

# NExUS-Heart: Novel examinations using smart technologies for heart health—Data sharing from commercial wearable devices and telehealth engagement in participants with or at risk of atrial fibrillation



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**BACKGROUND** Telemedicine and commercial wearable devices capable of detecting atrial fibrillation (AF) have revolutionized arrhythmia care during coronavirus disease 2019. However, not much is known about virtual patient-provider interactions or device sharing behaviors.

**OBJECTIVE** The purpose of this study was to characterize how participants with or at risk of AF are engaging with their providers in the context of telemedicine and using commercially wearable devices to manage their health.

**METHODS** We developed a survey to describe participant behaviors around telemedicine encounters and commercial wearable device use. The survey was distributed to participants diagnosed with AF

or those at risk of AF (as determined by being at least 65 years old and having a CHA<sub>2</sub>DS<sub>2</sub>-VASc stroke risk score of >2) in the University of Massachusetts Memorial Health Care system.

**RESULTS** The survey was distributed to 23,530 patients, and there were 1222 (5.19%) participant responses. Among the participants, 327 (26.8%) had AF and 895 (73.2%) were at risk of AF. Neither device ownership nor device type use differed by AF status. After adjusting for covariates that may influence surveyed participant communication patterns, we found that participants with AF were more likely to share their wearable device-derived data with providers (adjusted odds ratio 1.87; 95% confidence interval 1.02–3.41). Rates of sharing physical activity or sleep data were low for both groups and did not differ by AF status.

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**CONCLUSION** Compared with participants at risk of developing AF, those with AF were more likely to share heart rate and rhythm data from their commercial wearable devices with providers. However, both groups had similar rates of sharing physical activity and sleep data, telemedicine engagement, and technology use and ownership.

## Introduction

Atrial fibrillation (AF) is a common arrhythmia affecting more than 3 million individuals in the United States. AF is associated with a 4- to 5-fold risk of stroke, and it is also associated with an increased risk of myocardial infarction, cognitive impairment, heart failure, and mortality.<sup>1–9</sup> Because of its often asymptomatic and episodic nature, especially early in the course of the disease, AF can be difficult to diagnose. It is estimated that at least 698,900 AF cases in the United States remain undiagnosed.<sup>10</sup> Given the severity of adverse clinical outcomes, early detection and treatment of AF are of paramount importance. Traditional means of AF diagnosis such as Holter monitoring or implantable devices, however, are expensive and inconvenient to patients.<sup>11–13</sup>

In recent years, several commercially available wearable devices have been cleared by the Food and Drug Administration for use in detecting AF, and studies have shown that wearable devices can detect AF with high accuracy.<sup>14–19</sup> As a result, understanding patients' device use and acceptance of data sharing would allow for improved patient outcomes. Commercial wearable devices are especially relevant during the age of coronavirus disease 2019 (COVID-19) during which remote care and telemedicine use have expanded.<sup>20,21</sup>

While there are many studies about how wearable devices can help detect AF,<sup>14,15,17–19,22</sup> much less is known about how patients with AF or those at risk of AF use wearable devices for health monitoring. Furthermore, there is not much published in the medical literature about how patients communicate these health care data with their providers. We anticipate that a better understanding of patients' device use and data sharing patterns would allow providers to better integrate these devices into their workflows and better engage patients during clinical visits to meet their specific health care needs. We believe that this could help initiate or modify treatment as needed and improve patient outcomes. Identifying and addressing patient barriers to engaging in telemedicine is especially important in the current climate and will be important in expanding health care access.

This study aimed to characterize how participants with or at risk of AF are engaging with their providers in the context of using commercially wearable devices to manage their health and characterize telemedicine use for both groups. We assessed device ownership and duration of use, rate of wearable device data sharing, and telemedicine interactions. We hypothesized that participants with AF would share all types of wearable data with their providers at a higher rate than participants without AF and that there would be a similar rate of telemedicine engagement and technology use and ownership between the 2 groups.

**KEYWORDS** Atrial fibrillation; Commercial wearable device; Cardiac data; Data sharing behavior; Telehealth; Telemedicine

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## Methods

### Data source

Participants were recruited from the University of Massachusetts Memorial Health Care system via an e-mail survey from January 6 to February 12, 2021. Inclusion criteria were as follows: participants had to receive care from the University of Massachusetts Memorial Health Care cardiology or internal medicine clinics at any point in their life, they have an e-mail address on record in the electronic health record (EHR), and they have a diagnosis of AF or are at high risk of developing AF (as determined by being at least 65 years old and having a CHA<sub>2</sub>DS<sub>2</sub>-VASC stroke risk score of >2).<sup>23–25</sup> Participants excluded from the study were non-English speaking, incarcerated, or younger than 18 years. We sent eligible participants an e-mail that had some information about the study, and it also included a link to the fact sheet with more information and the actual survey itself. In the fact sheet, we specify that by completing the survey, participants were consenting to participate in the study. We attempted to identify a population of participants with AF and those without AF who were similar in age, sex, and other characteristics so that data from each group could be compared. Each participant's medical history information was abstracted from the EHR upon their survey completion, and the latest recorded values of body mass index, blood pressure, and heart rate within the past year were used for the present study. The Institutional Review Board of the University of Massachusetts Medical School approved survey methods, data storage, and the analysis plan (IRB #H00021909: e-cohort wearable survey). The research conducted in this article adhered to the Helsinki Declaration guidelines.

### Survey content development

Once eligible participants were identified, they were sent an automated e-mail containing a link to the survey. The e-mail was sent again to those who did not respond after 2 weeks and then sent a third time after 2 more weeks. The survey was developed by content experts in cardiac electrophysiology, digital medicine, medical devices, and EHR data management through an iterative process to ensure question clarity as well as maximizing content and face validity while maintaining a reasonable length to minimize participant burden. The major constructs that the survey assessed were commercial wearable device use, electronic health communications, and perceptions regarding the participant's cardiac health. The survey questions are listed in Online [Supplemental Appendix A](#). For this study, we defined *commercial wearable devices* as personal electronic devices that can be

**Table 1** Participant characteristics by atrial fibrillation diagnosis (N = 1222)

Characteristic	Atrial fibrillation (n = 327)	Risk of atrial fibrillation (n = 895)	P
<b>Demographics</b>			
Age (y)	71.5 ± 9.3	72.9 ± 5.9	.01
Female sex	106 (32.4)	494 (55.2)	<.001
Race			.36
White	314 (96.6)	855 (96.3)	
Black	1 (0.3)	13 (1.5)	
American Indian/Alaska Native	2 (0.6)	4 (0.5)	
Asian	4 (1.2)	10 (1.1)	
Other	4 (1.2)	6 (0.7)	
Hispanic/Latino	7 (2.2)	11 (1.3)	.28
<b>Medical history</b>			
Stroke	19 (5.8)	26 (2.9)	.02
Transient ischemic attack	6 (1.8)	18 (2.0)	.84
Congestive heart failure	76 (23.2)	43 (4.8)	<.001
Hypertension	229 (70.0)	668 (74.6)	.11
Hyperlipidemia	225 (68.8)	729 (81.5)	<.001
Valvular disease	56 (17.1)	71 (7.9)	<.001
Chronic pulmonary disease	71 (21.7)	150 (16.8)	.046
Diabetes	68 (20.8)	191 (21.3)	.84
Vascular disease	110 (33.6)	193 (21.6)	<.001
Renal disease	69 (21.1)	158 (17.7)	.17
Major bleeding event or predisposition to bleeding	2 (0.6)	5 (0.6)	.99
Myocardial infection	13 (4.0)	28 (3.1)	.47
Sleep apnea	82 (25.1)	170 (19.0)	.02
<b>Treatment history</b>			
<b>Treatments</b>			
Percutaneous coronary intervention	12 (3.7)	30 (3.4)	.79
Antiarrhythmic medication	153 (46.8)	161 (18.0)	<.001
β-Blocker	229 (70.0)	295 (33.0)	<.001
Calcium channel blocker	0	4 (0.5)	.58
Anticoagulant	281 (85.9)	254 (28.4)	<.001
Antihypertensive	193 (59.0)	479 (53.5)	.09
Antiplatelet	206 (63.0)	495 (55.3)	.02
Statin	240 (73.4)	636 (71.1)	.42
<b>Vitals* (n = 1138)</b>			
	(n = 298)	(n = 840)	
Body mass index (kg/m <sup>2</sup> )	31.4 ± 6.7	29.5 ± 6.2	<.001
Systolic blood pressure (mm Hg)	128.4 ± 16.9	131.4 ± 15.7	.006
Diastolic blood pressure (mm Hg)	74.4 ± 8.4	75.1 ± 8.8	.27
Heart rate (beats/min)	73.6 ± 13.5	74.1 ± 12.1	.62

Values are presented as mean ± SD or n (%).

\*Latest recorded values of body mass index, blood, pressure, and heart rate within the past year were used.

purchased by consumers and are designed to be worn close to or on the surface of the skin to monitor and transmit biosignals and other vital signs.

## Data analysis

Descriptive statistics stratified by AF status were calculated for all medical history variables, vital signs, and survey responses. Continuous variables were compared using the Student *t* test, and categorical variables were compared using the  $\chi^2$  test. Logistic regression was used to calculate odds ratios using an AF diagnosis as an independent variable and 3 separate telehealth engagement metrics as outcomes. The outcomes were having communicated with a provider via an electronic patient portal, having shared wearable device-derived data with a provider, and using telehealth clinic visits. We calculated adjusted odds ratios for those outcomes

adjusting for covariates that might influence how participants communicate with their providers. The covariates included were age, sex, stroke, congestive heart failure, valvular disease, pulmonary disease, sleep apnea, and anticoagulation use.

## Results

We sent e-mails to 23,530 eligible participants, and there were 1222 (5.19%) total participants who enrolled and completed the survey. Of those participants, 327 (26.8%) were diagnosed with AF and 895 (73.2%) were at risk of AF. Their baseline characteristics are listed in [Table 1](#). Participants with AF were, on average, younger than those at risk of AF (71.5 years old vs 72.9 years old; *P* = .01), and there was a smaller proportion of female participants in the AF group (106 [32.4%] vs 494 [55.2%]; *P* < .001). Compared with

**Table 2** Health technology use and telemedicine engagement by atrial fibrillation status

Variable	Atrial fibrillation (n = 327)	Risk of atrial fibrillation (n = 895)	P
Device ownership			
Tablet	228 (69.7)	631 (70.5)	.79
Smartphone	265 (81.0)	754 (84.3)	.18
Commercial wearable device	107 (32.7)	265 (29.6)	.30
Basic cell phone	113 (34.6)	326 (36.4)	.55
Engaged with a provider via telehealth visit*	170 (52.0)	429 (47.9)	.21
Suggested by a provider to use a commercial wearable device†	9 (2.8)	7 (0.8)	.02

Values are presented as n (%).

\*Six participants with atrial fibrillation and 17 participants at risk of atrial fibrillation did not answer this question, and we counted these 23 participants as having answered “No” for this analysis.

†Six participants with atrial fibrillation and 16 participants at risk of atrial fibrillation did not answer this question, and we counted these 22 participants as having answered “No” for this analysis.

participants at risk of AF, those with AF had higher rates of stroke (19 [5.8%] vs 26 [2.9%];  $P = .02$ ), congestive heart failure (76 [23.2%] vs 43 [4.8%];  $P < .001$ ), valvular disease (56 [17.1%] vs 71 [7.9%];  $P < .001$ ), chronic pulmonary disease (71 [21.7%] vs 150 [16.8%];  $P = .046$ ), vascular disease (110 [33.6%] vs 193 [21.6%];  $P < .001$ ), and sleep apnea (82 [25.1%] vs 170 [19.0%];  $P = .02$ ) and a lower rate of hyperlipidemia (225 [68.8%] vs 729 [81.5%];  $P < .001$ ) in their medical history. Participants with AF had a higher body mass index (31.4 kg/m<sup>2</sup> vs 29.5 kg/m<sup>2</sup>;  $P < .001$ ) and a lower mean systolic blood pressure (128.4 mm Hg vs 131.4 mm Hg;  $P = .006$ ).

Participants with AF were also more likely to receive cardiovascular medications, including antiarrhythmic (153 [46.8%] vs 161 [18.0%];  $P < .001$ ),  $\beta$ -blocker (229 [70.0%] vs 295 [33.0%];  $P < .001$ ), anticoagulant (281 [85.9%] vs 254 [28.4%];  $P < .001$ ), and antiplatelet (206 [63.0%] vs 495 [55.3%];  $P = .02$ ) medications. All the other baseline characteristics were not significantly different between the 2 groups. Responder and nonresponder demographic data are presented in Online Supplemental Appendix B.

### Differences in health technology use

Health technology use and telemedicine engagement by AF status are listed in Table 2. Overall, there was not a significant difference between tablet, smartphone, commercial wearable device, and basic cell phone use between the 2 groups. However, we did find that there was a high percentage of tablet

and smartphone use in participants of both groups and roughly a third of participants used a commercial wearable device and a basic cell phone. We also found that roughly half of participants in both groups engaged with their providers through telehealth. Of all respondents, 30.4% (372 people) in the survey owned a commercial wearable device and 30.2% (369 people) mentioned that they had gone online or accessed the Internet in the past 4 weeks. Among those people, there was not a significant difference in AF status regarding participants communicating with their providers via an electronic portal (69.5% [73 people] for participants with AF compared with 60.2% [159 people] for participants at risk of AF;  $P = .10$ ).

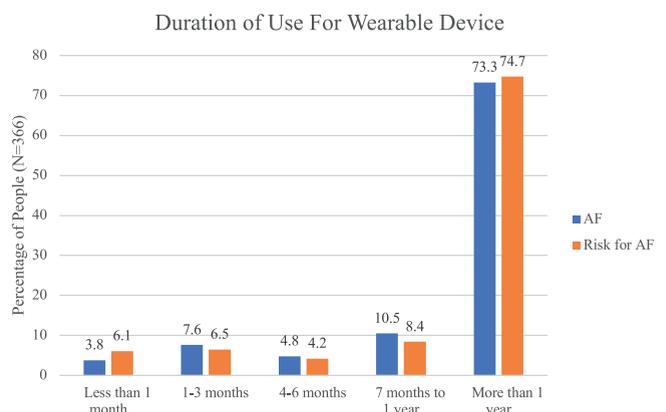
The duration of use for people who owned a wearable device is provided in Table 3 and Figure 1. The majority of people in both groups have been using their wearable devices for longer than a year.

The data sharing behavior is reported in Table 4 and Figure 2. Among the respondents who owned a commercial wearable device, 45.8% of participants with AF (49 participants) mentioned that they had shared information from commercial wearables with their doctors compared with 22.6% of participants at risk of AF (60 participants) who owned a commercial wearable

**Table 3** Duration of wearable device use (n = 366)

Duration of wearable device use	Atrial fibrillation (n = 105)	Risk of atrial fibrillation (n = 261)	P
<1 mo	4 (3.8)	16 (6.1)	.86
1–3 mo	8 (7.6)	17 (6.5)	
4–6 mo	5 (4.8)	11 (4.2)	
7 mo to 1 y	11 (10.5)	22 (8.4)	
>1 y	77 (73.3)	195 (74.7)	

Values are presented as n (%).



**Figure 1** Duration of wearable device use by AF status. The duration of wearable device use for participants with AF is shown in blue and that for participants at risk of AF is shown in orange. AF = atrial fibrillation.

**Table 4** Data sharing behavior

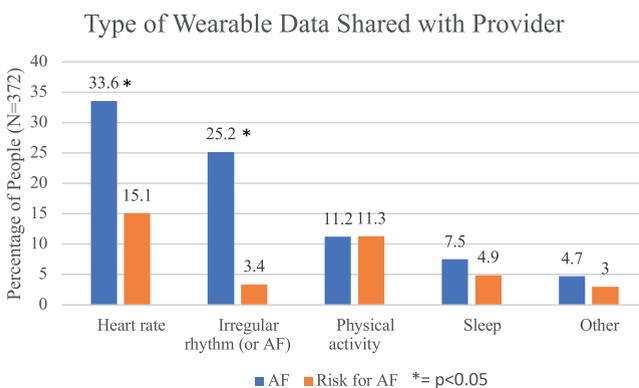
Shared wearable data with the provider*	Atrial fibrillation (n = 107)	Risk of atrial fibrillation (n = 265)	P
Yes	49 (45.8)	60 (22.6)	<.001
Heart rate	36 (33.6)	40 (15.1)	<.001
Irregular rhythm (or atrial fibrillation)	27 (25.2)	9 (3.4)	<.001
Physical activity	12 (11.2)	30 (11.3)	.98
Sleep	8 (7.5)	13 (4.9)	.33
Other	5 (4.7)	8 (3.0)	.53

Values are presented as n (%).

\*There were 2 participants in each group who did not answer this question, and as a result the following questions regarding the type of wearable data shared. However, they mentioned that they owned a commercial wearable device. We counted those 4 participants as having answered "No" for this analysis.

device ( $P < .001$ ). There were significant differences between the 2 groups in the information that participants shared with their doctors. Among participants who owned a commercial wearable device, participants with AF were more likely than those at risk of AF to share their heart rate data (36 [33.6%] vs 40 [15.1%];  $P < .001$ ) and irregular rhythm (or AF) alert data with their doctors (27 [25.2%] vs 9 [3.4%];  $P < .001$ ). However, there were no significant differences in rates of sharing physical activity or sleep data by AF status.

Associations between AF diagnosis and telehealth engagement are listed in Table 5. Logistic regression analysis showed that participants with an AF diagnosis were 2.96 times as likely to share information from commercial wearables with their doctors compared with those at risk of AF (95% confidence interval 1.83–4.78). When adjusting for covariates that might influence how participants communicate with their providers (eg, age, sex, stroke, and medical comorbidities with high symptom burden), participants with AF were 1.87 times as likely to share information from commercial wearables with their doctors compared with those at risk of AF (95% confidence interval 1.02–3.41).



**Figure 2** Data sharing behavior by AF status. The data regarding the type of wearable data shared with their providers for participants with AF is shown in blue and the data for participants at risk of AF is shown in orange. Values that were significantly different from each other were labeled with an asterisk. AF = atrial fibrillation.

## Discussion

In this study, we conducted a survey to characterize how participants with or at risk of AF are interacting with their providers in the context of telemedicine and commercial wearable devices. About a third of our survey respondents owned a commercial wearable device. Among them, participants with AF were more likely than those at risk of AF to have shared information from commercial wearables with their doctors.

### Recommendation of wearable device use by providers

Our study found that although participants reported that providers suggested that participants with AF use a wearable device at a higher rate than those at risk of AF, overall rates of commercial wearable device recommendation were low for both groups. Some providers may have been encouraging participants with AF to use commercial wearable devices to make more informed decisions regarding treatment and management of the participant's AF. However, given that only 2.8% (9 participants) of AF respondents in our study stated that their providers recommended the use of a wearable device, it is clear that this is not common practice. One of the barriers that could be limiting this recommendation is that physicians may not completely trust the data from wearable devices or are unsure how to act on these data. A study found that among heart rhythm health care practitioners who did not recommend patients use a digital device for AF detection, 29.6% of respondents mentioned that they had a lack of confidence in the accuracy of AF detection and 22.8% had concerns about the clinical utility of the results.<sup>14</sup> This could be because physicians are worried about wearable device data misreporting AF episodes or having errors in detection, which could lead to both missing a diagnosis or a false AF alert, which may then result in patient anxiety and further unnecessary medical expenditure. Additional barriers that might reduce the likelihood that providers recommend the use of wearable devices include device cost, absence of insurance coverage for devices, and concerns over data privacy. Furthermore, reimbursement for this type of data review is not common and there is a lack of infrastructure for proper commercial wearable data workflows and resources.

### Sharing of device-collected biometric data

A small proportion of participants shared their sleep data with providers, and this did not differ by AF diagnosis. This is especially striking because of obstructive sleep apnea (OSA) being extremely common in patients with AF, with 1 study estimating the prevalence to be as high as 85%.<sup>26,27</sup> Given the high prevalence of OSA in patients with AF, wearable technologies may present an ideal modality for sleep monitoring in patients with AF. One study validating Fitbit wearable devices (Fitbit, San Francisco, CA) for sleep measures including total sleep time and sleep onset latency in patients with suspected OSA concluded that the Fitbit devices demonstrated adequate sensitivity (87.81%) but also had poor specificity (43.85%)

**Table 5** Association between atrial fibrillation diagnosis and telehealth engagement

Variable	Odds ratio (95% confidence interval)	Adjusted odds ratio (95% confidence interval)*
Shared information from a wearable device (n = 368)	2.96 (1.83–4.78)	1.87 (1.02–3.41)
Communicated through an electronic patient portal (n = 369)	1.51 (0.93–2.44)	0.99 (0.53–1.84)
Engaged with a provider via telehealth visit (n = 1199)	1.18 (0.91–1.52)	0.90 (0.66–1.24)

\*Model is adjusted for age, sex, stroke, congestive heart failure, valvular disease, pulmonary disease, sleep apnea, and anticoagulation use.

compared with polysomnography.<sup>28</sup> Another study that looked at a commercial wearable device, WatchPAT 200 (Itamar Medical, Caesarea, Israel), in participants with suspected OSA syndrome found that there was a high correlation ( $r = 0.931$ ;  $P < .01$ ) between the device's and polysomnogram's apnea-hypopnea index values.<sup>29</sup>

Although sleep monitors require further validation, eventually sleep monitoring could help improve outcomes if OSA is identified in patients with AF, leading to its diagnosis and treatment. A study showed how untreated patients with OSA had a higher recurrence of AF after cardioversion than did treated patients with OSA.<sup>30</sup> Despite the higher prevalence of sleep apnea in our cohort of participants with AF, we found that there were no differences in rates of sharing sleep data with providers. This is likely because participants do not believe that sleep data are useful or relevant information for health care providers. Thus, engaging patients with AF who own wearable devices in conversations regarding their sleep data could be an excellent way for providers to assess the risk of sleep comorbidities such as OSA in this at-risk population.

Wearable device-derived physical activity data were also shared with providers at a low rate of 11% among both groups of participants (12 AF participants and 30 at risk of AF participants) who owned a commercial wearable device. This could be due to participants believing that this physical activity data are not useful or relevant to providers. Additionally, patients may be concerned about overburdening their providers with data, and they would rather wait for something more concerning to be detected. Another reason why participants share sleep data and physical activity data at such a low rate from both groups could be because they find this information to be more personal than cardiac health data, and consequently, they are potentially less likely to share it with their providers. Moreover, patients may not know the value or relevance of physical activity data to cardiovascular disease. One study found that only 42% of their participants believed that behavioral risk factors are the main cause of their heart disease and 10.4% of the study's participants did not know the cause of their heart disease.<sup>31</sup> Lastly, many patients may not know where to find and share these data or the other types of data with their providers, which could also explain why some participants do not share their data.

### AF as a driver for sharing device data

Our data show that an AF diagnosis is significantly associated with participants sharing wearable device-derived data

with physicians. This could be due to several reasons. Principally, we hypothesize that having an AF diagnosis likely makes participants more aware of their cardiac health. Although there was no observed difference in heart rate between the groups, participants with AF were more likely than those at risk of AF to share their cardiac data (heart rate and irregular rhythm [or AF] alerts) from their commercial wearables with their doctors. This suggests that participants with AF are sharing their wearable device heart rate data with their physicians not because they are experiencing heart rate abnormalities, but rather because they are more acutely aware of their cardiac health and perhaps have a lower threshold for sharing cardiac health data with their physicians.

Another potential explanation for the differential rate of sharing wearable device-derived data is that physicians may be more likely to ask participants with AF to share the data. A previous survey of heart rhythm health care professionals found that 62.3% recommended that patients use a digital device for AF detection and 58.8% of those people recommended KardiaMobile (AliveCor, Mountain View, CA) followed by 35.5% recommending the Apple Watch (Apple, Cupertino, CA).<sup>14</sup> As a result, it is plausible that physicians of patients with AF might be asking them to share their wearable device data at a higher rate.<sup>14</sup>

### Guidance and future directions

Currently, there is a lack of guidance about which exact patients (those with AF and/or those at risk of AF) should be sharing wearable data. More broadly, there is a lack of guidance about what screening practices are necessary for detecting AF in those at risk, and there is a lack of guidance about controlling AF in those with previously diagnosed AF.

A number of studies have demonstrated that commercially available wearable devices can accurately detect AF.<sup>15,17–19</sup> Encouraging patients with AF to share their wearable device data could allow physicians to modify treatment as needed, thus potentially improving patient outcomes. As the literature on wearable devices and AF continues to grow and as wearable devices continue to become more accurate, we expect the proportion of physicians who ask for data from wearable devices to increase. Appropriate reimbursement for the review of wearable data and the necessary clinical workflows and resources are also needed for this increase.

## Strengths and limitations

Our study has multiple strengths. We accrued and surveyed a large respondent pool. The survey integrated feedback from content experts to generate questions examining novel patient-provider interactions in the context of telemedicine and wearable devices. Our focus on telemedicine and wearable devices is especially relevant given the COVID-19 pandemic and the subsequent shift to telehealth over the past year. Patterns of use and data sharing around commercial wearable devices will likely become more important only as this technology advances and the adoption of this technology increases.

A limitation of our study is potential selection bias as a result of our recruitment methodology. Only participants who had e-mail addresses listed in their medical records, were proficient in reading English, and were familiar enough with e-mail communications were able to complete our survey. As a result, our respondents were more likely to use technology and have the time needed to participate in a research study. This might make them more likely to use wearable devices and share data with their health care providers, potentially limiting our study's generalizability. In addition, most of our respondents were white. Although our findings are representative of those receiving ambulatory cardiovascular care, our findings may have limited generalizability to other racial and ethnic groups. Participants may also be subject to recall bias, and those with AF might remember more about their communications with their providers regarding their cardiac health, which could skew the data. Another limitation is that we do not know whether participants or providers initiated the conversation that led to the sharing of wearable device data. Finally, there may remain unmeasured confounding variables that influence participants with AF to share data at a higher rate with providers.

## Conclusion

Most patients reported that their health care providers have not suggested that they use a commercial wearable device, yet about a third of the participants in our study who owned these devices chose to share their health data with their providers. Compared with participants at risk of developing AF, those with AF are more likely to share data derived from their commercially available wearable devices with their health care providers, despite having a similar rate of telemedicine engagement and technology use and ownership. However, these data sharing is limited to cardiac metrics such as heart rate and rhythm, and a low proportion of participants chose to share other physiological data such as sleep or physical activity. Further guidance about commercial wearable device use is needed for both patients and providers in order for the data to be used in a responsible and safe manner. Further research regarding the clinical use of wearable device data is also needed to understand the validity of this type of data and its implications on clinical decisions.

## Disclaimer

Given his role as Editor-in-Chief, David McManus had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to Dr Hamid Ghanbari.

## Appendix Supplementary data

Supplementary data associated with this article can be found in the online version at <https://doi.org/10.1016/j.cvdhj.2021.08.001>.

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