

# How Patients Feel with Telemedicine Devices as an Enabling Factor for Personalised Medicine: A Preliminary Study

Fabiola BOCCUTO<sup>a</sup>, Patrizia VIZZA<sup>a</sup>, Salvatore DE ROSA<sup>a</sup>, Giuseppe TRADIGO<sup>b</sup>,  
Pierangelo VELTRI<sup>c</sup>, Daniele TORELLA<sup>d</sup>, and Pietro Hiram GUZZI<sup>a,1</sup>

<sup>a</sup>*Department of Surgical and Medical Sciences, University of Catanzaro*

<sup>b</sup>*University eCampus*

<sup>c</sup>*Department of Computer Science, Modeling and Electronics, University of Calabria*

<sup>d</sup>*Department of Experimental and Clinical Medicine, University of Catanzaro*

**Abstract.** Telemonitoring tools have become essential in today's healthcare, representing fundamental resources for chronic disease home management supporting early detection of clinical worsening with great reduction of hospitalization costs. Therefore the investigation of the patient compliance is a key enabling point. We aim to assess how patients with chronic coronary syndromes evaluate a telemonitoring device meant for ongoing health monitoring. Twenty-six patients used the device for a week and subsequently filled out a well-designed questionnaire. The survey questions were about the device's ease of use, satisfaction levels, perceived effectiveness, and its influence on the patients' healthcare experiences. This study emphasizes the significance of focusing on patient needs in telemedicine and the importance of addressing these concerns to improve telehealth interventions.

**Keywords.** Telemedicine, Wearable Device, Compliance

## 1. Background

Monitoring patients through telemonitoring is an essential part of the advancement towards personalised medicine [1]. It provides a constant and immediate flow of health data that the patients generate. This method enables the remote monitoring of vital signs and physiological parameters and makes it easier to gather information about their behaviour and lifestyle [2].

Integrating telemonitoring technologies creates a rich dataset that can be analysed to gain insights into individual health patterns, contributing to a more personalised approach to medical care. Studies such as that by Mistry et al. [3] emphasise the role of telemonitoring in tailoring interventions based on patient-specific data, ultimately improving outcomes and patient satisfaction. In essence, telemonitoring is a fundamental enabling step in realising personalised medicine, fostering a patient-centric and data-driven healthcare paradigm.

The widespread adoption of telemedicine tools in cardiology would necessitate a comprehensive evaluation and adjustment of various ecosystem factors to ensure

---

<sup>1</sup> Corresponding Author: Pietro Hiram Guzzi, hguzzi@unicz.it

effective implementation. It is of fundamental importance to encourage the development of some procedural aspects establishing protocols for virtual consultations, including patient screening, scheduling, and follow-up procedures, developing guidelines for remote monitoring of cardiac conditions, including data collection, transmission, and interpretation and implementing telemedicine-specific documentation. From an organizational point of view, training healthcare providers in telemedicine technology and communication skills will facilitate effective virtual consultations, redefining roles and responsibilities within cardiology departments to accommodate telemedicine practices and optimize workflow efficiency. It will also be essential to ensure the security and privacy of patient data transmitted during telemedicine encounters through robust encryption and data storage measures, address connectivity issues and device compatibility to minimize disruptions during virtual consultations and logistical barriers to telemedicine adoption, such as geographic disparities in internet access and socioeconomic inequalities in digital literacy.

In such a field, the cardiology unit of the University of Catanzaro, jointly with the Telemedicine unit and the Computer Science group, is conducting an initial investigation into telemonitoring patients by using wristband devices, monitoring patients' heart rate, level of saturation and movement habits [4]

Our goal was to analyse the data obtained from telemonitoring and assess the user preferences and experiences through comprehensive questionnaires delivered through a simple web interface. These questionnaires provide critical insights into the reception and efficacy of wristband devices within a medical context. Utilising wristband devices for telemonitoring represents a notable progress and potential customisation of healthcare management. Considering the lack of public transportation and the presence of many patients living in remote rural areas, these devices present an effective solution for overcoming geographical and resource constraints in accessing healthcare.

The study employed Sidly wristbands [5], which are equipped with various sensors to measure essential health indicators and can offer continuous health data through a web interface [6]. The system allows the doctor to set alarms and be aware in real time of anomalies in heart rate, saturation or loss of balance (as in the case of syncope).

Since the patients' satisfaction with wristbands is crucial, we defined a questionnaire to collect extensive feedback from patients using these wristband devices. These questionnaires are crafted to encompass a broad range of user experiences, including the ease of use, comfort, the perceived accuracy of health data, and general satisfaction with the device. This method facilitates a thorough understanding of patient interaction with the technology and their comfort and confidence in utilising it for health monitoring.

In addition, the questionnaires are created to obtain a deeper understanding of how the wristband devices are incorporated into patients' everyday lives. These questionnaires consist of inquiries that seek to comprehend the effects of these devices on daily schedules, their ability to shape patient actions and choices related to lifestyle, and their contribution to fostering a feeling of personal control in managing one's health.

The information gathered through these questionnaires also provides a distinct view of the patient-healthcare provider relationship in telemonitoring. It is instrumental in evaluating how wristband-generated data is employed in clinical decision-making and how these devices improve communication between patients and healthcare providers. Privacy and data security are paramount in the utilisation of wearable health tech-

nology. The questionnaires address patients' perceptions and concerns regarding data privacy, security measures, and confidence in the technology's capacity to safeguard sensitive health information.

In summary, using questionnaires in this study is essential for understanding patient perspectives regarding wristband telemonitoring devices. This approach not only collects quantitative data on user preferences but also provides qualitative insights into the patient experience, concerns, and the broader impact of these devices on healthcare delivery in the region. The results from these questionnaires are expected to shape future advancements in telemedicine, ensuring that patient-centred care remains a central focus in the ongoing evolution of healthcare technology.

## **2. Methods**

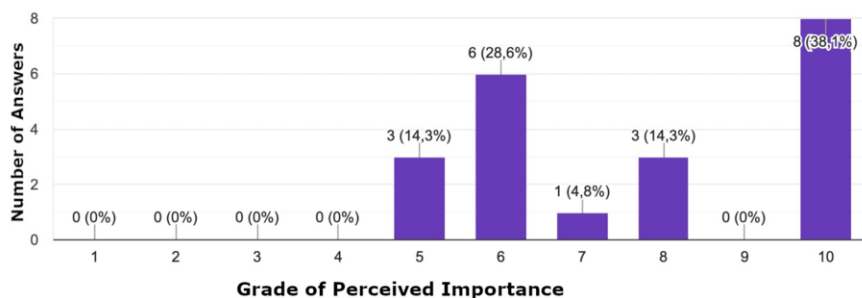
We made our selection from a database of approximately 800 patients with myocardial infarction at a young age (less than 50 years). We examined 66 patients as follow up and 26 of them completed the questionnaire (that will be submitted to all the patients ). After gathering informed consensus we conducted a thorough assessment of their medical history, physical examination, electrocardiogram, and evaluation of their hemodynamic compensation. At the end of the visit, we applied and instructed patients to wear the Sidly telemonitoring device for seven days, which allows remote monitoring of their health status via a web-based platform <https://sidly.eu/>.

After a week, each patient completed a detailed questionnaire that consisted of different sections. The introductory section examined the patient's age, gender, and education level. Age was classified into five specific ranges: 18 to 30 years, 31 to 40 years, 41 to 50 years, 51 to 60 years, and over 60 years. Education level was categorized as primary school diploma, middle school diploma, high school diploma, degree, and post-degree qualifications such as doctorate, master's degree, and specialization.

The second section evaluated the patient's knowledge of informatics using a self-assessment scale from poor to excellent skills. The questionnaire assessed the patient's ability to send and receive emails, make purchases, read newspapers, use banking apps, games and/or gaming, using social media and apps on the web.

The third section investigated on a scale from one to ten how important the patient considered the use of the telemonitoring system. The questionnaire asked the patient whether they preferred a smartwatch-based monitoring system or a system not associated with each phone device. It also inquired whether the patient preferred a system with manual or fully automatic updating, a system connected exclusively to their phone or to a remote team of healthcare professionals. The questionnaire assessed how many patients desired a telemonitoring device reimbursed by healthcare systems and how important patients considered on a scale of one to ten the access to their parameters (for example, trends in frequency, saturation, and steps). Finally, it was assessed whether the device feedback had improved the patient's health state and whether they would prefer automatic feedback (e.g. based on artificial intelligence) or feedback generated by medical personnel.

## Importance of Telemonitoring for Healthcare



**Figure 1.** Figure reports the perceived importance of telemonitoring for improving healthcare. The x-axis report the perceived importance on a 0-10 scale, while for each level we report the number of answers. Only a single answer was admitted.

### 3. Results

The questionnaire provided valuable information to better understand the patient's perspective on the telemedicine devices use. Most patients are aged between 41 and 50 years (61,5 percent), are male (80.8 percent) and with a middle school diploma (57,7 percent) Only 30 percent of patients reported excellent ability to send and receive emails. A good ability to read newspapers on the Internet has emerged (38,5 per cent), and a poor ability to use Internet/APP Banking Systems (38,5 per cent)-We highlighted a good ability to use games and/or recreational apps (34,6 per cent), television apps (e.g. streaming channels) (42,3 per cent), video calling and video conferencing systems (26,9 per cent), social networks (e.g. Facebook, Instagram, e.g. Whatsapp, Telegram) (26,9 per cent) and of Messaging Systems (e.g. Whatsapp, Telegram) (30,8 per cent).

46,2 percent of patient thought telemonitoring is fundamental for improving both healthcare system and health status of patients as reported in Figure 1, preferring a smartwatch-based monitoring system (69,2 percent) with automatic updat (92,3 percent). Patient preferred a device system connected to remote team of healthcare professionals (69,2 percent) and desired a telemonitoring device reimbursed by healthcare systems (92,3 percent). Most patients believed it is important to a continuous vital parameters monitoring (65,4 percent) and to have a device feedback on health state (53,8 percent) preferably with a feedback generated by medical personnel rather than from artificial intelligence system (88,5 percent).

### 4. Discussion

Our study revealed that there is a wide range of digital literacy among participants, with only 30% reporting excellent ability to use email and make online purchases. This indicates the need for telemonitoring systems to be easy to use and accessible to people with varying levels of technological proficiency.

Patients' desire for devices that are reimbursed by healthcare systems reflects the im-

portance of affordability and accessibility in adopting telemonitoring technologies. This points to a broader issue within the healthcare system, where innovative technologies require supportive policies and funding mechanisms to reduce barriers to access.

A significant finding from our study is the high value placed on continuous monitoring and feedback from medical personnel. This suggests that patients are interested in being actively engaged in their health management, supported by a professional healthcare framework. The preference for feedback generated by medical personnel over artificial intelligence solutions indicates a trust in human-based clinical judgment and a desire for a more personalized healthcare experience.

The results suggest that telemonitoring can play a critical role in improving patient outcomes and satisfaction. However, the success of these technologies depends on addressing concerns related to data privacy and security. Thus, there is a need for robust safeguards and transparent communication about how personal health information is protected. The main limitation of this study is the small sample of patients who completed the questionnaire. At the moment the obtained data are not solid enough to have statistically relevant information. Our goal is to extend the questionnaire to all patients who have already used our monitoring system and to those who will use it in the future.

## 5. Conclusion

This study highlights the potential of telemonitoring technologies to advance personalized medicine, particularly through the use of Sidly wristband devices for patient monitoring. Our investigation found that the majority of participants, who were mostly men aged between 41 and 50 years with a middle school education level, displayed varying degrees of proficiency in using digital technologies. This emphasizes the importance of user-friendly telemonitoring solutions.

## References

- [1] N. Hjelm, Benefits and drawbacks of telemedicine, *Introduction to Telemedicine, second edition* (2017), 134–149.
- [2] Á. Garai, I. Péntek and A. Adamkó, Revolutionizing healthcare with IoT and cognitive, cloud-based telemedicine, *Acta Polytech. Hung* 16(2) (2019).
- [3] H. Mistry, Systematic review of studies of the cost-effectiveness of telemedicine and telecare. Changes in the economic evidence over twenty years, *Journal of telemedicine and telecare* 18(1) (2012), 1–6.
- [4] J. Silva-Cardoso, J.R.G. Juanatey, J. Comin-Colet, J.M. Sousa, A. Cavalheiro and E. Moreira, The future of telemedicine in the management of heart failure patients, *Cardiac failure review* 7 (2021).
- [5] Sidly Website. <https://sidly.eu/en/#aktualnosci>.
- [6] A. Gallo, S. Fregola, M. Menon, F. Talarico, S. Fragkiadaki, D. Kontaxopoulou, K. Vukojevic, D. Matijaca, M. Miljkovic, S. Kožetinac et al., Using Smart Devices for Monitoring Elderly Patients in Rural Areas of Calabria after COVID-19 Vaccination: Experiences within the SI4CARE Project, *COVID* 3(2) (2023), 124–130.