in-person visits either by their own decision or through state and local policy requirements, we were concerned about avoidance of preventive care and treatment for exacerbations by individuals with COPD, resulting in poor outcomes. Hence, in S2 we added the following questions to explore the use of healthcare and telemedicine in individuals experiencing COPD exacerbations:

(1) *"Which of the following ways has COVID-19 affected your interactions with healthcare providers?"* including the choices, *"I started doing telehealth (phone/video) visits*" and, "*I started avoiding the emergency department in situations that I would have gone to the emergency department before COVID-19*";

(2)"*Since January 1, 2020, have you had exacerbations or flare ups of your COPD that required ANY of the following: use of oral steroids or antibiotics; a visit to the emergency room; or hospitalization?*"

(3) "*What do you feel would help you cope during this COVID-19 pandemic?*" which included the response choice "*Assistance with technology, video calls, and/or social media*".

S3 was considerably shorter than the first two surveys and included new questions about telehealth utilization; the results of S3 informed our programming and outreach and confirmed some of the findings of S2. Surveys were conducted using SurveyMonkey.com received an exemption determination from Western Institutional Review Board before recruitment began. We recruited respondents through COPDF's COPD360^0 network, including the online communities for COPD (COPD360social) and bronchiectasis and nontuberculous mycobacterial lung disease (BronchandNTM360social), e-newsletters, Twitter, and Facebook. COPDF partners NTM Info (NTMir) & Research and Pulmonary Education and Research Foundation (PERF)

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also assisted in recruitment. This report focuses on respondents with COPD in the United States who answered S2 questions on telemedicine and exacerbation history (n=244 out of 508 total respondents), overall summaries of surveys were reported on the COPDF website (4). Frequency, percent, and Fisher's exact test (two-sided) were calculated using SPSS version 26.

Results

Respondents to S2 represent a variety of communities, with 31% residing in medium-sized cities. More than half of the respondents (59%) are not currently employed, but 5% are essential workers and still working at the time of the survey. Among those respondents who categorized their employment status as "other," 17% wrote in "retired" while 5% wrote in "disabled." Fifty-five percent of the sample report the use of supplemental oxygen (See Table 1). Almost all (97%) of respondents to S2 reported being on respiratory medication for their COPD and 78% reported that they "avoid leaving the house" since the beginning of the pandemic. More than half of respondents (157, 64%), indicated that they started using telemedicine in 2020. Forty-seven percent of respondents had at least one exacerbation since January 1, 2020. Respondents who had at least one exacerbation in 2020 were more likely to start using telemedicine in 2020 than respondents who did not report any exacerbation in 2020 (75.7% versus 54.3%, $p < 0.001$, Figure 1). Respondents reporting a 2020 exacerbation indicated significantly higher avoidance of emergency healthcare since the pandemic began (27.8%) as compared to those who did not have an exacerbation in 2020 (10.1%), $p < 0.001$. There was no statistically significant difference in adoption of telemedicine based on size of city or town of residence, employment status, or supplemental oxygen use (Table 1). One respondent (non-exacerbator) tested positive for

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COVID-19 and reported initiating telehealth in 2020. Fifteen percent of all respondents indicated that they would like assistance with using technology, video calls, and/or social media. While not statistically significant, we noted that respondents who had exacerbations in 2020 were more likely to report that they needed assistance with technology (19.5%) as compared to respondents who did not have an exacerbation (10.7%), p=0.07.

Discussion

Our data demonstrate that the most vulnerable members of the COPD community are turning to telemedicine for the management of their condition during COVID-19. Some S2 respondents commented that they were already using telemedicine prior to COVID-19 (Table 2), so we do not assume that if they did not respond that they started telemedicine since the pandemic began that they are not using telemedicine. Acknowledging this limitation of S2, we asked respondents about prior use of telehealth in S3. We found that all six of the respondents who reported using telehealth exclusively before the pandemic continued to use telehealth exclusively after the pandemic. For those who had only in-person appointments before the pandemic, 44 (49%) of exacerbators versus 28 (34%) of non-exacerbators reported using at least some telehealth visits (p=0.046). Because S3 was conducted later in the pandemic (August versus May), it is possible that part of this mix is due to the fact that some health care facilities had reopened and participants were unable to postpone essential, in-person services such as spirometry.

While we are pleased to observe that a high percentage of our survey respondents seem to be following COPD treatment and COVID-19 prevention guidelines (based on medication use and social distancing responses), we are concerned about the inconsistency of telehealth approaches

Published online December 8, 2020 doi: https://doi.org/10.15326/jcopdf.2020.0181

reported in open ended comments. We remain concerned about the quality, consistency, technological accessibility, and affordability of the telemedicine options available to the COPD community at large and accelerating the development of better digital tools remains a key focus of the COPDF. A potential limitation of our study is the fact that respondents to our online surveys are likely a subset of the population more inclined to use the internet and telemedicine while our mission is to meet the needs of the entire COPD community. In addition, based on the number of respondents reporting that they are not working or retired, supplemental oxygen use, and exacerbations, our sample may skew toward older and/or severely ill participants. This is also true in S3, in which 52% of respondents experienced at least one exacerbation since January 1, 2020. We did not collect data on age or other demographic characteristics, so it was impossible to control for confounders. However, even the adoption of telehealth is due to age and severity of illness, we do not feel that this changes the conclusion that there needs to be improved access to telehealth for all members of the COPD community, especially the elderly and more severe cases.

COPD is the 4th leading cause of death in the United States and in 2017, there were nearly one million emergency department visits and 5.7 million physician office visits with emphysema or COPD as the primary diagnosis (9). The Centers for Disease Control and Prevention (CDC) recognizes telemedicine as a promising public health tool in part because of its potential to improve healthcare access to medically underserved populations (10). However, it is imperative to include the patient perspective in the design of these programs to avoid the risk of creating new disparities in communities that lack the hardware, internet access, and skills to fully participate in telemedicine. Additionally, given the fact that 51% of COPD-related medical costs

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are borne by Medicare, and outside of the current public health emergency, telehealth services in patients' homes are not reimbursed, future efforts will be needed to inform policy changes required to allow the full benefits of telehealth chronic disease management services to be realized (11).

Acknowledgement

The authors thank Ms. Delia Prieto of the COPD Foundation for programming the surveys.

Published online December 8, 2020 doi: https://doi.org/10.15326/jcopdf.2020.0181

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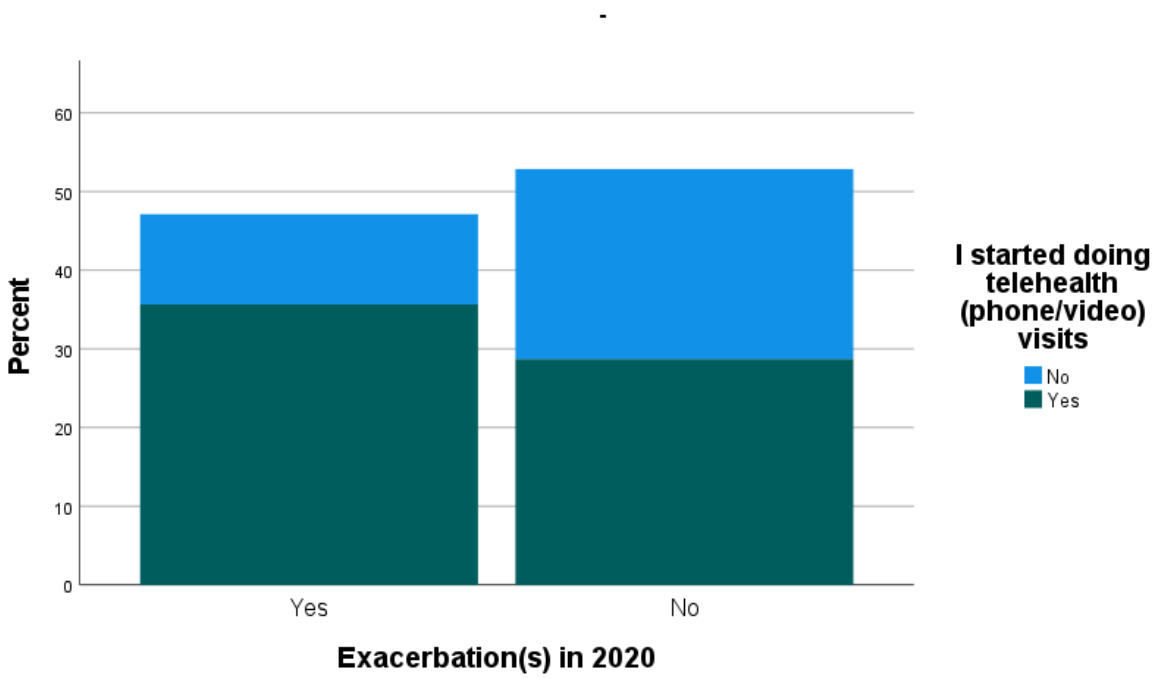
Published online December 8, 2020 doi: https://doi.org/10.15326/jcopdf.2020.0181

Figure 1. Telemedicine Adoption by 2020 COPD Exacerbation Status (n=244)



Comparison of 2020 exacerbation status between telehealth and non-telehealth adopters since the COVID-19 pandemic began. The difference between 2020 exacerbators and non-exacerbators was statistically significant (p=0.001).

Published online December 8, 2020 doi: https://doi.org/10.15326/jcopdf.2020.0181

Table 1: COPD Foundation COVID-19 Survey 2
Telemedicine adoption, avoidance of healthcare, exacerbation history, and participant characteristics (n=244)[a]

Respondent Feature	**I started doing telehealth (phone/video) visits**				**p-value**
		All #(%)	**Yes #(%)**	**No #(%)**	
>=1 exacerbation, 2020	Yes	115(47.1)	87 (55.4%)	28 (32.2%)	.001
	No	129(52.9)	70 (44.6%)	59 (67.8%)	
>=1 exacerbation, 2019	Yes	173 (70.9)	115 (73.2%)	58 (66.7%)	.305
	No	71 (29.1)	42 (26.8%)	29 (33.3%)	
I started avoiding the emergency department in situations that I would have gone to the emergency department before COVID-19	Yes	45 (18.4)	37 (23.6%)	8 (9.2%)	.006
	No	199 (81.6)	120 (76.4%)	79 (90.8%)	
Assistance with technology, video calls, and/or social media	Yes	35(14.9)	21 (13.8%)	14 (16.9%)	.57
	No	200 (85.1)	131 (86.2%)	69 (83.1%)	
Community size					
Large city (> 500,000 residents)		36 (14.8)	24 (15.3%)	12 (13.8%)	.255
Big city (100,000 -500,000)		37 (15.2)	28 (17.8%)	9 (10.3%)	
Medium-sized city (20,000 -100,000)		76 (31.1)	46 (29.3%)	30 (34.5%)	
Small town (2,500 -20,000)		62 (25.4)	35 (22.3%)	27 (31%)	
Rural or remote area (<2,500 residents)		33 (13.5)	24 (15.3%)	9 (10.3%)	
Yes, I am an essential worker and I am still working		13 (5.4)	7 (4.5%)	6 (7.1%)	.683
Yes, I am an essential worker but I am not working		13 (5.4)	7 (4.5%)	6 (7.1%)	
No, I am not an essential worker but I am still working		14 (5.9)	10 (6.5%)	4 (4.7%)	
No, I am not currently employed		140 (58.6)	92 (59.7%)	48 (56.5%)	
Other[b]		59 (24.7)	38 (24.6)	21 (24.7)	
Supplemental oxygen use					
Yes, supplemental oxygen		130 (54.9)	84 (54.5%)	46 (55.4%)	1.0
No oxygen		107 (45.1)	70 (45.5%)	37 (44.6%)	

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a. The focus of this analysis was respondents in the United States due to jurisdiction-specific policy implications. There were an additional 25 non-US respondents with COPD. Of those, eleven had an exacerbation since January 1, 2020, nine started using telehealth and four started avoiding emergency departments since the beginning of the COVID-19 pandemic. None of the non-US respondents reported having a positive COVID-19 test.
b. 41 (17%) who indicated "Other" responded in the open-ended comment field that they are retired; 12 (5%) indicated in the comment field that they were disabled.

Published online December 8, 2020 doi: https://doi.org/10.15326/jcopdf.2020.0181

Table 2. COPD Foundation Survey 2 Respondent Comments Regarding Telemedicine

Comments
"THEY started telehealth. I did have an actual in person visit with Oncology/Hematology earlier this week though."
"Some of The doctors changed to phone calls."
"My doctor calls me & I always had my medication delivered."
"My healthcare providers had already done many telehealth visits. Since the pandemic, I have had already planned (previously scheduled) telehealth visits. My next appointments may or may not be in person, in 6 months or so."
"I was using telemed until my ear and lymph nodes started swelling. I've been had to go for an in-person visit at the doctor's office."
"I communicate online via "My Chart"
"Telehealth has worked well for me. I see my therapist about every two weeks via my computer. Works great. I have an appointment with my PCP in a couple of weeks for a routine follow-up and we'll do that via computer."
"My bp, blood oxygen, temp and weight are not being taken on a regular basis. Telehealth is not as in depth as face to face."
"It is extremely hard to get in touch with them now, even with calling and e-mailing. My main doctors office has completely closed its doors, medication updates are done by phone if/when they call."
"After a phone consult and medicine called in, with little improvement, instead of being seen in office, I was sent to the ER. So I had 6 hours in ER for all that could have been done in office except for blood draw."
"I am continuing my rehab on SKYPE with my pulmonary rehab presently"
"I participate in a pulmonary program via an App. Lift Pulmonary. It is terrific and designed to do it at your pace. It also has great breathing techniques I'd never heard of to help COPD breathing."

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