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Assessment of functionalities and attitude toward telemedicine for patients with cardiovascular disease

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Abstract

Introduction: Many patients with cardiovascular diseases are only seen by a physician once or twice a year unless urgent symptoms. Recent years have shown an increase in digital technologies to follow patients remotely, that is, telemedicine. Telemedicine can be supportive for follow-up of patients at continuous risk. This study investigated patients' attitude toward telemedicine, the defined features they consider important and future willingness to pay.

Methods: Cardiology patients with various types of prior telemedicine follow-up or who never had a telemonitoring follow-up were included. A new self-developed survey was implemented electronically and took 5–10 min to complete.

Results: In total, 231 patients (191 telemedicine [T] and 40 controls [C]), were included. Most participants owned a smartphone (84.8%) and only 2.2% of the total participants did not own any digital device. The most important feature of telemedicine cited in both groups was personalization (i.e., personalized health tips based on medical history, 89.6%; personalized feedback on entered health parameters 86.1%). The most important motivating factor for the use of telemedicine is recommendation by a physician (84.8%), while the reduction of in-person visits is a minor reason (24.7%). Only half of the participants (67.1%) would be willing to pay for telemedicine tools in the future.

Conclusion: Patients with cardiovascular disease have a positive attitude to telemedicine, especially when it allows for more personalized care, and when it is advocated by the physician. Participants expect that telemedicine becomes part of reimbursed care. This calls for interactive tools with proven efficacy and safety, while guarding unequal access to care.

Keywords

Telemedicine, cardiovascular patients, willingness to pay

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Introduction

Recent years have seen an increase in the use of digital technologies, in general, and also in health care.[1] These technologies add a dimension to the healthcare system as they allow to follow patients from a distance (i.e., telemedicine) in a more continuous way. This type of follow-up can make a major contribution to the monitoring of chronic disease patients, like cardiovascular diseases (CVD).[2] Secondary prevention is important in CVD and self-management is a central pillar in secondary prevention.[3] Despite their chronic condition, patients with CVD are often seen only once or twice a year unless urgent symptoms occur. Telemedicine provides opportunities to create a more

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continuous way of follow-up between yearly visits and to support self-management and education in patients with CVD. The COVID-19 pandemic forced the healthcare system to use innovative measures to provide care from a distance, which has led to increased availability and usability in daily clinical practice.[4,5] Remote monitoring of cardiovascular implantable electronic devices (CIEDs) has already been shown to have a positive impact on various outcome parameters.[6] However, implementation of other telemedicine tools (e.g., smartphone applications, and fitness trackers) in daily clinical practice is still limited.

It is recommended to involve patients early on when developing telemedicine tools, ensuring pathways implemented in line with their preferences.[7] This MEDICAR study assessed which features or services patients with CVD consider important for using telemedicine in their (daily) care, their attitude toward telemedicine, and if they are willing to pay for such tools in the future.

Methods

Development

For the MEDICAR study, a new questionnaire was developed in order to assess cardiology patients' preferences concerning telemedicine features and services, their attitude toward using it and to evaluate the willingness to pay for such telemedicine tools in the future. This new questionnaire was developed in cooperation with a healthcare consultancy (HICT, Gent, Belgium; Supplemental File 1). The questionnaire contains three main parts (Table 1): **(a)** questions on participants' attitude toward telemedicine (i.e., general information on the patients and the use of telemedicine tools; questions regarding enablers to use telemedicine; questions on the ease of use of such technologies; questions on barriers using telemedicine), **(b)** questions about the importance of functions and services in telemedicine tools, and **(c)** questions on the willingness to pay for such telemedicine tools. The questionnaire was reviewed by different experts, that is, two cardiologists, two psychologists, three experts in mobile health (mHealth), one health economist, one valorization manager, and the head of the clinical trial unit of one of the participating hospitals. After integrating their feedback, the questionnaire was used in the MEDICAR study.

Table 1. General overview with number of questions in the questionnaire.

	No. of questions
Attitude toward telemedicine	21
General information on the patients and use of telemedicine	3
Enablers to use telemedicine	7
Ease of use of telemedicine technologies	4
Barriers to use telemedicine	7
Importance of functions and services in telemedicine tools	14
Willingness to pay for telemedicine tools	3

Design

The MEDICAR study (NCT05337020) was a multicentric, prospective, comparative cross-sectional study performed in two Belgian hospitals: Jessa Hospital Hasselt (a tertiary hospital) and Antwerp University Hospital (UZA). The research protocol was approved by the Ethics Committees of the two participating centers. The study was conducted in compliance with the Declaration of Helsinki and all patients were provided digital informed consent (IFC) before starting the questionnaire.

Study population

Patients with CVD with a follow-up at the cardiology department of Jessa Hospital Hasselt or UZA were included. The patients needed to be older than 18 years and able to read or fully understand Dutch.

Two types of patients with CVD were included. The first group consisted of patients who never had used a telemonitoring tool, further referred to as a control group (C). Teleconsultations during or after the COVID-19 pandemic without any other telemedicine tool did not count as a telemonitoring tool. The second group consisted of patients who were listed in databases and already had used a telemonitoring tool to investigate remote follow-up from 2014 until 2022 (Telemedicine group = T). In this T group, five subgroups were included based on the type of previous telemedicine tool: (a) a CIED followed by telemonitoring; (b) atrial fibrillation (AF) patients who received personalized follow-up for education or therapy adherence monitoring; (c) remote heart rhythm monitoring during the COVID-19 quarantine period as part of Telecheck study[8]; (d) telerehabilitation patients; and (e) heart failure (HF) patients who received telemonitoring via an online platform.

We aimed for a total of 240 completed questionnaires, with at least 40 completed forms in each group (i.e., the five T groups and the C group). A sample size calculation for this study was not applicable as this is a descriptive observational study. Eligible patients were drawn from the database of patients with a previous telemonitoring experience (T) and consecutive patients coming for an in-person clinic follow-up or hospitalized at the Cardiology ward were asked for the C group.

Data collection and recruitment

The questionnaire was implemented electronically using Qualtrics survey software (Qualtrics, Provo, UT). IFC was implemented as the first question. This made it possible to recruit part of the participants (111 patients; 79.5%) online. The questionnaire was filled in anonymously by the participants. Every group had a specific Qualtrics link to enable group analyses.

Patients with CVD were recruited from March 2022 until August 2022. Two recruitment strategies were applied. Firstly, patients from the C group and patients of the T group who were present at the hospital for an in-person consultation or who were hospitalized, were recruited in person at the cardiology ward of both hospitals. C patients were asked at the cardiology department at random, while T patients were asked consecutively when they had an outpatient visit at the hospital. After a short introduction about the project, the patients were asked to participate in the study. Patients approved to participate by means of the digital IFC after which they filled in the questionnaire via a tablet at the hospital. Secondly, patients who already had a mHealth follow-up in the past and whose contact details were available in a database were contacted by phone. Every week a block of 20 patients (5 of each group) were called until the goal of 40 participants in each T group was reached. If they agreed to participate, a mail with a hyperlink to the questionnaire was sent. After approval of the digital IFC, they could further fill in the questionnaire. A list was kept of patients who had been approached to avoid patients being asked twice as the questionnaire was completed anonymously.

Statistical analysis

Statistical analyses were performed using SPSS 28 (IBM Corporation, Armonk, USA). Continuous variables were described as mean ± standard deviation (SD). Categorical variables were described as numbers (n) and percentages.

To get an overall view of the answers regarding telemedicine, a positivity score was created based on four questions (Q5–8; Supplemental File 1) using the formula:

$$\text{Positivity score}: [Q5] + \left[\sum_{i=1}^{6} Q6\right] + \left[\sum_{i=1}^{2} Q7\right] + \left[\sum_{i=1}^{7} Q8\right]$$

Question five has six answer options; the other three questions have a 7-point Likert scale as answer options on various statements. The most negative answer receives a score of one, while the most positive option receives a score of six or seven, depending on the number of answer options. The minimum score of 16 indicates that the patient has given the most negative answer to all questions. The highest possible score is 110, when a patient would give the most positive answer to all questions.

For continuous variables, the Mann–Whitney U test was used to compare two groups and the Kruskal Wallis for two or more groups. The chi-squared test was used for categorical variables. p-values <0.05 were considered statistically significant.

Results

Demographics

A total of 486 patients with CVD (C: 67, T: 419) were contacted to participate. Of the 67 approached C patients, 40 of the C patients (59.7%) were willing to participate and completed the questionnaire. Of the 419 contacted T patients, only 272 started the questionnaire (64.9%) and only 191 also completed the entire questionnaire (70.2%; CIED: 40 patients, 20.9% AF: 43 patients, 22.5% telecheck: 40 patients, 20.9% telerehabilitation: 40 patients, 20.9% and HF: 28 patients, 14.7%; $p = 0.406$). This results in 174 not willing to participate ($n = 486$; 35.8%) and a non-response rate of 26.0% (81/312). Demographic data of the 231 participants who finished the questionnaire are shown in Table 2. They had a mean age of 66.5 ± 11.1 years. There was a significantly higher educational degree in the T group ($p = 0.015$). Most participants owned a smartphone (84.8%) and only 2.2% of the participants of the total cohort did not own any digital device, a number which was slightly higher in the C compared to the T group (5.0% vs. 1.6%, respectively; $p = 0.071$). An activity tracker was the least owned smart device (29.0% of the patients).

Attitude toward telemedicine

Remarkably, of the 191 participants in the five T groups, only 126 (66.0%) were still aware that they had used a telemedicine tool in the past. A majority of these patients (118/126, 93.7%) found the telemedicine tool easy to learn and 112 (88.9%) felt better monitored while using the tool (Figure 1). However, only 85 patients (67.5%) would like to use the telemedicine for a longer period.

The T group scored significantly more positive in its interest to use telemedicine in the future: the positivity score (i.e., a range between 16 and 110, from least to most positive) was 87.0 ± 15.2 for T and 78.3 ± 17.4 for C ($p = 0.001$). The T subgroups itself scored significantly different ($p = 0.012$), driven by the significantly higher positivity score of the HF group compared to the other T subgroups ($p < 0.001$; Figure 2). Based on the demographic data, there was a significantly higher positivity score in the

Table 2. Demographic data of included cardiology patients.

	Total population ($n = 231$)	Telemedicine ($n = 191$)	Control ($n = 40$)	p-Value[a]
Male, *n* (%)	1780 (77.9%)	153 (80.1%)	27 (67.5%)	0.172
Age (years), mean ± SD	66.5 ± 11.1	66.6 ± 10.9	65.8 ± 12.4	0.791
Education degree, *n* (%)				**0.015**
Primary school	10 (4.3%)	9 (4.7%)	1 (2.5%)	
Secondary school	111 (48.1%)	83 (43.5%)	28 (70.0%)	
College	70 (30.3%)	61 (31.9%)	9 (22.5%)	
University	40 (17.3%)	38 (19.9%)	2 (5.0%)	
Living, *n* (%)				0.293
Alone/with partner	225 (97.4%)	187 (97.9%)	38 (95.0%)	
Other	6 (2.6%)	4 (2.1%)	2 (5.0%)	
No of smart digital device, *n* (%)				0.071
No	5 (2.2%)	3 (1.6%)	2 (5.0%)	
1–3	169 (73.2%)	136 (71.2%)	33 (82.5%)	
4–5	57 (24.7%)	52 (27.2%)	5 (12.5%)	
Smartphone, *n* (%)	196 (84.8%)	162 (84.8%)	34 (85.0%)	0.977
Tablet, *n* (%)	116 (50.2%)	98 (51.3%)	18 (45.0%)	0.468
Laptop, *n* (%)	157 (68.0%)	133 (69.6%)	24 (60.0%)	0.235
PC, *n* (%)	81 (35.2%)	71 (37.4%)	10 (25.0%)	0.137
Activity tracker, *n* (%)	67 (29.0%)	60 (31.4%)	7 (17.5%)	0.078

p-value in bold if they were significant.
[a]Mann–Whitney U test was used for continuous data and a Chi-square test was used for categorical data.

younger age categories (i.e., < 50years: 89.8 ± 8.0; 50–75years: 88.6 ± 14.1; > 75years: 79.1 ± 18.9; $p = 0.011$), for a higher educational degree (i.e., primary school: 80.7 ± 20.2; secondary school: 83.4 ± 17.2; College: 90.0 ± 12.5; University: 91.5 ± 10.7; $p = 0.025$), and a significant higher score based on a higher number of smart digital devices (i.e., no digital device: 81.3 ± 23.1; 1–3 devices: 85.3 ± 16.0; 4–5 devices: 91.7 ± 11.3; $p = 0.033$) in the T group (Supplemental File 2). There were no significant differences in the C group.

Looking at the different parameters of the positivity score, there was no significant difference in the number of participants claiming to be able to learn a new telemedicine tool via computer or smartphone (computer:64.0%, smartphone:64.5%; $p = 0.994$). There was also no significant difference when comparing the T and C groups in the ability to learn to use telemedicine tools via computer (T: 64.9%, C: 60.0%; $p = 0.539$) or via smartphone (T:64.9%, C:62.5%; $p = 0.707$). However, there was a significant difference between the C and five T groups in their personality in relation to learning and using new telemedicine tools, that is, on how they considered themselves on a continuum from early adopters to continued sceptics ($p = 0.020$; Figure 3). Large proportions of the groups would use a telemedicine tool only when many others are already using it or even as one of the latest to use new technologies. Only in the Telecheck group and HF group, a majority of participants indicated they like to use a new

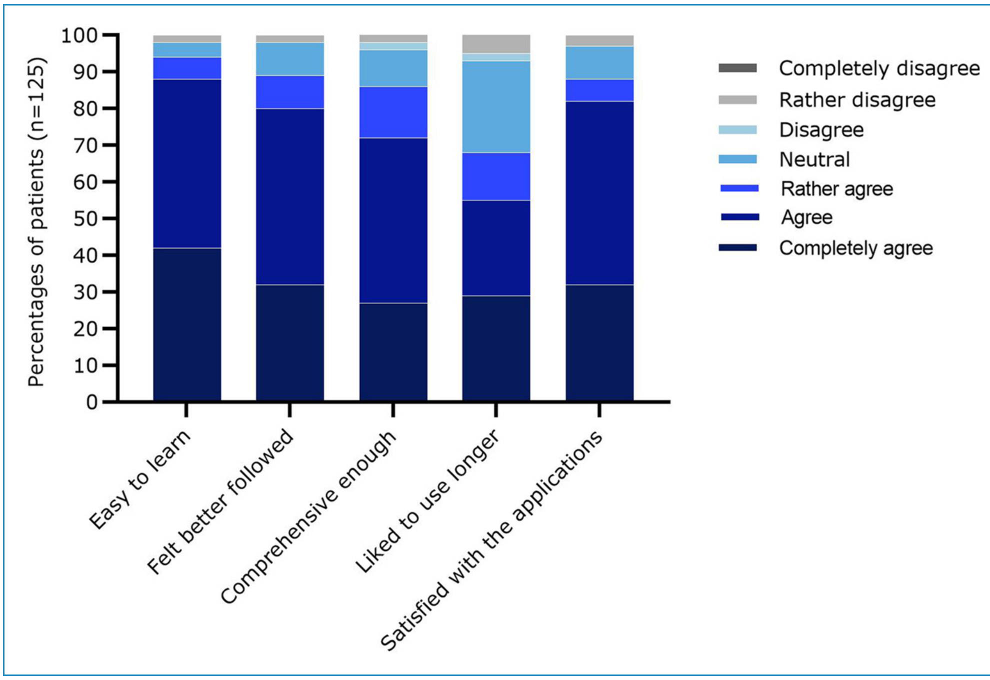

Figure 1. Positivity toward earlier used telemedicine tools.

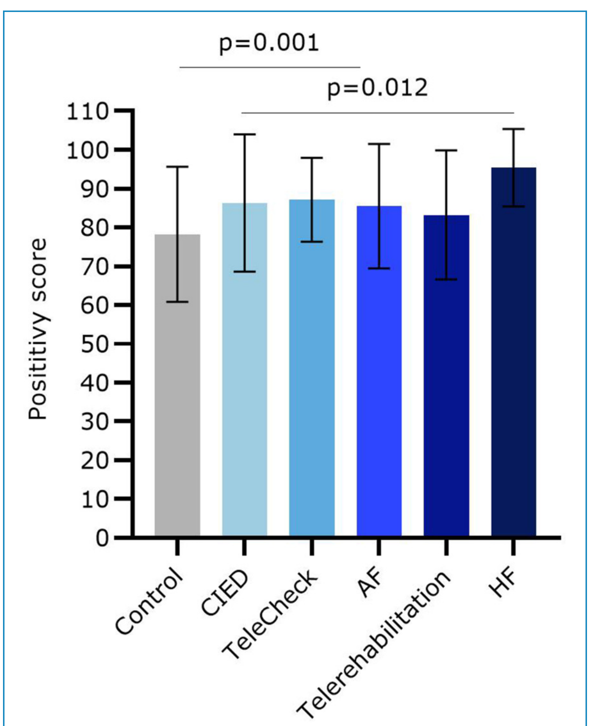

Figure 2. General positivity score for the control group and five telemedicine groups ($n = 231$). Minimum score of 16 and a maximum score of 110. CIED: cardiovascular implantable electronic device; AF: atrial fibrillation; HF: heart failure.

telemedicine tool before others use it or even as one of the first users.

When comparing the motivational factors that would trigger use of telemedicine tools in the future (i.e., other patients telling about it, an information brochure about telemedicine in waiting room, recommendation by a doctor, secure data storage, feedback based on parameters/questionnaires, possibility to contact someone with questions, the doctor/nurse can see the results), there were significant differences between the C group and the five T groups in six of the seven domains (Figure 4A). The HF patients ($n = 28$) scored highest on all seven. In all groups, participants agreed that each of these motivating factors would increase the chance of using telemedicine in the future. Other patients telling about telemedicine (51.9%) and an information brochure (51.1) scored lowest, while recommendation by a doctor (84.8%) and secure data storage (80.5%) were the two most prominent motivating factors.

In all six groups, participants were positive about using telemedicine in their daily care (Figure 4B). There were significant differences between the six groups in all categories, possibly driven by the high acceptability of the HF group. The C group scored significantly lower ($p = 0.006$) for the statement "Feel safer if telemedicine is applied to current care" compared to the other groups. In contrast, participants in the C group also believe telemedicine is useful in health follow-up and telemedicine could be a good addition to

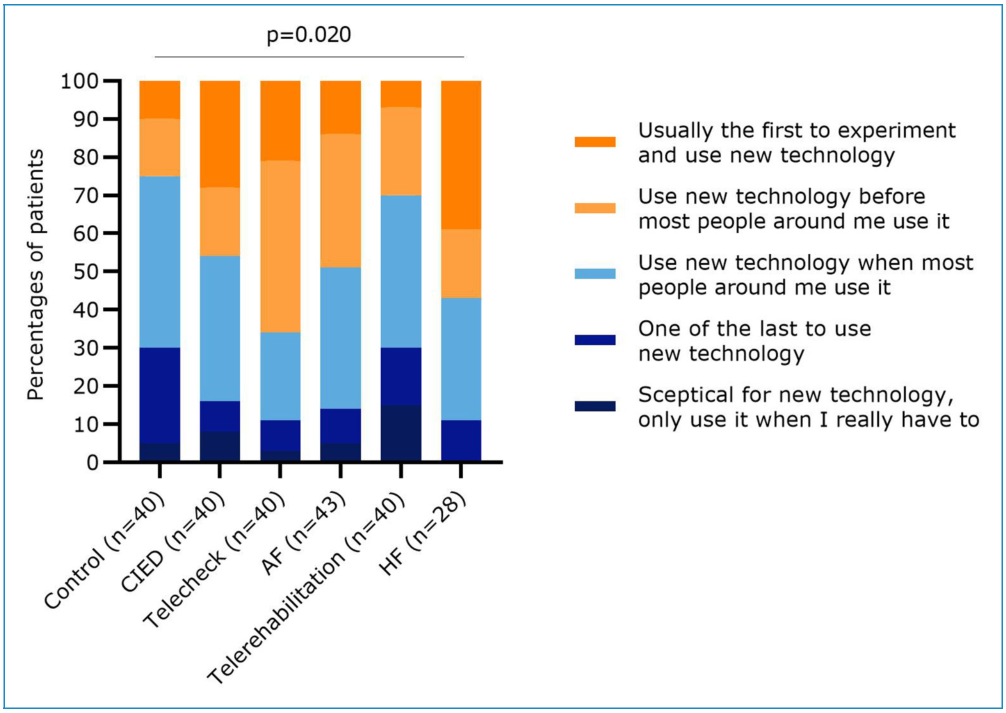

Figure 3. Personality toward learning and using new telemedicine tools. CIED: cardiovascular implantable electronic device; AF: atrial fibrillation; HF: heart failure.

in-person follow-up, comparable with the T groups. Nevertheless, participants in all groups except the HF group are less sure whether a decrease in in-person visits and replacing with telemedicine follow-up is a worthwhile evolution (24.7%).

Functions

We presented 14 functions related to telemedicine tools for value appreciation to the patients. Twelve out of 14 functions were considered important to be implemented in future telemedicine tools by a majority of participants (Figure 5). Health tips based on medical background (89.6%), personalized feedback on entered parameters (86.1%), and (personalized) information about the condition (85.3%) were most often rated important, while the possibility to share parameters/medication list with family (44.6%) and psychological follow-up (50.2%) were rated least important.

When comparing the C and T groups, there were five significant differences in functions in the three main categories (i.e., personalization, parameters, and notifications; Supplemental File 3). For these five functions, that is, notifications for new blood test ($p = 0.016$), notifications for new doctor visits ($p = 0.008$), medication reminders ($p = 0.006$), ability to enter parameters ($p = 0.032$), and support lifestyle changes ($p = 0.015$), significantly more participants in the C group found these parameters (very) important compared to the T group. Remarkably, there were relatively few participants who were motivated to participate in the development of new telemedicine tools in the future (Figure 6). Patients in the telecheck and HF group were most motivated, while patients in the telerehabilitation group were least motivated to participate.

Willingness to pay

Lastly, participants received questions about their willingness to pay for telemedicine tools. Only about half of the participants (67.1%) would pay for a telemedicine tool. Interestingly, no significant difference was seen between the study groups to pay for telemedicine in general (T: 69.6% vs. C: 55.0%; $p = 0.073$).

Three different tools were presented to the patients: that is, tool 1: a basic telemedicine tool that sends entered parameters to the medical file; tool 2: on top of tool 1, the care team receives notifications based on alert ranges of the entered parameters; and tool 3: the patient additionally receives notifications for out-of-range entered parameters. Willingness to pay for the different tools is shown in Figure 7. Significantly more participants in the T group would pay for tool 3 compared to the C group (T: 54.5%, C: 35.0%; $p = 0.025$). In the T group, more participants tended to pay for a telemedicine follow-up with tools 2

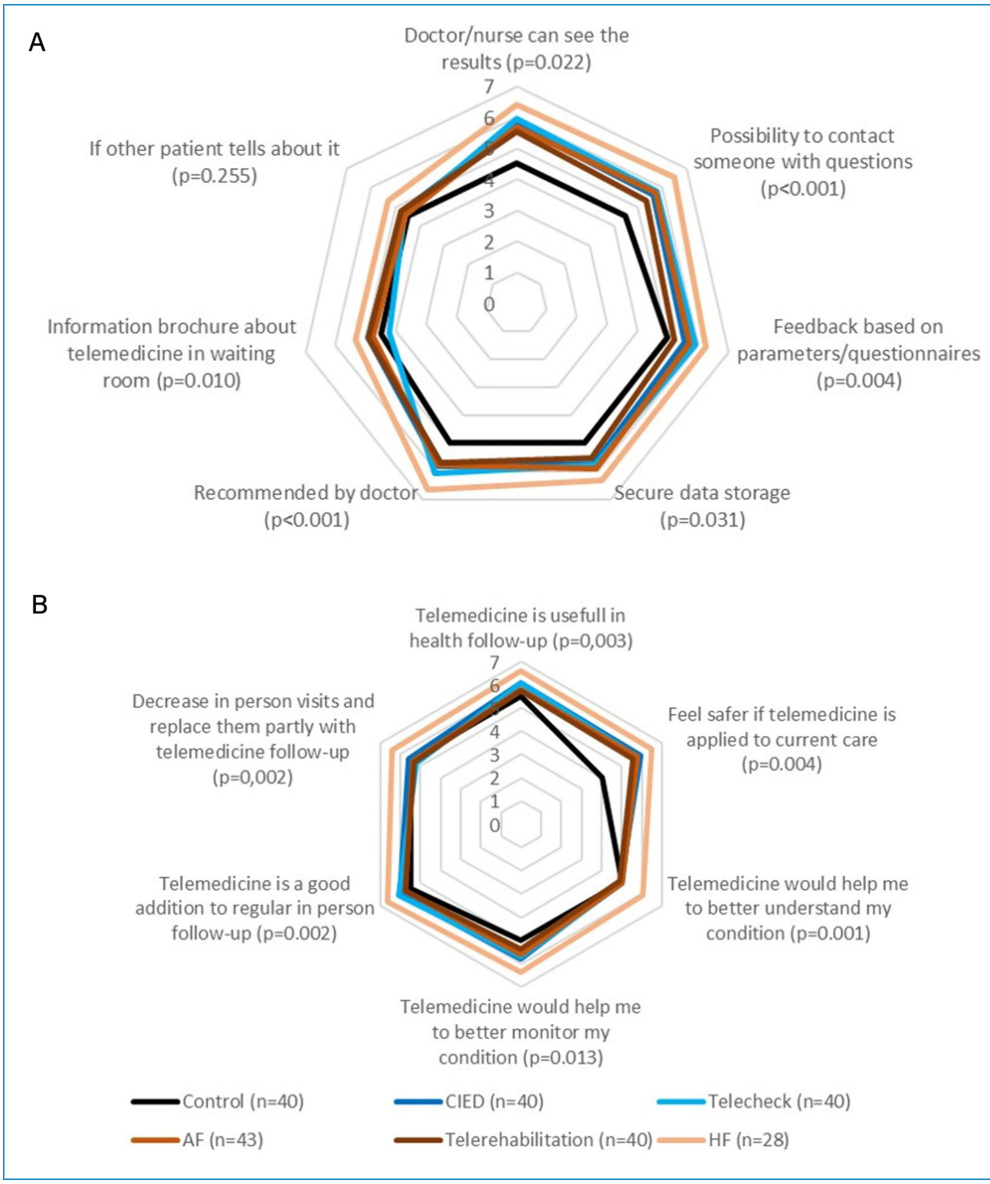

Figure 4. Enablers and barriers to use telemedicine. (A) Motivating factors to use telemedicine in the future. Answers ranging from very small chance to use (1) to big chance to use it (7). (B) Statements about the use of telemedicine in daily care. Answers ranging from completely disagree (1) to completely agree (7). CIED: cardiovascular implantable electronic device; AF: atrial fibrillation; HF: heart failure.

and 3 compared to the number of participants who would pay for tool 1 ($p = 0.130$).

When looking in more detail (Table 3), participants would pay monthly a mean sum ranging from €12.2 to €21.8 for one of the three tools. Participants in the C group would pay a significantly higher monthly fee for telemedicine tool 2 ($p = 0.009$) and tool 3 ($p = 0.018$) compared to the T group. If asked whether they would be willing to pay yearly for additional health care insurance that would also cover telemedicine if indicated (i.e., not directly paying for the tool itself), a mean amount per year was cited between €51.5 and €59.5, with no significant differences between the C and T groups.

Discussion

Patients increasingly utilize smartphones and tablets for health-related activities as more and more people have access to these electronic devices.[9] Besides, the COVID pandemic increased the use of telemedicine. Teleconsultations were profoundly more applied to replace face-to-face consultations.[10] Additionally, other telemedicine tools (applications, fitness trackers) were increasingly used during and after the COVID pandemic.[11] This growth in telemedicine tools shows that telehealth may significantly contribute to the future advancement of health care. It enables multidisciplinary collaboration and gives patients a more active role in

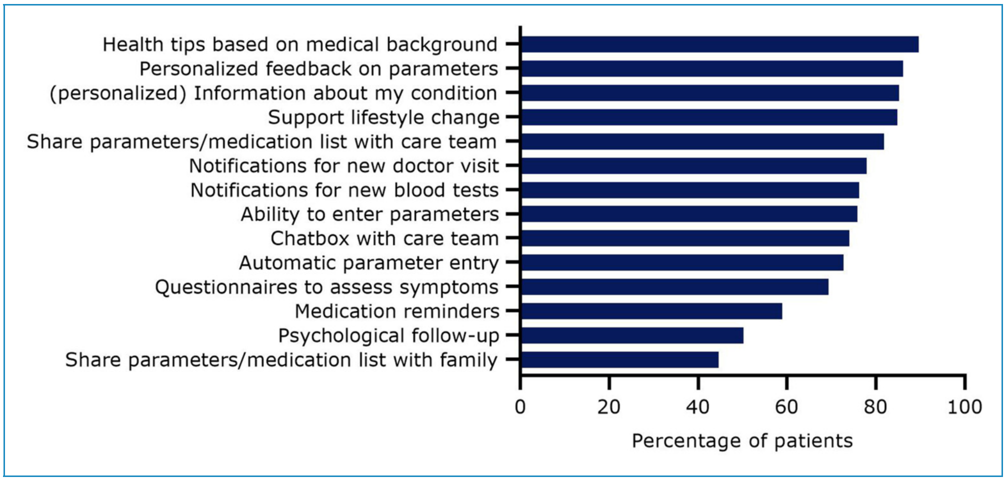

Figure 5. Functions to implement in new telemedine tools ($n = 231$). Results are shown of patients who indicated the three most positive answers.

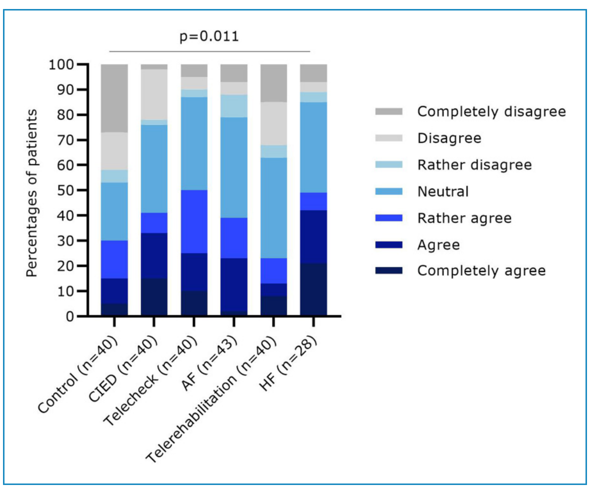

Figure 6. Number of patients who want to participate in the development of new telemedine tools. CIED: cardiovascular implantable electronic device; AF: atrial fibrillation; HF: heart failure.

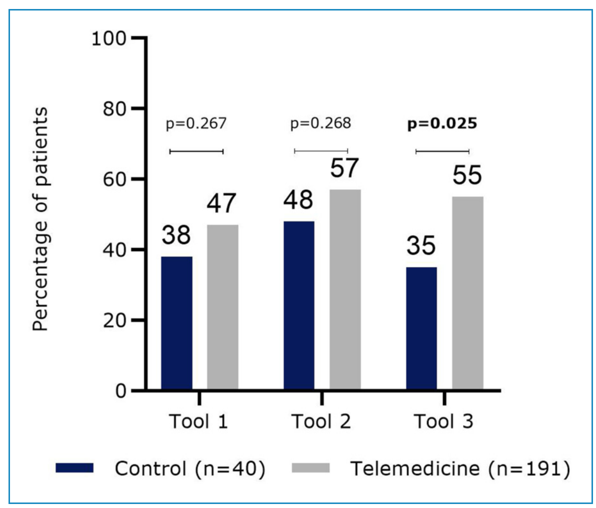

Figure 7. Willingness to pay for each tool. Tool 1: telemedicine follow-up in which entered parameters are sent to the medical file; Tool 2: telemedicine follow-up in which entered parameters are sent to the medical file and the care team receives notifications based on these parameters; Tool 3: telemedicine tool in which entered parameters are send to the medical file and both the patient and the care team receive notifications based on these parameters.

their care process. It is important to understand patients' expectations about these telemedicine tools and involve them in the development.

The majority of participants in this study already owned at least one device (>95%), which shows the possibility of using telemedicine tools in the future, even in older cardiovascular populations. Our results were already higher compared to a survey performed in 2018 with 85% of the participants owning ≥1 smart device and, already, 12.5% of the participants used wearable devices.[12] Activity trackers were the least owned devices in our study (29.0%), although these are the simplest of devices, and could easily be accepted by patients if medically recommended. However, these results show that there is a digital shift occurring over the past years.

Remarkably, only 66.0% of the participants in the T group knew that they had used a telemedicine tool in the past. Of these participants, only 67.5% would like to use this telemedicine tool for a longer period. This low percentage despite a high satisfaction rate was also seen in other studies.[13–15] Main reasons may lie in the need for assistance to use telemedicine tools due to technical issues, lack of insight into the possible health benefits, and preference for in-person follow-up. To increase effective use of telemedicine tools, these aspects need to be addressed.

Table 3. Willingness to pay for three different tools.

		Price per month (€), mean + SD	Price per year for additional insurance (€), mean + SD	Frequency of payment, *n* (%) Monthly	Quarterly	Annually
Tool 1: entered parameters send to medical file	**Control (*n* = 15)**	12.2 ± 25.3	52.3 ± 70.9	2 (13.3)	6 (40.0)	7 (46.7)
	Telemedicine (*n* = 90)	14.4 ± 16.9	55.7 ± 116.0	26 (28.9)	32 (35.6)	32 (35.6)
	***p*-value**	0.326	0.691	0.435		
Tool 2: Entered parameters send to medical file. Care team receives alarms	**Control (*n* = 19)**	20.5 ± 15.4	59.5 ± 69.4	3 (15.8)	7 (36.8)	9 (47.4)
	Telemedicine (*n* = 109)	12.8 ± 14.0	51.5 ± 108.4	30 (27.5)	40 (36.7)	39 (35.8)
	***p*-value**	**0.009**	0.331	0.486		
Tool 3: Entered parameters send to medical file. Both patient and care team receives alarms.	**Control (*n* = 14)**	21.8 ± 16.9	57.4 ± 79.8	2 (14.3)	5 (35.7)	7 (50.0)
	Telemedicine (*n* = 104)	13.4 ± 15.4	52.3 ± 116.8	32 (30.8)	36 (34.6)	36 (34.6)
	***p*-value**	**0.018**	0.456	0.374		

p-value in bold if they were significant ($p<0.05$).
Chi-square for categorical data and Mann–Whitney U for continuous data.

Attitude toward telemedicine

Nevertheless, the positive attitude for the use of future telemedicine was high in all patient groups. As could be expected, a lower age and higher educational degree were associated with a more positive attitude.

Already in 2011, a study by *Cranen et al.* showed that even 15 min of use of a web-based telemedicine service on top of basic training resulted in a higher technology acceptance concerning usefulness and perceived ease of use compared to the control group who only received basic training.[16] Our study confirmed different personality traits between no prior users and prior users, in the sense that the former group would mostly use telemedicine when it is already used by many other patients, while the latter are more curious and could even be early adopters. Tipre et al. also reported a difference in personality between patients with our without experience of virtual communication. The odds of choosing virtual visits were significantly higher in the experienced group.[17] This shows that the development of good tools by itself is not the only important parameter for their implementation, but that it is also important to encourage patients along different motivational axes (cf. Figure 4A). Although a doctor recommending the application is an important motivational factor in the older population of our study, participants also considered data safety to be important. This was also addressed in a recent review by *Pool et al.* in which data privacy concerns were pointed out as an important barrier for an older population to use telemedicine.[18]

Patients with CVD in both groups fear that telemedicine would replace in-office visits, and they consider its value rather than complementary. This was also seen in a study by *Scherrenberg et al.* in which patients (65%) indicated that remote cardiac rehabilitation is equally useful as center-based rehabilitation. However, while 54% indicated that remote rehabilitation in combination with center-based rehabilitation is an option, only 35% would consider remote rehabilitation without center-based rehabilitation a valuable option.[15]

Functions

Of the 14 functions that were offered to the patients, there was a strong preference in both groups for personalized feedback on entered parameters, (personalized) information about their medical condition, and specific health tips based on medical background. Generic applications will definitely have less appeal. On the other hand, tips for a healthier lifestyle are part of one of the most important pillars in the prevention and care of cardiovascular patients.[19] There is little information in the literature about the features that patients with CVD currently favor in telemedicine tools. According to a systematic review on mobile applications for cardiovascular diseases, the opinions on motivational messages varied, some described them as motivating while others chose not to. However, more tailored motivational messages based on achieved goals or to motivate the patient to increase their effort were preferred.[20] Also a user study performed by *Baek et al.* on mHealth tools for self-management and care engagement of CVD patients found that patients have a preference for functions to communicate with doctors or receive advice from doctors.[21] Based on the usability test with a mock-up design for a CVD application patients reported being satisfied with the education, although medical education should be customized according to patients' diseases and conditions.

Despite the high positivity score in our study, it is surprising that only a limited number of people want to participate in developing new telemedicine tools. Health literacy plays an important role in the motivation to take part in the development, often being lower in older people and in women (e.g., Results of Sciensano show poor health literacy in 38.7% men vs. 50.4% for women).[22] On the other hand, limited health literacy is associated with inadequate health-related behavior, underuse of health service, and less engagement in health-promoting behaviors.[23,24] Since these patients participate less to the development of new tools, one has to guard development that suits the needs of those in highest need.

Willingness to pay

Despite the high positivity for telemedicine, only half of the patients would pay for telemedicine tools. These results are comparable with other studies examining willingness to pay, that is, ranging from 19% to 70% depending on the suggested amount.[15,25,26] More patients in the T group would pay compared to the C group, which was significantly higher for the most complex tool. This again shows that previous use of telemedicine triggers patients to use it in their daily health care, and they are even more willing to pay for it. Surprisingly, patients would pay a high yearly amount for additional insurance (i.e., ranging from €51.5 to €59.5) compared to the yearly prices for basic health insurance in Belgium (e.g., ranging from €48 to €180).[27] Despite the willingness to pay for telemedicine by some, it is important to ensure equal access to care and to prevent the willingness to pay for an application or additional insurance does not create a care gap between patient groups.

Limitations

Only 191 of the 419 patients with previous telemedicine follow-up, who were informed by phone and agreed to participate, answered the questionnaire. This could be because the questionnaire was sent by mail and patients forgot to answer. In addition, the questionnaire had to be filled out digitally by the patients. As a result, the respondents could be the more engaged or motivated patients or patients with a higher digital literacy, which may affect the survey's findings. Unfortunately, we did not achieve the intended number of inclusions for the HF group.

Conclusions

Patients with CVD have a positive attitude toward the use of telemedicine, with a clear preference for telemedicine tools with a focus on personalized care and a healthy lifestyle. Besides, patients found privacy issues an essential factor that needs to be considered when developing new tools. Previous use of telemedicine made the participants more curious about the use of new technology and created a higher willingness to pay. However, patients are still hesitating to replace in-person visits with online visits. Healthcare providers should motivate new users along different motivational axes, addressing patient concerns like effectiveness and ensurance about in-person follow-up. Finally, preserving equal access opportunities for all patients needs to be ensured during development and during implementation, including potential fees for use.

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