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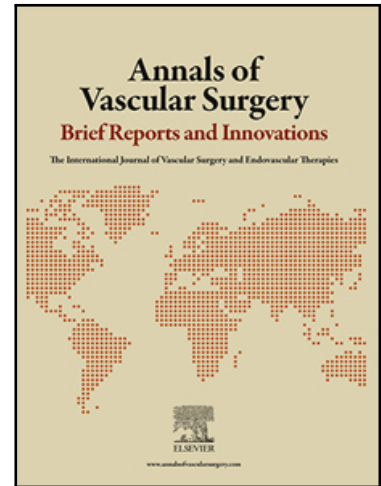
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Telemedicine at the VA: Examining Smartphone Connectivity Rates to VA Video Connect and Doximity Dialer Video

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# **Title:** Telemedicine at the VA: Examining Smartphone Connectivity Rates to VA Video Connect and Doximity Dialer Video

**Short Title:** VA Telemedicine Connectivity

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**Declarations of Interest:** none

## Abstract:

BACKGROUND: Telemedicine usage has accelerated as a result of the COVID-19 pandemic, raising concerns those without the necessary technology and digital literacy to participate may face increasing health disparities. In this study, we examined the rates at which veterans are able to connect to two common telemedicine applications: VA Video Connect (VVC) and Doximity Dialer Video (DV).

METHODS: Participants were selected from a pool of vascular surgery patients seen from August 2020 to October 2021 at a single Veterans Affairs medical center. Participants had to be >50 years old and not previously participated in a video visit. Eligible veterans were asked their interest participating in video visits and if they owned a smartphone. Those who met the eligibility requirements were tested on their ability to connect to both VVC and DV with minimal assistance. The connectivity rate for both platforms was recorded, and basic demographic and medical history information was collected.

RESULTS: One hundred-four veterans participated in the study, with an average age of  $70\pm 7$  years. Seventy-four participants (71%) expressed interest in video visits, and 52 (70%) owned a smartphone. Forty-five smartphone owners (87%) successfully connected to DV, whereas 19 (37%) successfully connected to VVC ( $p<0.001$ ). VVC connectivity decreased with increasing age-group: 50-59=80%, 60-69=44%,  $\geq 70=18%$  ( $p=0.02$ ).

CONCLUSIONS: Older veterans demonstrate difficulty connecting to VVC. The VHA is taking important steps to streamline usability of VVC, however continued expansion of support programs is necessary to improve access and reduce healthcare disparities in this population.

KEYWORDS: Telemedicine; Veterans Affairs; Vascular Surgery; Doximity; VA Video Connect.

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## Introduction

Throughout the last decade, telemedicine has become an increasingly popular healthcare delivery tool across the country. This shift has been further motivated by the COVID-19 pandemic, as utilization of tele-visits has been increasingly encouraged by the Department of Health and Human Services to protect patients from exposure to the virus.<sup>1</sup> The rapid adoption of telemedicine within various healthcare fields has raised concerns that we may widen the digital divide, which adversely affects populations with low digital literacy and reduced access to modern technologies, such as broadband internet and camera-equipped devices.<sup>2</sup> Groups susceptible to the digital divide include those over the age of 65, of lower socioeconomic status, and residents in rural communities.<sup>2</sup> These vulnerable populations may face worsening health disparities as reliance on telemedicine continues to increase.

The Veterans Health Administration (VHA) has long been a pioneer in expanding telemedicine access in an effort to lessen the digital divide within its own population, which is typically older and more rural than the general population.<sup>3,4</sup> VHA has been implementing telehealth practices within its system for almost two decades, starting with clinical video telehealth (CVT) in 2003.<sup>5</sup> CVT allows veterans to virtually connect to providers located at larger, typically urban, VA medical centers from smaller outpatient clinics within veterans' own communities. Of those who use CVT, nearly 45% are from rural communities, greatly increasing their access to care.<sup>5,6</sup> VHA has expanded upon this idea with its "*Anywhere to Anywhere*" initiative, which began in 2018 with the release of VA Video Connect (VVC).<sup>7</sup> VVC is a tool that allows veterans to connect

with their healthcare provider via secure, HIPAA-compliant video chat from their own home. Inherently, VVC requires access to the internet and a camera-equipped personal device (e.g., smartphone, tablet, or personal computer). VVC saw moderate usage on initial rollout, with over 400,000 unique visits from 2018 through 2019.<sup>8,9</sup> However, usage dramatically increased in the wake of the COVID-19 pandemic, with a 1,000-fold increase between February and May of 2020.<sup>10</sup>

Despite the dramatic increase in VVC usage, there continues to be a significant disparity in VVC participation in veterans aged 65 and older and whom live in a rural setting.<sup>11</sup> These populations are significantly less likely to have the capable technologies needed to participate in VVC, with one study finding that only 56% of older veterans had access to a camera-equipped device.<sup>6</sup> These populations are also generally less willing to participate in VVC, with the same study finding nearly 42% of older veterans were uninterested in using VVC.<sup>6</sup> Another study examining the implementation of VVC for use in tele-mental health showed that 17% of VVC technical issues were due to veteran user error, demonstrating that even those with the necessary technology may have difficulty connecting.<sup>12</sup>

As telemedicine usage increases and potentially worsens the digital divide it is important to examine connectivity rates to medical video platforms and explore potential barriers to access and usage of telemedicine services within a veteran population. While VVC is the primary telemedicine platform used within VHA, Doximity Dialer Video (DV) is also supported by VHA and is often used as an alternative to VVC in our practice. Doximity started as a professional

network for healthcare providers in 2011 and has since grown to become the single largest medical network, with over 70% of US physicians becoming members as of 2019.<sup>13</sup> DV, released by Doximity in 2020, works similarly to VVC in allowing patients to connect with providers via secure, HIPAA-compliant video chat.<sup>14</sup> Given the common use of both platforms, our objective was to examine the rate at which first-time users were willing and able to connect to VVC and DV via smartphone. Additionally, we attempted to identify any relevant patient characteristics that may correlate with veterans' interest in utilizing telemedicine as well as the ability to connect to either platform.

## Methods

This study was deemed to be exempt from review by the University of Texas Health Science Center San Antonio Institutional Review Board, and a waiver of informed consent was approved for the collection of retrospective demographic and medical history data.

Participants were identified from a pool of patients previously seen at the vascular surgery clinic at Audie L. Murphy VA Hospital (ALM) in San Antonio, Texas between October 2020 and August 2021. Patients aged >50 years and who had not previously participated in a video visit were eligible to participate. Confirmation of previous video visits was performed via review of the electronic medical record as well as direct confirmation from the participants.



Eligible patients were contacted via telephone and asked about their willingness to participate in the study. Those who agreed to participate were asked to confirm they had not previously participated in a video visit. Once confirmed, participants were asked if they would be interested in receiving care in the future via video visits. Those who answered in the affirmative were asked if they owned a smartphone with video-chatting capabilities (e.g., iPhone, Android, etc.). Only those with a smartphone were eligible to complete the remainder of the protocol. Eligible participants were sent a link to a non-clinical VVC visit via text message or email to connect them with the performing research staff. Participants were given minimal assistance and allowed approximately ten minutes to connect to the visit. Those who were unable to connect underwent light trouble-shooting by verifying their correct email address and/or phone number and were re-sent the link. A similar protocol was followed for all eligible participants using DV (**Figure 1**). No clinical assessments were performed as part of the video visits. Additionally, all video visits were conducted in English, which was the primary language of all participants. Demographic and medical comorbidity information was collected from the electronic medical record for each participant.

A questionnaire was given to participants after completion of the above procedures.

Information collected from the questionnaire included education level, access to email on personal device(s), access to home internet, and if the participant has to take off work or book a hotel room to make appointments at ALM. Additionally, travel distance to ALM was estimated using patient zip-codes by inputting them into Google Maps.

Veterans who were not interested in receiving care via video visits and those who did not own a smartphone were ineligible to participate in the majority of the protocol and did not take the questionnaire. However, their demographic and medical comorbidity information was collected from the electronic medical record, and their travel distance to ALM was estimated as described above.

### **Statistical Analysis**

Descriptive statistics, such as means, standard deviations, and percentages, were calculated for the demographic and medical comorbidity data for all participants, as applicable. Statistical analyses were performed to find any significant differences in demographics, comorbidities, and connectivity rates between veterans interested and uninterested in video visits via Chi-squared using GraphPad software 9.3.1. Additional descriptive statistics and Chi-squared analyses were calculated to compare veterans with and without smartphones, and to compare connectivity rates between VVC and DV. Lastly, descriptive statistics were calculated for the information collected from the survey and estimated travel distances.

## **Results**

In total, 185 veterans were assessed for eligibility. Of those, 104 veterans (56%) fulfilled the initial eligibility criteria and agreed to participate in the study. The average age of all study participants was  $70 \pm 7$  years, and 95% were male (**Table 1**). The majority of participants were Caucasian (86%; includes 42% who classify themselves as Hispanic). Comorbid disease rates

were representative of a typical vascular surgery patient population, with the most common being peripheral vascular disease (61%) and diabetes mellitus (60%). Of all participants, 74 (71%) expressed interest in receiving care via video visits, while 30 (29%) had no interest in video visits. There was a significantly higher percentage of patients with diabetes in the uninterested group (77%;  $p = 0.024$ ), as well as a higher percentage of patients requiring hemodialysis in the uninterested group (23%,  $p = 0.033$ ). All other demographic characteristics and comorbidity rates were similar between groups.

Of the 74 study participants who expressed interest in video visits, 52 (70%) owned a smartphone with video-chatting capabilities and were eligible to participate in the remainder of the protocol (**Table 2**). The average age of participants that owned a smartphone was  $67 \pm 6$  years, while the average age of participants that did not own a smartphone was  $73 \pm 8$  years ( $p = 0.001$ ). Participants that had  $\leq 2$  comorbid diseases were found to be more likely to own a smartphone ( $p = 0.049$ ), while those that had  $\geq 5$  comorbidities were less likely to own a smartphone ( $p = 0.041$ ). There were no significant differences in ownership of smartphones between age, sex, or race.

Of the 52 participants who owned smartphones, 45 (87%) were able to connect to DV, whereas only 19 (37%) were able to connect to VVC ( $p < 0.001$ ) (**Figure 2A**). Seven participants (14%) were unable to connect to DV or VVC. The average age of participants who successfully connected to VVC was  $64 \pm 7$  years, which trended younger than that of DV at  $67 \pm 6$  years ( $p = 0.053$ ). There were no significant differences in DV and VVC connectivity rates between sex,

race, or within the comorbidity data (**Table 2**). DV connectivity rates were relatively similar across age groups, whereas there was a marked decline in VVC connectivity as age increased. Patients aged  $\geq 70$  had the lowest rates of VVC connectivity at just 18%, compared to 80% of those aged 50-59 and 44% of those aged 60-69 ( $p = 0.02$ ) (**Figure 2B**).

The questionnaire for education level, technology access, and travel needs was completed by 50 participants (**Table 3**). All participants who responded had at least a GED or equivalent, while 22 (44%) had an Associate's or Bachelor's degree. Twenty-three (46%) respondents had a desktop or laptop computer with a camera, and 34 (68%) had access to home Wi-Fi. Six (12%) respondents answered they have to book a hotel room to make appointments, and 17 (34%) answered they have to take off work to make appointments.

Median travel distance to ALM was 20.5 miles for all participants. Of those interested in video visits, median travel distance was 20 miles, while that of those uninterested in video visits was 23.5 miles. Additionally, median travel distance for smartphone owners was 20 miles, with 23 (44%) having to travel further than 20 miles (**Table 3**). Comparatively, non-smartphone owners had a median travel distance of 24.5 miles, with 13 (59%) having to travel further than 20 miles.

## Discussion

As reliance on telemedicine continues to expand, we must ensure that the already significant digital divide does not continue to widen. Multiple studies have already demonstrated that

geriatric patients are significantly less likely to participate in video visits.<sup>2,11,15,16</sup> This is a multifactorial issue, as previous studies suggest patient inexperience or a lack of the necessary technology to participate as a significant contributor to hesitation with video visits.<sup>1</sup>

Additionally, older patients may mistrust video visits, suspecting their participation may result in inadequate care compared to in-person visits.<sup>17</sup> Health-related factors, such as poor hearing or vision, may also contribute to the reasons some older patients are unwilling to use video visits.<sup>1</sup> Our data support the previous research, demonstrating a large number of veterans who remain uninterested in receiving care via video visits, with approximately 30% of our participants expressing no interest. This percentage is slightly lower than previous studies, which have described rates of veteran disinterest up to 42%.<sup>6</sup> Additionally, our study was unable to identify any important differences in demographics or comorbidity rates, including disability, between veterans who were interested and those who were uninterested in video visits.

Access to technology remains an important hurdle in crossing the digital divide in an older veteran population. Smartphone ownership among older adults has generally increased over the past few years, with an estimated 77% of adults 50 years and older claiming to own a smartphone as of 2020.<sup>18</sup> This is slightly higher than the results of our study, which demonstrated only 70% of veterans interested in video visits had a smartphone capable of video-chatting. Results from the questionnaire also show there is a large number of older veterans without home internet, with only 65% of those polled claiming to have internet service in their homes. This is a lower estimate than findings from a previous study of VVC

usage, which demonstrated 77% of veterans have home internet access.<sup>6</sup> While these patients can still connect to virtual visits using cellular data on their smartphones, having access to home broadband internet via Wi-Fi or direct ethernet is a much more reliable way to connect with these patients. The VHA is attempting to increase access to broadband internet to those who do not have it, specifically those older than 45 and in rural communities, with their newly implemented program, *Digital Divide Consult*.<sup>19</sup> As part of this service, they have also established test-call centers that aid veterans in connecting to their first video visit. Additionally, they have partnered with Microsoft's Airband Initiative in an effort to educate veterans on essential digital skills.<sup>19</sup> Clearly, the VHA is committed to improving digital literacy and access to virtual care throughout its population, but our data demonstrate there are still improvements to be made in reducing the gap.

Importantly, our data demonstrate a significant difference in first-time connectivity rates between DV and VVC within an elderly veteran population, with a majority of participants able to connect to DV but not VVC. At the time of our data collection, VVC required first-time users to download an application to their smartphone or tablet device before connecting to a provider. Upon set-up of an initial visit, a link would be sent to the patient via text or email, which would then send them directly to the app store to download the application. After downloading the application and setting up an account, the patient would be able to connect to the video visit. Conversely, DV creates a direct web-link to the video visit, which is sent to the patient via text or email and does not require an application download. The differences in initial setup may have contributed to the discrepancy in connectivity rates between the two

platforms, as downloading the VVC application creates an additional step and increases the difficulty for first-time users to successfully connect. Since the time of our data collection, VVC has been updated so as not to require users to download an application to connect to a virtual visit, providing a direct web-link via text or email similar to DV. Further studies are needed to determine if this change results in higher VVC connectivity rates. However, it is clear that limiting the amount of steps and “clicks” is important in improving VVC connectivity in this population. Given the relatively high rates of connectivity to DV (>80% overall), it is reasonable to continue using this platform as an alternative to VVC in practice.

Lastly, our study demonstrates there is an opportunity cost advantage for veterans that are able to participate in video visits. Many veterans feel burdened by the costs of transportation to get to their local VA.<sup>20</sup> Of veterans who completed the questionnaire in our study, nearly 33% have to take off time from work to make appointments, and almost 12% have to book a hotel room. Additionally, median travel distance was approximately 20 miles for these participants, with approximately 44% having to travel more than 20 miles to attend appointments at ALM. A study by Paquette et al., which only included cost of gas and travel, demonstrated a cost savings of \$622 in 87 vascular surgery patients utilizing video visits.<sup>21</sup> Taking into account the cost of missing work and booking a hotel, veterans could save significantly more time and money by using video visits for routine care.

This study has inherent selection bias in that it was an observational study without randomization in the patient population of interest. However, similar previous studies

examining VVC usage were also not randomized and were mostly retrospective in nature. Our study sample size is relatively small, with 104 overall participants, and 52 that were able to complete the entire protocol. We limited our protocol to only veterans with smartphones, which may have unintentionally excluded veterans with other video-chat capable technologies, such as tablets or laptops. However, we believe including these veterans would have complicated the protocol since tablets and computers/laptops are not ubiquitously equipped with cameras. Furthermore, their inclusion may have made the results difficult to fully interpret. Also, given our data was collected before updates were put in place to improve the usability of VVC, it may not be representative of the current ability of first-time users to successfully connect. Lastly, given this study only included patients from a VA population, it may not be generalizable to the general population.

## CONCLUSION

Older veterans demonstrate a poor ability to connect to VA Video Connect (VVC), the Veteran Health Administration's (VHA) telemedicine application, in comparison to another popular application, Doximity Dialer Video (DV). VVC requires first-time users to download an application before connecting with a provider, while DV sends a direct web-link to the video visit via text or email, resulting in a more streamlined process. Therefore, we believe improving the usability of VVC and reducing "clicks" will lead to improved connectivity rates. Additionally, a large number of veterans remain uninterested in video visits. Previous studies would suggest this is likely due to a lack of necessary technology such as smartphones, computers, and home



internet, or due to distrust of the video visit platform in general.<sup>1,17</sup> The VHA is already taking steps to improve the VVC user interface, and is committed to improving access to broadband internet and smartphones/tablets with their *Digital Divide Consult*. Continued expansion of these programs in conjunction with a dedicated onboarding process with in-person setup for vulnerable populations are likely necessary to narrow the digital divide and reduce health disparities in older veterans.

#### **Declaration of interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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**Figure 1. Methodology flowchart**

Summarizes the overall protocol and methodology of contacting participants and evaluating their ability to connect to VVC and DV.

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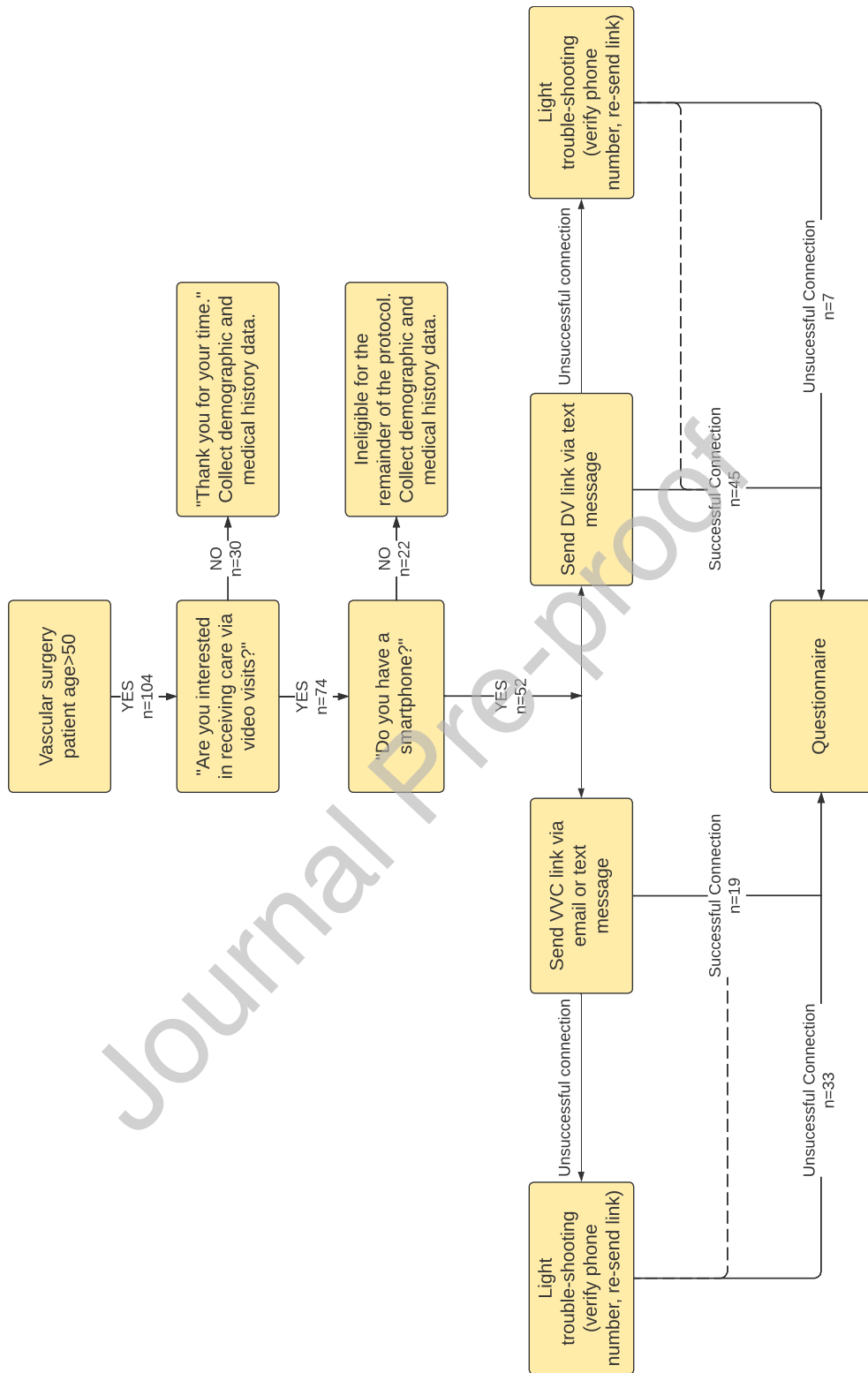


Table 1. Characteristics of all participants and according to interest in video visits

Participant Characteristic	All participants (n=104)	Interested in video visits (n=74)	Not Interested in video visits (n=30)	p value
<b>Average age</b>	69.5 (7.2)	69 (7.3)	69.8 (6.9)	0.59
<b>Male sex</b>	99 (95.2)	70 (94.6)	29 (96.7)	0.65
<b>Race</b>				
Caucasian	46 (44.2)	31 (41.9)	15 (50)	0.45
Caucasian (Hispanic)	44 (42.3)	33 (44.6)	11 (36.7)	0.46
African American	12 (11.5)	9 (12.2)	3 (10)	0.75
Other	2 (1.9)	1 (1.4)	1 (3.3)	0.50
<b>Comorbidity</b>				
Disabled	25 (24.0)	16 (21.6)	9 (30)	0.37
Atrial fibrillation	16 (15.4)	10 (13.5)	6 (20)	0.41
Chronic obstructive pulmonary disease	14 (13.5)	12 (16.2)	2 (6.7)	0.20
Congestive heart failure	13 (12.5)	9 (12.2)	4 (13.3)	0.87
Coronary artery disease	49 (47.1)	35 (47.3)	14 (46.7)	0.95
Diabetes mellitus	62 (59.6)	39 (52.7) <sup>a</sup>	23 (76.7) <sup>a</sup>	0.024 <sup>a</sup>
End stage renal disease	20 (19.2)	13 (17.6)	7 (23.3)	0.50
Requiring hemodialysis	13 (12.5)	6 (8.1)	7 (23.3)	0.033 <sup>a</sup>
Peripheral vascular disease	63 (60.6)	49 (66.2)	14 (46.7)	0.06
Carotid stenosis	23 (22.1)	17 (23.0)	6 (20)	0.74
Abdominal aortic aneurysm	20 (19.2)	16 (21.6)	4 (13.3)	0.33
Active smoker	46 (44.2)	34 (45.9)	12 (40)	0.58
≥5 comorbidities	25 (24.0)	17 (23.0)	8 (26.7)	0.69
≤2 comorbidities	32 (30.8)	22 (29.7)	10 (33.3)	0.72

All values listed as n (%) with the exception of "Average age", which is listed as "years (standard deviation)".

<sup>a</sup>Statistically significant difference in the incidence of diabetes mellitus and hemodialysis requirement identified between interested and uninterested groups.

Table 2. Characteristics of veterans by smartphone ownership and video chat connectivity rates

Characteristic	Smartphone Ownership (n=74)			Video Chat Connectivity (n=52)		
	Smartphone	No smartphone	p value	DV	VVC	p value
All participants, n (%)	52 (70.3)	22 (29.7)		45 (86.5)	19 (36.5)	<0.001
Avg age, years $\pm$ SD	67.3 $\pm$ 6.3	73.2 $\pm$ 8	0.001 <sup>c</sup>	66.8 $\pm$ 6.2	63.9 $\pm$ 6.6	0.053
<b>Sex, n (%)</b>						
Male	49 (66.2)	21 (28.4)	0.83	42 (85.7)	16 (32.7)	0.25
Female	3 (4.1)	1 (1.4)	0.83	3 (100)	3 (100)	0.25
<b>Race, n (%)</b>						
Caucasian	22 (29.7)	9 (12.2)	0.91	20 (90.9)	10 (45.5)	0.55
Hispanic	22 (29.7)	11 (14.9)	0.54	19 (86.4)	6 (27.3)	0.43
African American	8 (10.8)	1 (1.4)	0.19	6 (75)	3 (37.5)	0.8
Other	0 (0)	1 (1.4)	0.12	0 (0)	0 (0)	N/A
<b>Comorbidities, n (%)</b>						
$\geq$ 5	11 (14.9)	6 (8.1)	0.041 <sup>c</sup>	11 (100)	3 (27.3)	0.44
$\leq$ 2	19 (25.7)	3 (4.1)	0.049 <sup>c</sup>	17 (89.5)	8 (42.1)	0.75

p value <0.05 represents statistical significance.

Table 3. Characteristics of smartphone owners

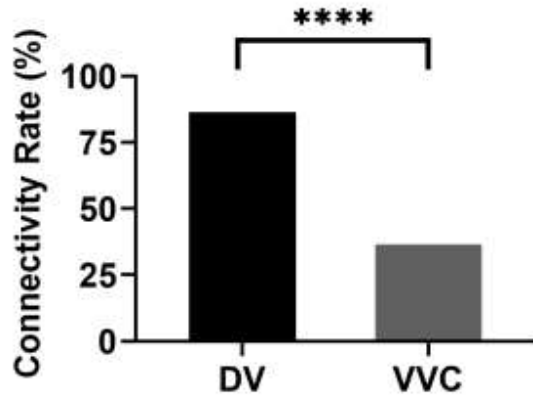
Characteristic	Smartphone owners (n=52)
<b>Education level</b>	
GED or equivalent	15 (28.8)
Some college	13 (25)
Associate's degree	11 (21.2)
Bachelor's degree	11 (21.2)
<b>Email on phone</b>	35 (67.3)
<b>Computer w/ camera</b>	23 (44.2)
<b>Home Internet</b>	34 (65.4)
<b>Take time off work for appointments</b>	17 (32.7)
<b>Book a hotel room for appointments</b>	6 (11.5)
<b>Travel distance</b>	
Median (miles)	20
>20 miles	23 (44.2)
$\leq$ 20 miles	29 (55.8)

All characteristics are described as n (%) unless otherwise noted.

Figure 2. DV and VVC connectivity rates of smartphone owners.

- A. The connectivity rates of DV and VVC expressed as a percentage of smartphone owners. Note the difference in connectivity between DV and VVC is statistically significant ( $p < 0.0001$ ).
- B. The connectivity rates of DV and VVC between age groups expressed as a percentage of smartphone owners. Note there is a statistically significant difference in VVC versus DV connectivity for those aged 60-69 ( $p < 0.001$ ) and those 70 and older ( $p < 0.001$ ).

A



B

