Use and acceptance of innovative digital health solutions among patients and professionals - a survey-based distinction.

Fritz Seidl, Florian Hinterwimmer, Ferdinand Vogt, Günther M. Edenharter, Karl F. Braun, Rüdiger von Eisenhart-Rothe, AG Digitalisierung der DGOU, Peter Biberthaler, Dominik Pförringer

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Abstract

Background: Digital solutions are gaining increasing importance and present a challenge regarding the introduction and acceptance into professional medical environments. Significant advances have been made regarding availability, safety, and ease of use of data generated by a multitude of devices and wearables. However, data security and data protection are delaying factors. The underlying analysis focuses on the use, acceptance of digital solutions and their respective differences between healthcare professionals and patients.

Objective: This study examines the current use and acceptance of digital solutions among healthcare professionals and patients. In addition, it derives an outlook to future developments and expectations in the setting of innovative technologies able to penetrate the health market.

Methods: An anonymous online survey of 23 multiple-choice and 3 open-text questions was conducted among medical professionals and patients between April and September 2023. In this study, quantitative analysis was performed using Python, with Pandas for data processing and Matplotlib for visualization. Chi-square tests were used to analyze binary categorical data, while Mann-Whitney U tests were used to evaluate ordinal data. Additionally, a qualitative analysis was conducted to summarize the results of the open-ended questions.

Results: During 178 days, the survey garnered 2,058 clicks, resulting in 1,389 participants (67.5% response rate). A total of 1,002 participants completed the entire questionnaire, while 387 (27.9%) did not finish. Incomplete responses were excluded from the comprehensive analysis. The sample comprised 271 physicians (27%) and 731 patients (73%). The study found significant agreement between both groups in adopting and foreseeing the use of digital health tools and telemedicine. Both groups recognized the future importance of digital health without substantial differences.

Conclusions: Overall, attitudes towards digital health and telemedicine were consistent, reflecting a uniform acceptance and expectation of these technologies among healthcare professionals and patients. The consensus on telemedicine's future role over the next five years indicates a unified vision for digital health paradigms.

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Keywords: *eHealth, digital health, medical data use, information, survey, adoption*

Introduction

Digital innovation in healthcare is accelerating in growth and presence in the media, while the regulatory framework is constantly evolving and adopting. Digitization has found its role in everyday medical life. It is of paramount importance to understand use and acceptance to improve and continuously develop technology based health offerings.

Developments have been catalyzed by the global COVID-19 pandemic situation [1] and, specifically in Germany, by early legislation in favor of digital health applications (under the acronym DiGa = Digitale Gesundheitsanwendungen) [2]. Many promises - such as the availability of telemedicine - have been met, while specific needs regarding data storage are strongly underserved [3]. The use and development of digital health applications differ in addressing the needs of professionals versus those of patients. Acceptance is influenced by factors varying in complexity and depth, often driven by fears or lack of understanding. National legal and technical regulations have yielded a desired increase in developing and usage digital healthcare solutions. The underlying study examines the current status and the drivers and barriers of this development, which have been found to be major influencing factors in the adoption of digital technologies in healthcare [4]. Specifically, it analyzes the gaps in the aforementioned categories between patients and professionals. Additionally, it helps understand the current and future needs of digital health and requirements for offered applications.

A multinational survey among healthcare professionals and patients focused on this delta, its underlying reasons, and the consecutively arising demand specifically regarding the following five research questions:

RQ1: How do estimations of future importance of digital health differ between patients and professionals?

RQ2: How do patients and professionals estimate their future use of digital health solutions?

RQ3: Which areas offer specific innovation potential in digital health from the perspective of patients and professionals?

RQ4: Which key obstacles to using digital health solutions do patients and professionals identify?

RQ5: How does the use of online access differ towards health data, electronic appointment booking, and telemedicine?

Every non-medical professional from the general population is considered a patient for research purposes.

Materials & Methods

An anonymous online survey, adopted from own earlier research in 2018 [5], was conducted between April and September 2023 via the scientific survey platform SoSci survey [6] hosted on German servers complying with European data protection laws. The survey was initiated with an introductory question distinguishing between patients and physicians, deciding on the further direction of the questionnaire. Depending on the chosen branch, 19 questions for patients and 25 for physicians followed, 3 of which were open-text questions. The questionnaire was provided in German and English and was available for six months: 6 April through 30 September 2023. Only fully completed questionnaires were considered for final analysis to guarantee a consistent data quality.

The link to the online survey was distributed via publications in scientific journals such as "Die Unfallchirurgie", the networks of the German Society for Orthopaedic and Trauma Surgery (Deutsche Gesellschaft für Orthopädie und Unfallchirurgie – DGOU) and the German Society for Surgery (Deutsche Gesellschaft für Chirurgie – DGCH), online communication platforms such as LinkedIn® and university webpages to reach a broad range of participants in both the professional field as well as amongst patients.

Participants were asked a set of specific questions regarding their personal and professional use, their acceptance and future expectations towards digital healthcare, followed by sociodemographic questions and questions regarding their field of expertise, age, and country of origin. In addition, open-text questions were offered to understand and evaluate individual needs and gain additional insights. The English version of the survey is added as Attachment 1 to this manuscript.

In this study, a quantitative analysis was conducted using the Python programming language, leveraging the capabilities of the Pandas library for data processing and the Matplotlib library for visualization. This approach allowed for a practical assessment of relative frequencies and distribution patterns in the responses of healthcare professionals and patients. For binary categorical data, such as responses regarding the 'Use of Electronic Appointment System,' Chi-square tests were used to assess the association between the respondents' profession and answers. In cases of ordinal data, including perceptions of the 'Future Importance of Digital Health' and estimations of telemedicine use in the past and future, the Mann-Whitney U test was employed. This non-parametric test compares the central tendency of two independent samples and is optimally suited for data not conforming to a normal distribution. Responses were numerically coded to facilitate this analysis. The primary objective of this investigation was to compare and contrast attitudes towards and usage of digital health tools, including aspects of telemedicine and online healthcare services. The qualitative data were assessed by a panel of experts (including a physician, a data scientist, and a

management expert) and evaluated for underlying trends and overlaps between the questionnaire participants.

Results

During the 178 days of availability, the questionnaire yielded 2,058 clicks, of which 1,389 visitors answered the questionnaire and became participants in the study (response rate of 67.5% among visitors). 1,002 participants (72.1% of the respondents, 947 of which were German-speaking, and 55 of which were English-speaking) completed the entire questionnaire, and the remaining 387 participants (27.9%) stopped answering the questionnaire before reaching the last question. The resultant dataset comprised 731 patient-derived responses juxtaposed with 271 physician-sourced answers, offering a representative overview of both primary healthcare stakeholders.

The study revealed a high level of conformity in perspectives between physicians and patients regarding the adoption and future utilization of digital health tools and telemedicine. Both groups showed parallel levels of adoption for electronic appointment systems and similar historical utilization patterns of telemedicine offerings. It yielded a comparable evaluation of the future importance of digital health, with no significant differences observed in their responses. Notably, the analysis indicated a consensus in expectations towards future use over the next five years, highlighting a synergistic alignment in the outlook towards digital health paradigms. The general attitude towards digital health and telemedicine yielded no significant differences either, underscoring a uniformity in the acceptance and anticipated future use of these technologies among both groups. Future expectations were aligned, with physicians and patients recognizing the importance and potential of digital health solutions in improving healthcare delivery. This consensus points towards a collaborative readiness for integrating digital health tools in future healthcare services, emphasizing the transformative potential of digital technologies in the medical field.

When asked about their "*Online Access Status to the Hospital Information System* (HIS)", 66.1% of physicians replied positively ("Yes"), while 33.9% did not have access ("No"). This result is shown in Figure 1, which refers exclusively to the answers of the doctors and excludes patient data. As demonstrated in Figure 2, the *"Use of Electronic Appointment System"* elicited a non-significant difference in usage patterns between physicians and patients (Chi-square test, p=0.159). This lack of statistical significance indicates parallel levels of adoption between the two groups. The assessment of the perceived *"Future Importance of Digital Health"* is visualized in Figure 3. Responses from both cohorts indicated no statistically significant divergence (Mann-Whitney U test, p=0.133),

indicating a uniform recognition of the importance of digital health across the medical community and patient population. As delineated in Figure 4, historical utilization patterns of telemedicine similarly showed no statistical difference between physicians and patients (Mann-Whitney U test, p=0.859), indicating a shared experience regarding the integration of telemedicine into healthcare delivery over the past five years. Prospective inclinations towards *"Future Use of Telemedicine in Next Five Years"* are graphically represented in Figure 5. The analysis revealed no statistically significant difference in expectations between the two groups (Mann-Whitney U test, p=0.103), highlighting a consensus in the projected trajectory of telemedicine's role in future healthcare services.

Collectively, the data shows a conformity in perspectives between physicians and patients regarding the adoption and future utilization of digital health tools and telemedicine. The absence of statistically significant differences underscores a potentially synergistic alignment in the outlook towards evolving digital health paradigms – in other words a contentual significance with regard to similarities between the two groups.

Question	**Statistical test**	**P-Value**	**Significant difference**
Use of Electronic Appointment System	Chi-square	0,1594	No
Future Importance of Digital Health	Mann-Whitney U	0,1330	No
Use of Telemedicine in Last Five Years	Mann-Whitney U	0,8591	No
Future Use of Telemedicine in Next Five Years	Mann-Whitney U	0,1028	No

Table 1: Comparative Statistical Analysis of Responses on Digital Health Adoption Between Healthcare Professionals and Patients Using Chi-square and Mann-Whitney U Tests. P-values are reported with a significance threshold of $p < 0.05$, indicating statistically significant differences between the two groups.

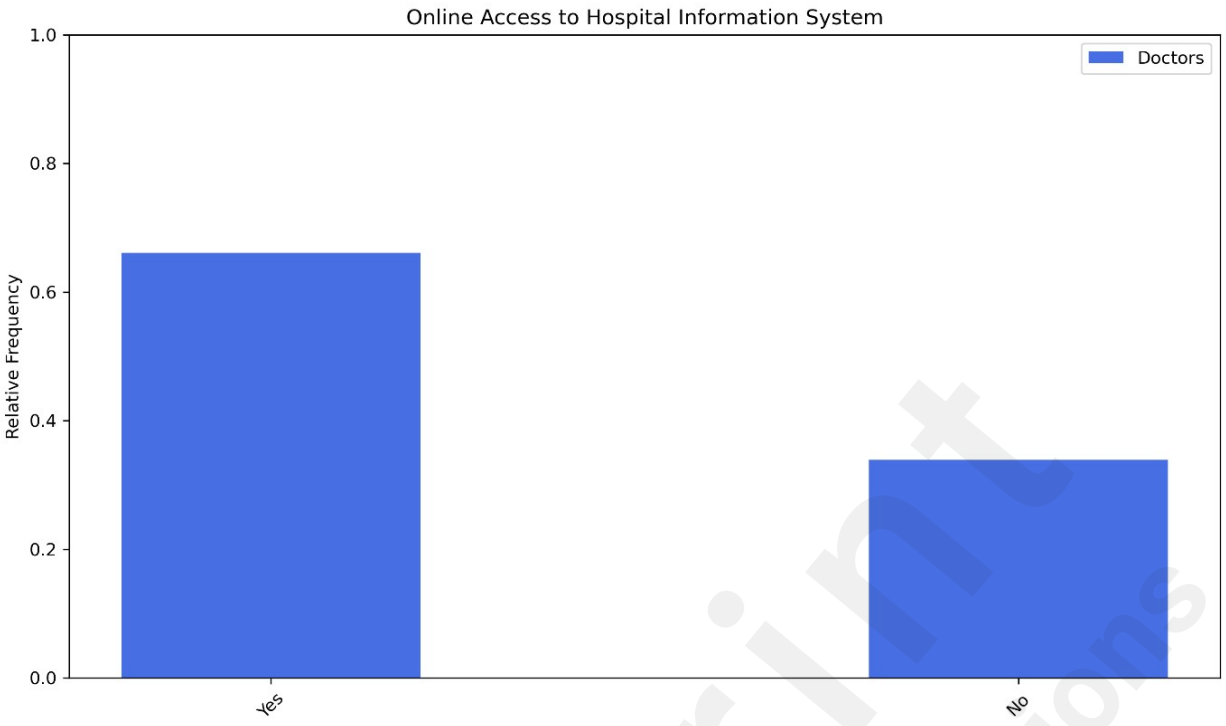

Figure 1: Access status of doctors to the Hospital Information System, showing that 66.1% of doctors have access ("Yes") while 33.9% do not ("No"). The figure exclusively focuses on doctor responses and excludes patient data.

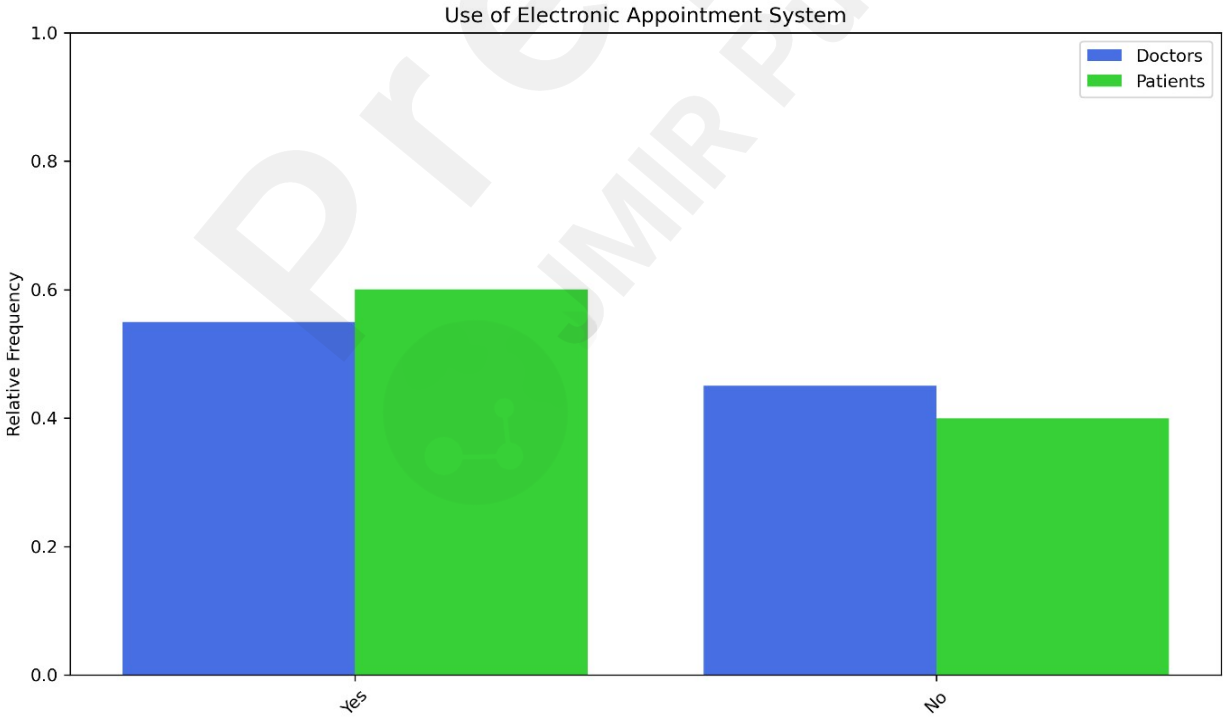

Figure 2: Proportion of healthcare professionals and patients using 'Electronic Appointment Systems'. (Chi-square test, p = 0.1594).

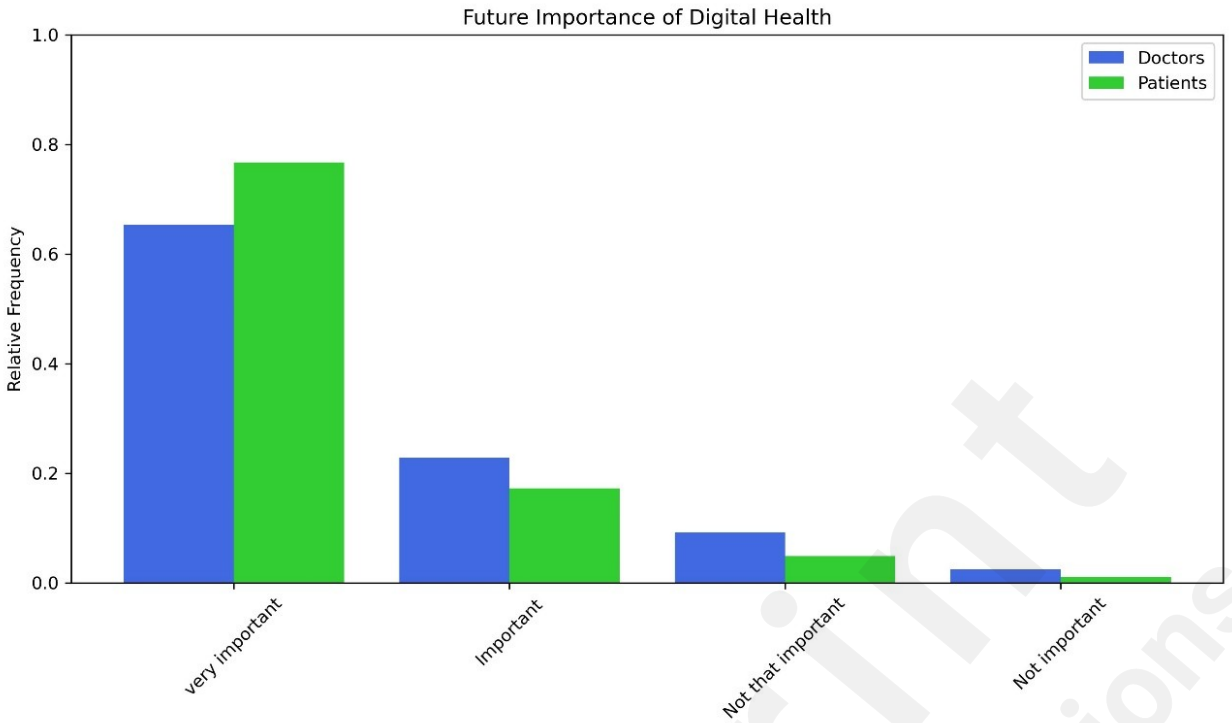

Figure 3: Comparison of the perceived 'Future Importance of Digital Health' between healthcare professionals and patients. (Mann-Whitney U test, p = 0.1330).

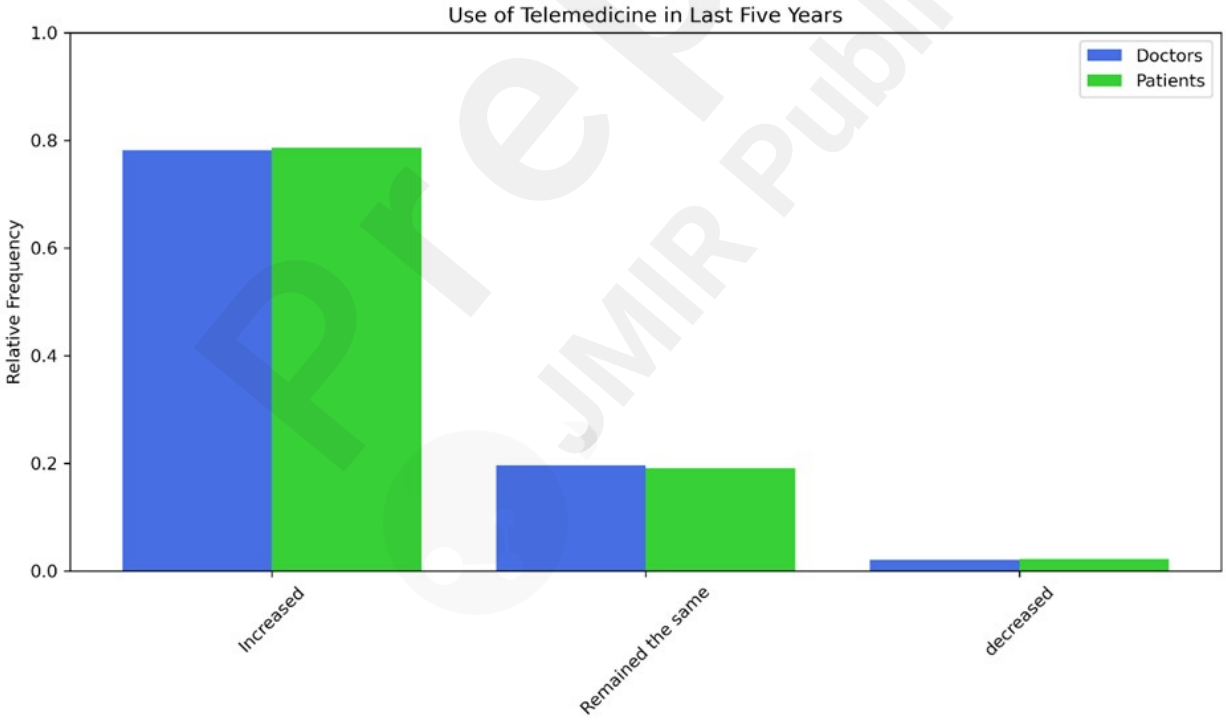

Figure 4: Visualization of responses to 'Use of Telemedicine in Last Five Years' between healthcare professionals and patients. (Mann-Whitney U test, p = 0.8591).

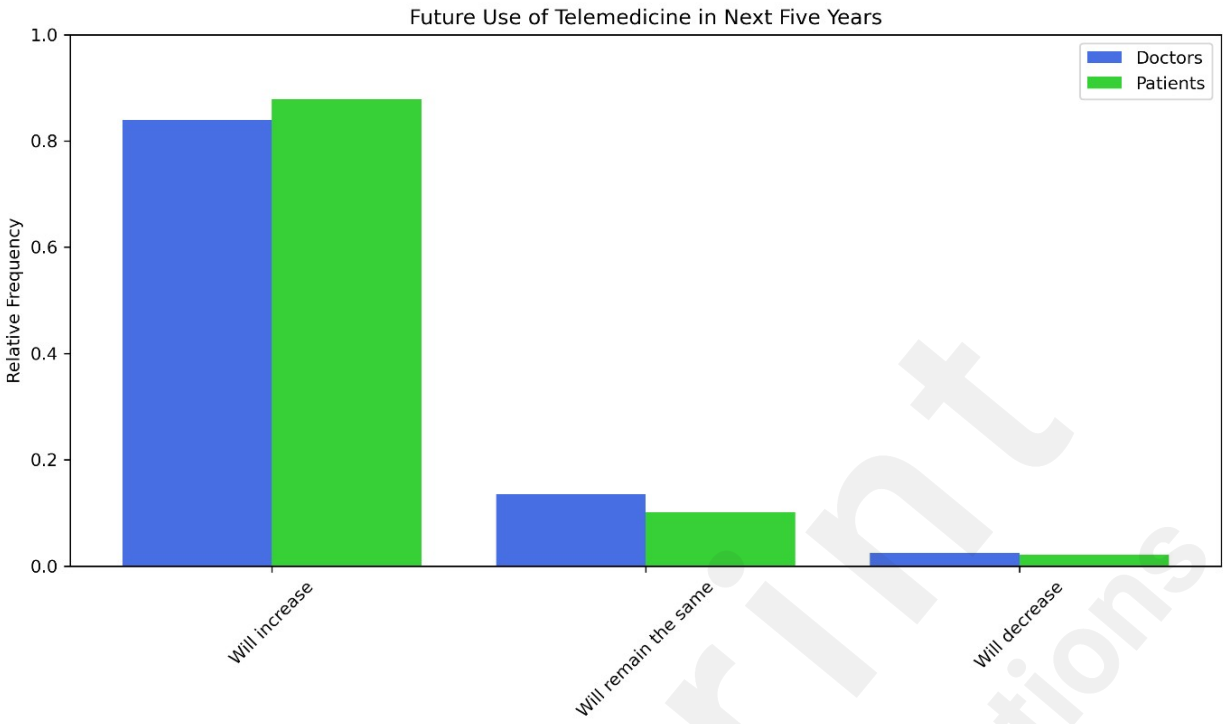

Figure 5: Expectations for the 'Future Use of Telemedicine in Next Five Years' among healthcare professionals and patients. (Mann-Whitney U test, p = 0.1028).

Open questions

The following section summarises answers to the open-text questions, highlighting the most common answers and key aspects focusing on regulated digital medical products.

"In your opinion, what can digitalization achieve for patients?": [3]There is a strong emphasis on how digital health solutions can improve patient care and treatment efficiency, with many noting the potential for streamlined treatment processes, quicker and more accurate diagnoses, and a reduction in unnecessary medical tests. Centralized and accessible data management assumes another critical area. Respondents point out the benefits of easily retrievable patient information in an organized format, leading to more informed clinical decisions. This is closely linked with promoting preventive healthcare and healthy lifestyles, emphasizing role of digitalization in disease prevention. Reducing the administrative burden on healthcare professionals is also a significant theme. Digital tools can allow professionals to focus more on direct patient care by minimizing time spent on non-medical tasks and bureaucracy. Enhancing communication and decision-making between patients and healthcare providers is viewed as crucial by study participants. Digital solutions are seen as facilitators of patient empowerment and shared decision-making, highlighting the importance of a patient-centered approach in digital health.

Regarding resource management, digitalization is seen as a potential solution to the shortage of healthcare professionals, supporting more personalized medicine and aiding in healthcare research through the provision of comprehensive data for analysis. Accessibility and inclusivity pose key themes, with digital health solutions considered vital for making healthcare more accessible, especially in remote or underserved areas. The responses collectively underscore the transformative potential of digital health solutions in enhancing healthcare delivery and patient experience.

"Which development potential and opportunities do you see in the digitalization of healthcare?": A recurring theme is the potential for digitalization to reduce bureaucracy and thus significantly improve the healthcare systems' efficiency. This aspect is particularly pertinent in the reduction of regulatory complexity associated with digital medical products. Enhanced data management and accessibility emerge as crucial factors, with many responses highlighting the integration of AI in diagnostics and decision-making, the utilization of big data for predictive health analytics, and the centralization of patient data. These points resonate with the emphasis on employing real-world data and evidence for regulatory surveillance and the development of digital health solutions. Improved communication and coordination through digital tools where seen as crucial for better interdisciplinary and inter-institutional collaboration, reflecting the challenges of diverse regulatory landscapes in healthcare. The attitude towards innovation in medical devices and diagnostics, especially the role of AI and machine learning, development of new diagnostic tools, and application of digital twins and simulation techniques, aligns well with the need for reduced regulation of AI products in healthcare. Patient-centric approaches are emphasized in the responses, highlighting the need for more personalized medicine and improved patient engagement through digital solutions. This underlines the necessary development of useful patient-centered regulated medical products. Regulatory strategy considerations, particularly secure data handling and privacy concerns, are implicit in the responses, reflecting the importance of clear regulations in the development and implementation of digital medical products. Lastly, digitalization is viewed as a solution to healthcare professional shortages and a means to improve healthcare access, particularly in remote areas.

"Where do you see the largest risks and disadvantages of the digitalization of healthcare?": The responses reveal a multifaceted set of concerns, deeply interconnected with the challenges inherent in regulated digital medical products. A primary worry is data security and privacy, with numerous responses highlighting apprehensions about the misuse of personal health information. This emphasises the need for stringent regulatory and ethical frameworks in the development and deployment of digital medical tools, as perceived by the study participants. Another significant

concern is the depersonalization of care. Many partcipants fear that the rise of digital therapeutics and diagnostics might erode the personal interaction between healthcare providers and patients, a perceived cornerstone of adequate healthcare. Balancing technological efficiency with human empathy is, therefore, a key challenge in the realm of digital health. Technological dependency and system vulnerabilities emerge as major concerns. Respondents worry about an over-reliance on technology, potential system failures, and cybersecurity threats, emphasizing the importance of safety and reliability in digital medical products, especially in critical care. Resistance to change is another notable theme, particularly among healthcare professionals and older patients. This resistance can significantly impact the adoption and effectiveness of digital health solutions. Finally, navigating the complex regulatory landscapes and ethical dilemmas, especially with integrating AI and machine learning in healthcare, presents its challenges. Robust regulatory strategies and ethical guidelines are seen paramount in ensuring the responsible and effective use of digital health innovations.

Participant demography

Considering the age distribution of the particpants, the following results were obtained from the questionnaire, as shown in Table 2. To better visualize the comparative values, Figure 6 shows the relative frequency of both study groups as a bar chart.

	18-25	**26-35**	**36-45**	**46-55**	**56-65**	**> 65**
Physicians	9 (3.32%)	53 (19.56%)	64 (23.62%)	71 (26.20%)	58 (21.40%)	16 (5.90%)
Patients	35 (4.79%)	166 (22.71%)	209 (28.59%)	155 (21.20%)	111 (15.18%)	55 (7.52%)

Table 2: Age distribution between the two study groups. Values are shown as absolute numbers and relative frequencies (percentages in squares) of the whole respective population.

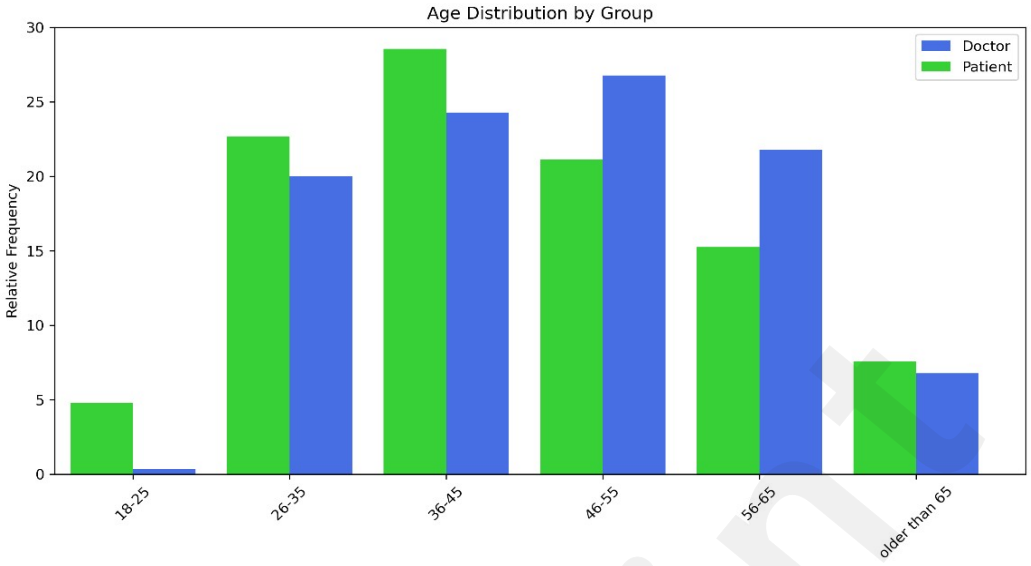

Figure 6: Demographic data (age) of the participants in both study groups. The graph depicts the relative frequency between the two groups.

Discussion

The survey results show an agreement between professionals and patients regarding the acceptance and use of technological innovations in healthcare and underline the need to enhance digital health literacy.

A specific *"Law for the acceleration of digitization in healthcare"* (Gesetz zur Beschleunigung der Digitalisierung des Gesundheitswesens (Digital-Gesetz – DigiG)) has been introduced by the German Ministery of Health and is currently under review by the legislator. Not only the title of the draft law expresses the need for an increasing pace of new developments in the field, but also its contents. The most important aims of DigiG comprise the introduction of electronic patient case files (elektonische Patientenakte – ePA), a digital overview of the patients' medication, an electronic medical prescription, the extensive use of the aforementioned DiGas, the implementation of assisted telemedicine and the foundation of a digital medical council including represenatives from the fields of data security, freedom of information and IT [7].

Current developments show the continuous growth of digital technology in healthcare [8]. Research exhibits a rise in digital health applications among professionals [9] and the population. In addition, it has a growing use in research [10] and in real-world evidence generation [2]. The global COVID-19 situation has accelerated digital adoption across various fields, including healthcare [11]. Different analogous outdated processes are being transformed, catalyzed, and enhanced, and boundaries at the *"digital front door"* for patients are being overcome. We now observe a balance

between "techno-optimism" and "techno-skepticism" [12].

While most users seem to value the internet as a source of information and for anonymous consultations, they seem hesitant about storing their personal data online. Haluza et al.'s questionnaire-based online survey investigates the influence of online health information-seeking behavior on doctor-patient interactions among internet users in Austria. They found that most respondents referred to the internet as their primary source of health information but expressed skepticism towards an electronic exchange of health data between healthcare professionals and patients and the reliability of online health information [13].

Barriers and facilitators to utilizing digital health technologies are being identified and scrutinized to understand and interpret catalyzing and accelerating factors [14]. Interdisciplinary co-creation, culture, and leadership play relevant enabling roles in digital health usage [4].

Online Booking platforms can facilitate and thus enhance appointsments between patients and physicians, depending on their readiness to use and appropriateness for the needs of patients [15]. Studies have proven local benefits without analyzing the differences between patients' and professionals' attitudes toward digital booking systems [16]. Our study demonstrates a growing interest and openness for technology in healthcare. The open-text responses illuminate the need for a more transparent, practical, and innovation-friendly regulatory framework.

In the future, digital health needs to be integrated into medical school curricula [17] to prepare future doctors for upcoming challenges, reduce hesitation, and enhance a favorable legal framework for using innovative technology in healthcare.

Legislative changes, for example at the level of the European Union, will help the respective healthcare systems to take the necessary steps for a transition from analog medicine to modern-day solutions [18]. *„Careful legal consideration has to be applied when considering privacy regulations (…), making every case an individual one”*. Such concerns place the patient as an individual at the center, not only legally but also humanly, and has the advantage of giving patients the feeling of being unique.

Further research will enable a deeper understanding of drivers and obstacles in digital health advancements. The underlying research deserves a follow-up in five years to understand and re-evaluate the described trend patterns on a timeline.

Limitations

Due to the nature of its origin and the involved researchers, our survey has reached mainly answers from German-speaking individuals (94.5% of the survey's participants). The survey distribution via digital means causes a bias towards respondents with an openness towards digital solutions. Persons unwilling or unable to complete an online questionnaire were not considered for technical reasons, causing a systematic bias.

271 professionals versus 731 patients is a logical outcome, as all people are patients in general, whereas a smaller percentage counts as medical professionals.

Outlook

As also suggested by the replies of the study groups, regulatory aspects must be modified to keep pace with current innovations, allowing for meaningful evaluation, regulation, and dysregulation of new technologies. This aspect is in line with the results of Torous et al., who highlighted this urgent need for a steady modification of regulations pertinent to the field of digitalization in healthcare [19].

Online data availability can lead to misinformation, which needs to be vigorously and continuously counteracted. *"To harness the full potential of digital media to support health and well-being as well as to mitigate or counteract the effects of mis- and disinformation, three fundamental skills should be continuously developed: digital literacy, health literacy, and digital health literacy"* [20].

In general, perceptions, fears, and resentments must be systematically eliminated to catalyze digital health acceptance and allow for further integration and innovative solutions to benefit patients and professionals. Bureaucratic burdens and technical obstacles must be overcome and transformed from technical barriers into enablers to accelerate acceptance and usage.

Recent developments such as the Data for Health conference (#DFH23) serve as catalysts for optimistic growth: *"With the momentum #DFH23 created, the European Health Data Space (EHDS) as a solid and safe foundation for consented collaborative health data use and the G7 Hiroshima AI process in place, we call on citizens and their governments to fully support digital transformation of medicine, research and innovation including AI"* [21].

Advancements in digital health literacy and enhanced technical reliability will drive openness and catalyze future developments in the patient's interest and, thus, in the interest of sustainable innovation-driven healthcare systems.

Conflict of interest: None

This study was approved by the Ethics Committee of Klinikum rechts der Isar, Technical University of Munich, before distribution. The approval number is 2023-146-S-NP.

Sources: all contained in the full-text body

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Attachment 1: Questionnaire

Use and Distribution of Digital Health Services: Innovative Digital Solutions in Healthcare - Usage and Acceptance among Professionals and Patients.

Questions are directed exclusively at professionals in the healthcare sector, questions are directed exclusively at patients.

1.) Are you a medical doctor?
(Yes/No): A=yes; B=no

2.) How often do you use digital medical software offerings (e.g., medical apps / Digas (digital health applications))?
(Likert scale): 1=never; 2=very rarely; 3=often; 4=regularly

3.) How often do you use electronic hardware for medical purposes (e.g., wearables)?
(Likert scale): 1=never; 2=very rarely; 3=often; 4=regularly

4.) Which of the following mobile devices do you use in your daily clinical routine, for example, during ward rounds / in patient contact?
(Multiple selections possible): A=private device; B=device provided by the clinic; C=both; D=I do not use mobile devices for medicine

5.) Do you have online access to the HIS (Hospital Information System) of your facility?
(Yes/No): A=yes; B=no

6.) Do you use an electronic appointment scheduling system for organizing patient appointments?
(Yes/No): A=yes; B=no

7.) Do patients or referring physicians - including those within the hospital - have the option to directly access this electronic calendar online?
(Yes/No): A=yes; B=no

8.) Do you use an online platform or cloud solution to store your personal health data?
(Yes/No): A=yes; B=no

9.) Do your patients use an online platform or a cloud solution to store their personal health data?
(Likert scale): 1=none; 2=only a few; 3=many; 4=most of them

10.) As a medical doctor, do you download or use clinical data of your patients from other medical facilities outside your organization?

(Likert scale): 1=never; 2=very rarely; 3=often; 4=regularly

11.) How do you assess the current significance of digital healthcare?
(Likert scale): 1=not important; 2=not that important; 3=important; 4=very important

12.) How do you assess the future significance of digital healthcare?
(Likert scale): 1=not important; 2=not that important; 3=important; 4=very important

13.) How do you assess the use of telemedicine in the last five years?
(Single choice): 1=Increased; 2=decreased; 3=remained the same

14.) How do you think the use of telemedicine will evolve in the next five years?
(Single choice): 1=Will increase; 2=will decrease; 3=will remain the same

15.) What is your personal attitude towards digital healthcare?
(Single choice): 1=Critical; 2=neutral; 3=open; 4=very willing to use

16.) Where do you see the greatest potential for innovation in the field of digital healthcare?
(Multiple selections possible): A=Papers and documentation; B=storage of patient data; C=analysis of patient data; D=treatment decisions; E=robotics

17.) Where do you see the most significant obstacles / hurdles for innovations in the field of digital health?
(Multiple selections possible): A=Economic; B=societal; C=psychological; D=technical; E=medical; F=legal/regulatory; G=ethical; H=other (free text)

Open text questions:

18.) In your opinion, what can digitalization achieve for patients?

19.) Which development potentials and opportunities do you see in the digitalization of healthcare?

20.) Where do you see the largest risks and disadvantages of the digitalization of healthcare?

21.) How and where do you believe personal health data should be stored?
(Multiple selections possible): A=electronic health card or electronic health record; B=medical facility (e.g., family doctor or hospital); C=insurance; D=private cloud storage; E=commercial provider

22.) Personal Information: Gender
(Single choice): A=female; B=male; C=non-binary

23.) Personal information: Educational level
(Single choice): A=Resident; B=specialist; C=consultant; D=chief consultant

Personal information: Educational level
(Multiple selections possible): A=Secondary school (German Hauptschule); B=secondary school with a more advanced curriculum (German Realschule); C=general university entrance qualification (German Gymnasium; equivalent to high school diploma); D=vocational school; E=university studies; F=doctorate (PhD)

24.) Personal information: Medical field
(Multiple selections possible): A=Anaesthesiology / emergency medicine; B=cardiology; C=dermatology; D=ear, nose, and throat; E=general medicine; F=general surgery; G=gynaecology; H=cardiac and thoracic surgery; I=internal medicine; J=microbiology / hygiene; K=nephrology; L=urology; M=oncology; N=orthopaedics / trauma surgery; O=pathology / histology; Q=psychiatry and psychotherapy; R=radiology; S=vascular surgery; T=neurology; U=neuro surgery; V=; no patient-related activity X=other (free text input)

25.) Personal information: Type of occupation
(Single choice): A=Clinic; B=private practice; C=researcher

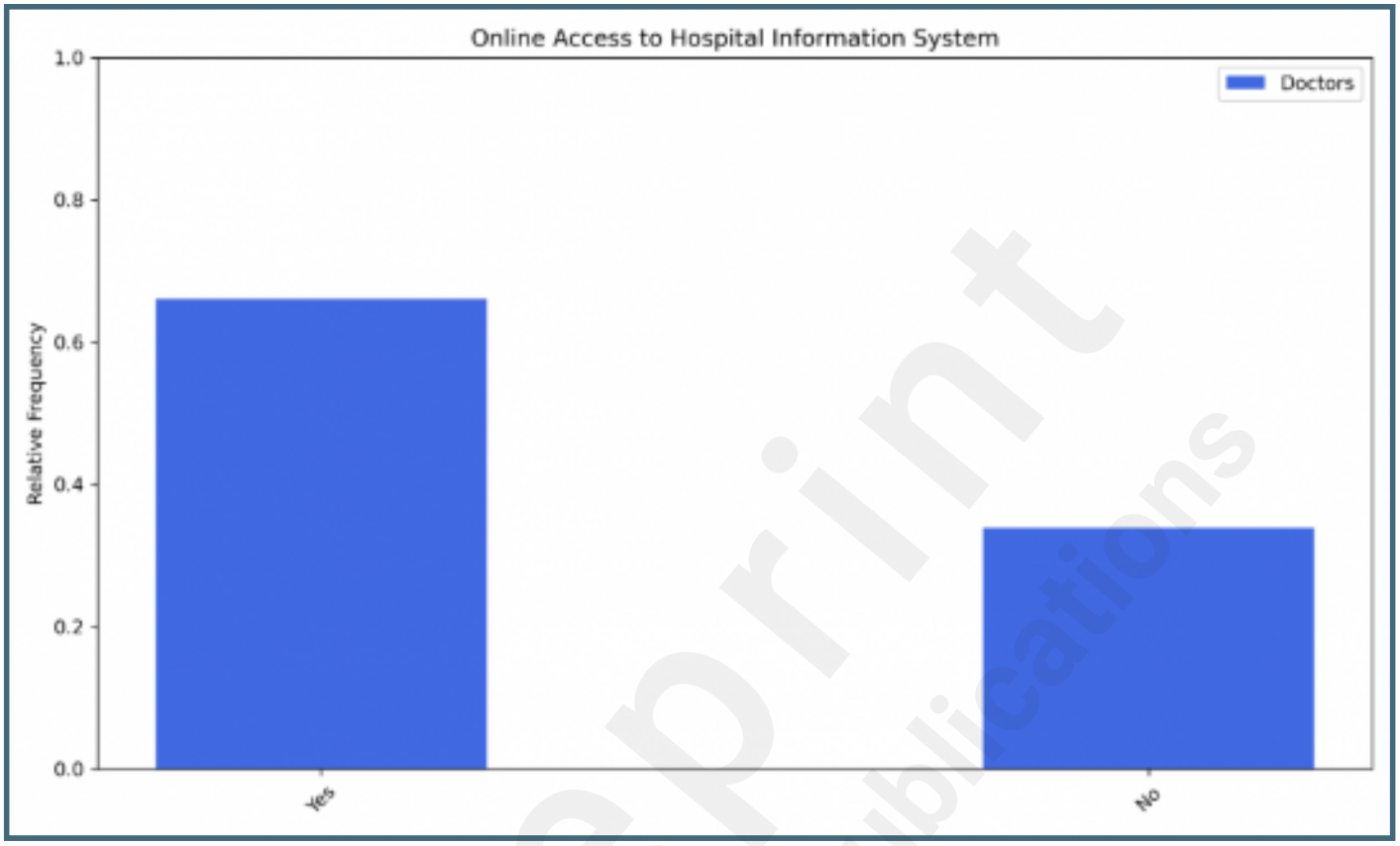
Personal information: Type of occupation
(Single choice): A=Unemployed/job seeker; B=employee/civil servant; C=self-employed; D=retired/pensioner

26.) Personal information: Age
(Single choice): A=18-25; B=26-35; C=36-45; D=46-60; E=older than 60

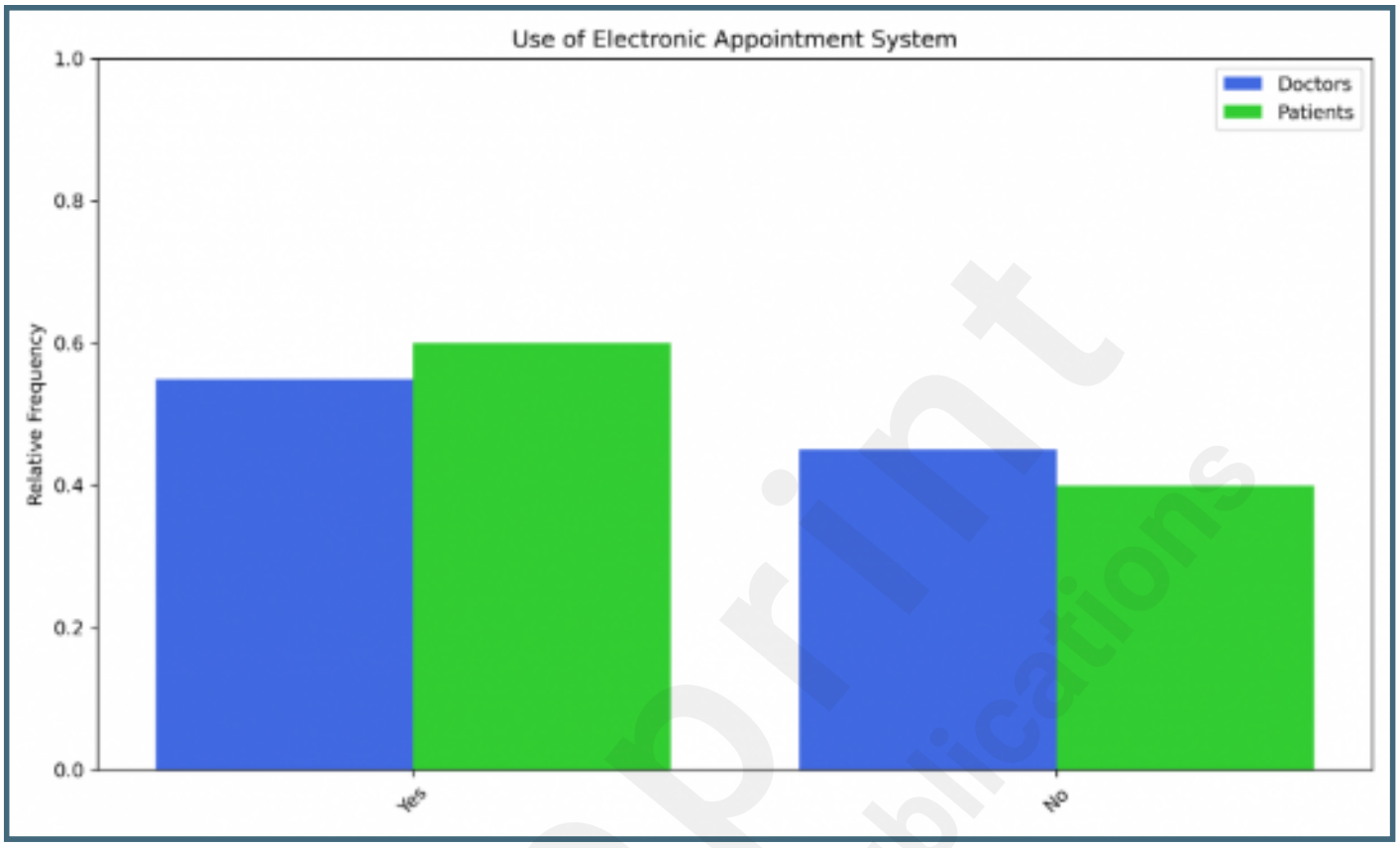
Supplementary Files

Figures

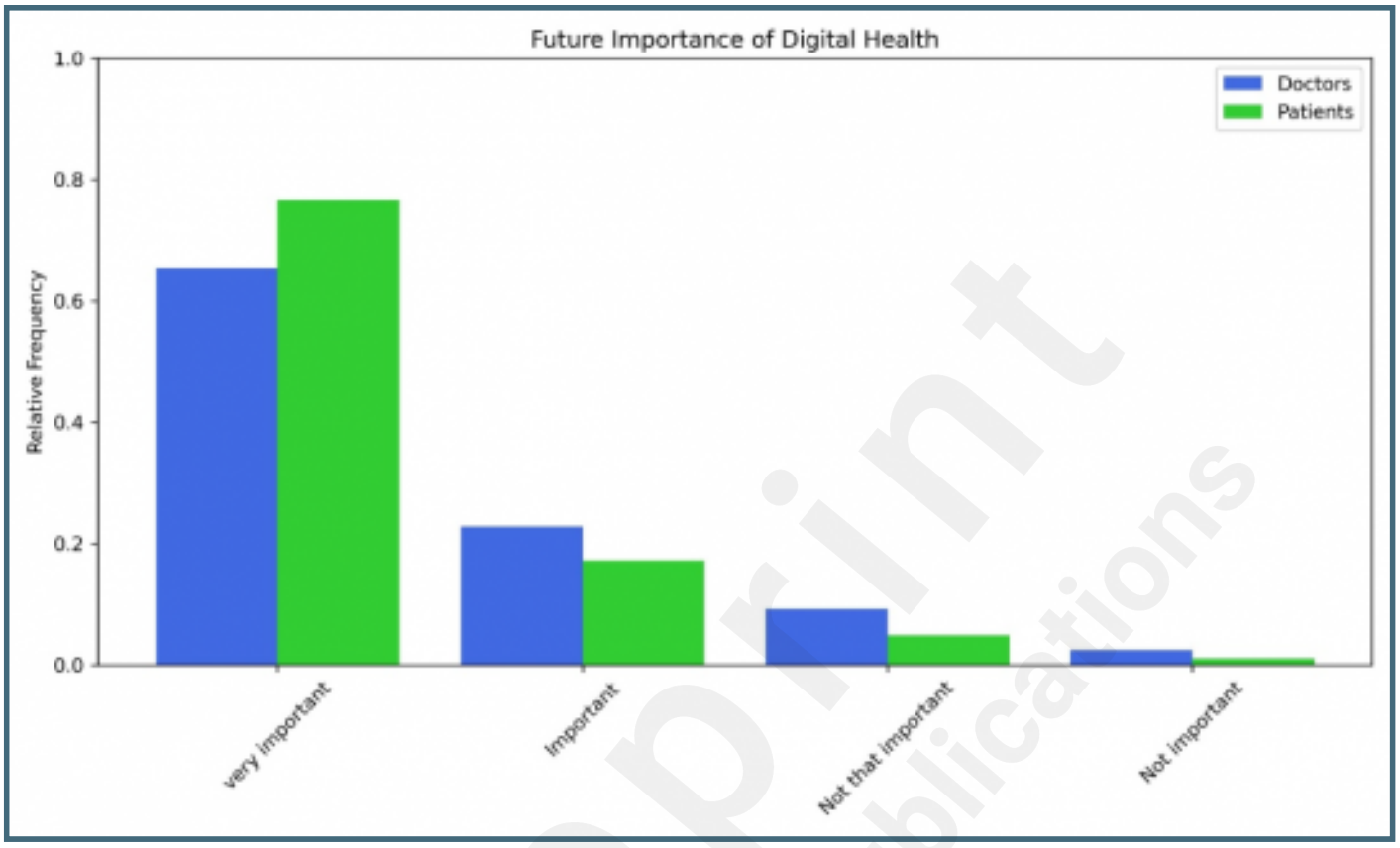
Access status of doctors to the Hospital Information System, showing that 66.1% of doctors have access ("Yes") while 33.9% do not ("No"). The figure exclusively focuses on doctor responses and excludes patient data.



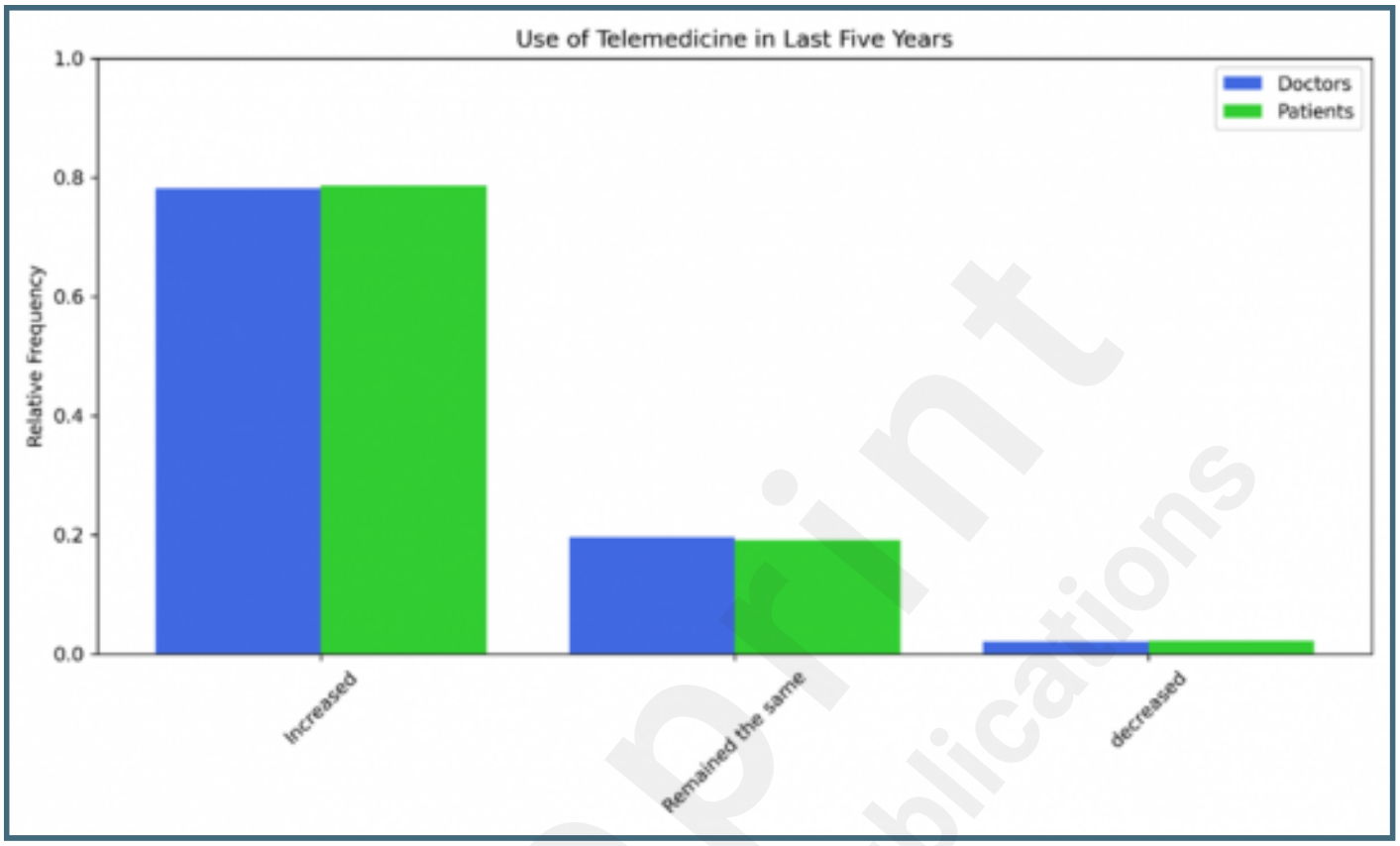
Proportion of healthcare professionals and patients using 'Electronic Appointment Systems'. (Chi-square test, p = 0.1594).



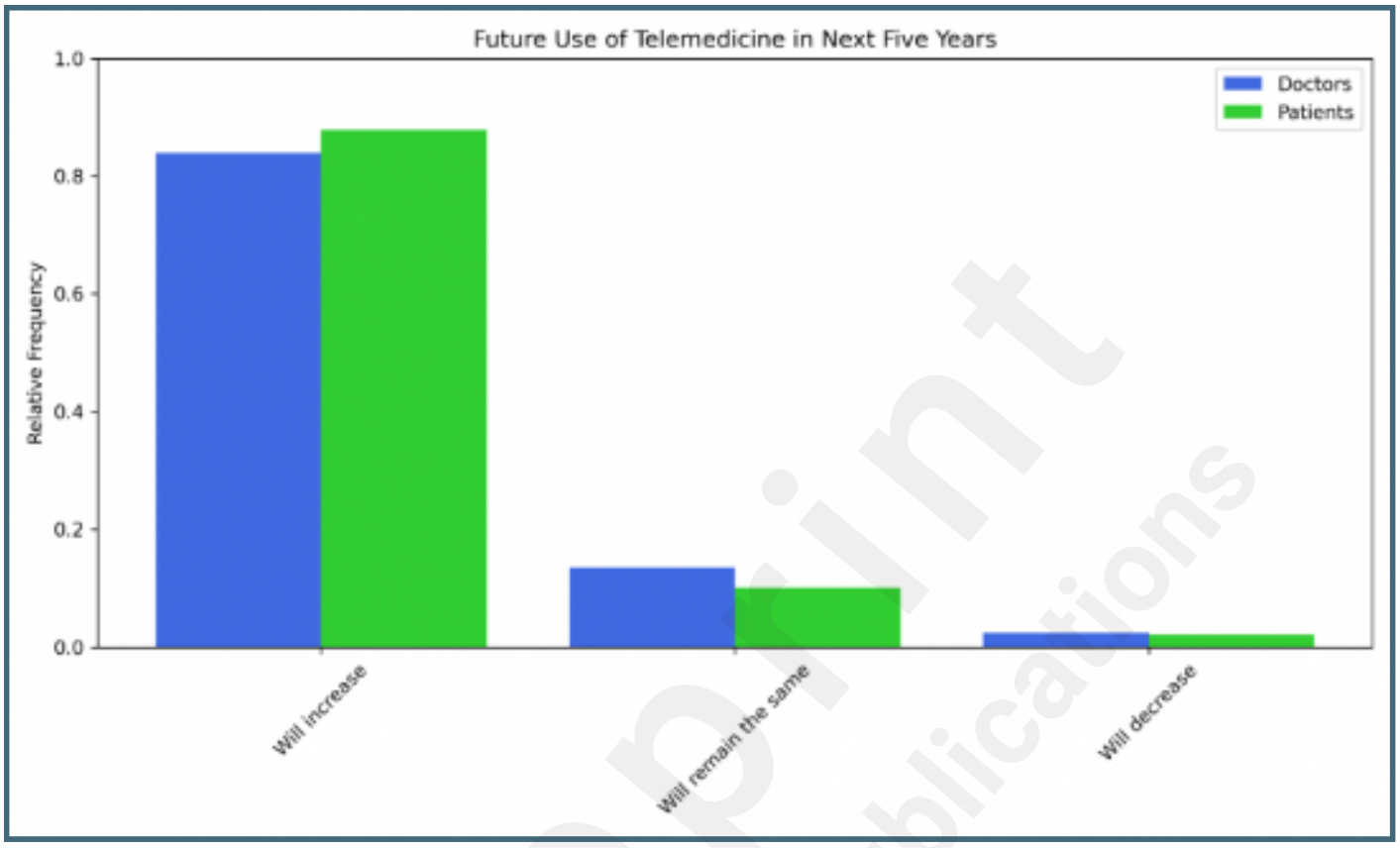
Comparison of the perceived 'Future Importance of Digital Health' between healthcare professionals and patients. (Mann-Whitney U test, p = 0.1330).



Visualization of responses to 'Use of Telemedicine in Last Five Years' between healthcare professionals and patients. (Mann-Whitney U test, p = 0.8591).



Expectations for the 'Future Use of Telemedicine in Next Five Years' among healthcare professionals and patients. (Mann-Whitney U test, p = 0.1028).



Demographic data (age) of the participants in both study groups. The graph depicts the relative frequency between the two groups.