Bachelor thesis

PERCEPTIONS OF THE ANTICIPATED ADOPTION OF A WEARABLE TROPONIN-MONITORING DEVICE AMONG HEALTHCARE EXPERTS AND AT-RISK INDIVIDUALS

A qualitative study on the anticipated adoption of a wearable troponin-monitoring device: Design preferences, functional requirements, personal motivations, and differences between healthcare professionals and at-risk individuals

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Abstract

As wearable health technologies advance, the possibility of continuously monitoring cardiac biomarkers like troponin becomes a growing possibility. This qualitative study explores the anticipated adoption of a wearable troponin-monitoring device by two potential user groups: at-risk individuals and healthcare professionals. Fifteen semi-structured interviews were conducted, including ten at-risk individuals and five healthcare professionals.

The findings were analysed through the lens of the four theoretical models: the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), the Health Belief Model (HBM), and the Uses and Gratifications Theory (UGT). These models explore how both groups assess the requirements and expectations towards the device, and their motivations.

The results show that participants value comfort, aesthetics, and minimal disruption to daily life, particularly among at-risk individuals. Regulatory approvals, clinical validation, and endorsement by healthcare professionals are also important factors for the adoption. While patients valued peace of mind and preventive monitoring, professionals raised concerns about overdiagnosis and system burden. Both groups emphasised the need for clear protocols, data sharing, and reimbursement structures to support real-world implementation. Cultural context also shaped expectations, with noticeable contrasts between participants from Western and Eastern Europe.

This study shows that the adoption of a troponin wearable device depends not only on technical features, but its fit within users' routines, healthcare infrastructure, and cultural norms.

The results suggest that existing technology adoption models alone are insufficient to explain user behaviour in medical contexts, it is important to combine models from both technology and health behaviour domains. This study shows that successful adoption of wearable troponin-monitoring technology depends not only on its technical capabilities, but also on its fit within users' daily lives and existing healthcare systems. The insights from this study offer practical recommendations for developers and contribute to the broader understanding of how emerging health technologies can be designed with user acceptance in mind.

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1. Introduction

Nowadays, cardiovascular diseases are among the leading causes of death worldwide. Approximately 18.6 million people die from cardiovascular diseases (CVD) annually worldwide. This includes deaths from ischaemic heart disease, stroke, and other heart-related conditions. Additionally, about 34.4 million people live with disability due to CVD each year. Both mortality and disability rates associated with CVD continue to rise each year (Roth et al., 2020).

Myocardial infarction (MI) is a crucial component of CVD due to its impact on mortality and morbidity. MI is a leading cause of death globally, with substantial short- and long-term consequences. People who experience it are at high risk of facing recurrent major adverse cardiac events, including recurrent MI, heart failure, stroke, and death (Jneid et al., 2017).

Current diagnostics of heart attacks include measuring troponin levels. Troponin is a protein complex found in cardiac muscle cells. Troponin is released into the bloodstream as a result of myocardial damage (Twerenbold et al., 2017). Measuring troponin levels supports MI prevention by allowing for early diagnosis and timely intervention. Elevated troponin levels signal the need for immediate medical attention. Currently, healthcare professionals mostly measure troponin levels through blood samples. Although this test method is considered to have several limitations, one major issue is that venepuncture can be uncomfortable for patients and costly for hospitals, especially given the need for serial measurements.

One of the possible solutions modern healthcare professionals are working on is a wrist-worn transdermal troponin sensor. It can detect troponin levels through the skin, without needing a traditional blood sample. A wrist-worn troponin sensor could potentially allow for real-time,

continuous monitoring of cardiac health (Lim, 2023). Constant monitoring could allow patients to avoid unnecessary hospital trips and invasive tests (Remote Monitoring of Heart Attack Patients Significantly Reduced Hospital Readmissions, 2024). That both makes the experience more comfortable for a patient and potentially less expensive for a hospital (Vaidya, 2025). Additionally, it would facilitate the fast, early detection of heart attacks, which would help with timely treatment and better long-term outcomes (Sengupta et al., 2023).

Wrist-worn health technology refers to wearable devices, such as smartwatches and fitness trackers, that are designed to monitor various physiological parameters and health metrics. These devices are equipped with sensors capable of non-invasive and continuous monitoring of health parameters (Babu et al., 2023).

Despite technological advancements in biosensing, there is still limited understanding of how potential users perceive wearable devices for monitoring cardiac troponin levels. This type of wearable technology is still in the developmental phase and has yet to reach the level of widespread clinical adoption seen with other wrist-worn health technologies, such as heart rate monitors and ECG sensors (Campu et al., 2022).

Therefore, the clinical potential of such a device must be matched by actual user acceptance. This research explores how two user groups: at-risk individuals and healthcare professionals anticipate using and integrating this technology into their daily lives or clinical workflows. At-risk individuals are those with cardiovascular risk factors (e.g. hypertension, high cholesterol, family history), while healthcare professionals include cardiologists, e-health specialists, and clinicians involved in wearable health technologies.

Since the device is still hypothetical, this study focuses on the anticipated adoption: the expectations, motivations, and concerns that shape users' willingness to adopt the technology once it becomes available.

This study therefore aims to explore the following research question:
How do potential users perceive the anticipated adoption of a wearable troponin-monitoring device?

To answer this question, the following sub-questions were created:

1. What are the functional and design-related requirements users express?
2. What personal motivations and expectations influence users' interest in the device?
3. How do the functional and design-related requirements, motivations, and expectations align or differ between healthcare professionals and at-risk individuals?

This study contributes to the growing field of health technology adoption by combining insights from both behavioural health theories (e.g. the Health Belief Model) and technology-focused frameworks (e.g. TAM, UTAUT). Each of the theories explains specific domains of the adoption, while the combination of them explains how users evaluate and accept a wearable health tool in healthcare environments. This aligns with broader academic efforts in communication science to explore how perceptions, expectations, and information-sharing shape the success of health innovations.

From a practical perspective, the findings offer concrete recommendations for developers, designers, and policymakers working on wearable health devices. From an academic angle, the

study deepens the understanding of user-centred design that influences the adoption of emerging technologies in preventive care.

2. Theoretical Framework

2.1. Defining Technology Adoption

The idea of adoption is central in this research; therefore, it is essential to define what adoption means. For this paper, the definition of Rogers (2003) will be used:
Adoption is viewed as a longitudinal process leading to a decision for technology use.
Therefore, adoption is considered the point at which an individual decides to start using a technology. However, this decision is not made instantly. It develops over time as users become more familiar with the technology. They go through the knowledge stage, where they search for information about it; the persuasion stage, where they evaluate it and assess its relevance to their needs; and the decision stage, where they choose whether or not to integrate it into their lives (Rogers, 2003).

Although the terms “adoption” and “acceptance” are often used interchangeably in the literature, this study considers adoption as a broader, multi-stage process that includes acceptance as an important early step. Acceptance refers to the user’s initial attitude and intention towards using a technology, while adoption refers to the actual decision and integration into practice or daily life.

2.2 Factors Influencing Adoption

In the context of health technologies such as wearable troponin-monitoring devices, the adoption process is often influenced by multiple elements such as personal, social, and contextual factors. A user may be motivated by the desire to prevent future heart problems, trust a healthcare provider’s recommendation, or feel encouraged by seeing others benefit from similar tools. These influences are relevant not only for patients, but also for healthcare

professionals, who make decisions about whether and how to recommend, implement, or integrate new technologies into their clinical workflows.

Therefore, to understand the adoption of technology, it is essential to identify and analyse these influences. This chapter will do that by being based on four theoretical perspectives: the Technology Acceptance Model (Davis, 1989), which focuses on perceived usefulness and ease of use; the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), which adds social and contextual dimensions; the Health Belief Model (Alyafei & Easton-Carr, 2024), which emphasises individual perceptions of risk and health behaviour; and the Uses and Gratifications Theory (Katz et al., 1973), which highlights personal motivations and expectations. Together, these models allow for a broader understanding of how both patients and professionals anticipate adopting a wearable troponin-monitoring device.

2.2.1 Usefulness and Ease of Use of the device

For people to adopt a technology, they need to perceive it as both useful and easy to use. This idea is central to the Technology Acceptance Model (TAM), developed by Davis (1989), which identifies two key factors influencing acceptance: perceived usefulness (PU) and perceived ease of use (PEOU).

Perceived usefulness refers to the extent to which a user believes that using the technology will improve their life. In the case of a wearable troponin-monitoring device, people at-risk might perceive it as useful for effective tracking of heart health and identifying early warnings of potential problems. While healthcare professionals might view it as a tool to improve diagnostics, monitor patients remotely, or reduce hospital visits.

Perceived ease of use refers to how simple the device is to operate and integrate into routines. For at-risk individuals, this could mean wearing the device without discomfort or needing technical knowledge. For professionals, it could mean that the device is compatible with existing systems or doesn't require extensive training. In both cases, PU and PEOU influence the willingness to adopt the device. In addition, TAM is applied in the context of medical devices. The study by Kim and Park (2012) shows that PU and PEOU significantly affect the consumers' behavioural intention towards health information technology.

2.2.2 Contextual and Social Influences

In addition to usefulness and ease of use, contextual and social factors also matter. This is explained in the Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003). UTAUT builds on TAM by expanding its scope with four constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions.

Performance expectancy refers to the degree to which users believe the technology will improve personal health or clinical efficiency. For at-risk individuals, this may involve the belief that the device helps detect early warning signs and prevents emergencies. For healthcare professionals, performance expectancy may relate to improved clinical decision-making, better patient monitoring, or reduced unnecessary admissions.

Effort expectancy addresses the perceived difficulty of using the device. Patients may assess whether the device fits seamlessly into daily routines, while professionals may consider ease of integration into existing workflows or electronic health systems.

Social influence captures how the opinions of others shape decisions to adopt the technology. Patients might be influenced by recommendations from doctors, friends, or family. Professionals may be guided by clinical guidelines, peers, or institutional leadership.

Facilitating conditions refer to the resources, support, and infrastructure that ease adoption. For patients, this might include app support, simple instructions, or reimbursement policies. For professionals, it includes things like compatibility with hospital IT systems, technical support, and clear clinical protocols.

UTAUT also considers other factors that influence adoption such as age, gender, previous experience, and voluntariness of use. Therefore, this theory provides a holistic view of technology adoption, which is essential for understanding how wearable health technologies might be adopted in real-world medical settings.

The research by Wu and Lim (2024) confirms the integration of UTAUT2 in the field of healthcare, and explains the acceptance of smart wearable health devices using it.

2.2.3 Health Beliefs

When studying the adoption of healthcare devices, it is also important to consider people's knowledge and beliefs about the disease and their relationship to it. The Health Belief Model (HBM), as presented in Alyafei & Easton-Carr (2024), explains how individuals' beliefs about health risks and benefits affect their health behaviours and decisions.
Key components of the model include perceived susceptibility (the belief that one may experience a health issue), perceived severity (the seriousness of that issue), perceived benefits

(expected effectiveness of the intervention), perceived barriers (obstacles to use), cues to action (triggers for behaviour), and self-efficacy (confidence in one's ability to use the device).

For at-risk individuals, these beliefs influence whether they perceive the device as necessary, trustworthy, or worth incorporating into daily life. For example, individuals who believe they are at high risk of heart attacks (perceived susceptibility) and who view cardiac events as severe (perceived severity) may be more open to adopting a device that promises early detection. At the same time, if they believe the device will effectively reduce that risk (perceived benefits), and that it will not disrupt their life or cause unnecessary worry (perceived barriers), they are more likely to adopt it. Cues to action, such as a doctor's recommendation or a family member's experience, also affect the adoption process.

For healthcare professionals, they may see benefits (perceived benefits) in early detection, such as faster treatment or fewer hospital visits. But they also think about possible downsides, like too many alerts, false alarms, or not having clear steps on what to do with the data (perceived barriers). Instead of worrying about their own health, professionals may feel responsible for spotting heart problems in time. Factors that might influence them to adopt the device (cues to action) include official guidelines, support from their hospital, or seeing other professionals use it.

Additionally, integrating HBM with other adoption frameworks has been shown to improve the prediction of health technology adoption (van der Waal et al., 2022).

2.2.4 Motivations and Expectations

Finally, it's important to look at the motivations and expectations users have regarding the device. The Uses and Gratifications Theory (UGT) suggests that users seek out technologies to fulfil specific needs (Katz et al., 1973).

In the context of wearable troponin monitoring, patients may be motivated by the desire for continuous health monitoring, the prevention of heart-related risks, and more personalised health management. Meanwhile, healthcare professionals could be motivated by other goals, such as improving care quality, increasing efficiency, or meeting institutional targets.

According to Stănescu and Romașcanu (2024), the Uses and Gratifications Theory (UGT) explains how people may adopt wearable devices to satisfy specific personal needs or motivations, even when other adoption factors, such as ease of use, are not fully met.

Taken together, these models TAM, UTAUT, HBM, and UGT provide a way to look at how people might adopt wearable medical devices. Each theory brings in something different: TAM and UTAUT focus more on how people perceive the technology itself (whether it is useful or easy to use), while HBM and UGT add elements such as personal health beliefs or individual motivations. Since these theories have already been applied in studies involving digital health tools and wearable technologies (e.g., Gao et al., 2015; Alalwan et al., 2021; Orji et al., 2012; Stănescu & Romașcanu, 2024), they seem an appropriate foundation for exploring how both healthcare professionals and at-risk individuals might respond to a wearable troponin-monitoring device.

3. Methodology

To answer the research question, the qualitative research method was applied. An interpretive research design was chosen, as the goal was to understand the meanings, motivations, and perceptions of technology adoption. To answer the "why" and "how" behind the adoption process, the semi-structured interview method was chosen. This method helped to follow the structure of open-ended questions while allowing the exploration of emerging topics and a deeper understanding of participants' views (Silverman, 2017). In total, 15 interviews were held, with an average length of 30 minutes.

3.1 Participants

For this study, 15 participants were recruited using purposive sampling, as participants had to meet certain criteria. The interviews were conducted in English (n=6), Ukrainian (n=6), and Russian (n=3), depending on the participant's language preference. All non-English interviews were transcribed and then translated into English by the researcher using human translation. No automated translation software was used. The translations were reviewed for accuracy and consistency to ensure the participants' original meanings were preserved.

Two types of participants were asked to participate:

Group I: People at-risk of myocardial infarction (MI). This included individuals with one or more cardiovascular risk factors such as hypertension (Wereski et al., 2021), hyperlipidaemia (Anand et al., 2008), diabetes mellitus (Wereski et al., 2021), those who smoke (Yandrapalli et al., 2019), are obese (Yandrapalli et al., 2019), physically inactive (Anand et al., 2008), have a poor diet (Anand et al., 2008), or consume alcohol (Anand et al., 2008). Additional risk factors included age (with risk increasing over time) (Anand et al., 2008), sex (men being at higher risk

at a younger age) (Anand et al., 2008), a family history of heart disease (Rallidis et al., 2022), and psychosocial stress (Anand et al., 2008).

Group II consisted of healthcare professionals who were connected to cardio health and/or wearable technologies, such as cardiologists, e-health professionals, or medical researchers.

Information about the participants is presented in Table 1.

Table 1

Characteristics participants

Participant ID	Key Characteristics	Cultural Region
HP01	Healthcare professional, assistant professor, focus on health technology assessment	Western Europe
HP02	Healthcare professional, assistant professor, focus on Cardio-Thoracic Surgery	Western Europe
HP03	Cardiologist	Southeast Asia
HP04	Healthcare professional, focus on biomedical signals and systems	Western Europe
HP05	Healthcare professional, focus on medicine and modern healthcare technology	Western Europe
A-RI01	Family history of heart disease, hypertension, high cholesterol	Eastern Europe
A-RI02	Hypertension, high cholesterol	Eastern Europe
A-RI03	Family history of heart disease	Western Europe
A-RI04	Hypertension	Eastern Europe
A-RI05	Smoker, drinker, hypertension, past experience with cardiovascular disease, overweight	Eastern Europe
A-RI06	Ischemia, arrhythmia, hypertension, past experience with cardiovascular disease	Eastern Europe
A-RI07	Hypertension, high cholesterol	Eastern Europe

Participant ID	Key Characteristics	Cultural Region
A-RI08	Hypertension, high cholesterol	Eastern Europe
A-RI09	Hypertension	Eastern Europe
A-RI10	Family history of heart disease, hypertension, high cholesterol	Eastern Europe

Note. HP = Healthcare Professional; A-RI = At-Risk Individual.

These groups were chosen because they represented two sides of the adoption process: those who might wear the device in their daily lives, and those who would be involved in deciding whether to use it in medical decision-making. Participants were purposively selected based on these criteria, but recruited through a combination of convenience and snowball methods. The researcher used their personal network, including family members, colleagues, and teacher friends who fit the criteria. These participants also referred others who met the requirements.

3.2 Pre-testing study

The pre-test is a procedure for testing the questions with test participants, with the goal of assessing the validity and reliability of the questions, identifying uncertainties, and implementing improvements in the interview protocol (Bhalla et al., 2023). The pre-test was conducted with two people from both groups. It aimed to test the clarity of the questions, assess the length of the interview, and gather feedback and suggestions for improvement from the participants.

Following the pre-test, several adjustments were made to the interview protocol. The primary feedback indicated the need to include additional questions to obtain more in-depth information from participants. During the pre-test, the initial set of questions was answered

relatively quickly, suggesting limited engagement or depth. To promote more comprehensive responses and explore key themes in greater detail, supplementary questions were added focusing on design, functionality, and motivations. For participants in Group I, additional questions were included specifically on the design of the technology, data processing, and the sharing of health data with healthcare professionals. In contrast, participants in Group II were asked broader questions concerning wearable health devices in general. Given that the troponin-monitoring device is not yet in use, it was important to explore existing health monitoring technologies and understand their application from a healthcare perspective.

Questions for the pre-test are shown in Table 2 and Table 3.

Table 2

Interview Topics and Example Questions Based on the Theoretical Framework

Topic	Theoretical Constructs	Example Question
Usefulness and Ease of Use of the Device	Perceived Usefulness, Perceived Ease of Use (TAM); Satisfaction of Needs (UGT); Facilitating Conditions (UTAUT)	What would make it difficult or annoying for you to use this device? If you could design this wristband yourself, what would it need to look like or do to fit into your life?
Contextual and Social Influences	Social Influence, Facilitating Conditions (UTAUT); Performance Expectancy (UTAUT), Perceived Benefits (HBM)	Who would influence your decision to start using something like this? (Doctor? Family? Yourself?) If this device gave you a warning or alert, would you trust it and act on it? What would make you trust it?
Health Beliefs and Risk Perception	Perceived Susceptibility, Perceived Severity (HBM); Cues to Action (HBM)	Would you personally feel at risk of heart problems, or not so much? Why? If this device gave you a warning or alert, would you trust it and act on it?

Topic	Theoretical Constructs	Example Question
Motivations and Personal Expectations	Motivations, Gratifications (UGT)	How do you feel about the idea of wearing a wristband that tracks heart health continuously?

Table 3
Clinician Interview Topics and Example Questions Based on Theoretical Framework

Topic	Theoretical Constructs	Example Question
Challenges with Current Clinical Practice	Perceived Barriers, Effort Expectancy, Perceived Ease of Use (HBM, UTAUT, TAM)	What are the main challenges you see with current methods of troponin assessment?
Initial Reactions and Motivations	Cues to Action, Motivation, Performance Expectancy (HBM, UGT, UTAUT)	What is your initial reaction to the idea of a wrist-worn, continuous troponin monitor?
Concerns About New Technology	Perceived Barriers, Trust, Perceived Severity (HBM, TAM, UTAUT)	What concerns would you have about relying on such a device for patient monitoring?
Requirements for Clinical Adoption	Facilitating Conditions, Performance Expectancy, Perceived Usefulness (UTAUT, TAM)	What technical or clinical requirements would you expect for such a device to be accepted in practice?
Professional Input and Design Recommendations	Cues to Action, Satisfaction of Needs, Trust (HBM, UGT, TAM)	If you were advising the development team, what is one key feature or safeguard you would insist on?

3.3 The interview protocol

The finalised interview protocol, refined based on feedback from the pre-test, was structured around key themes from the theoretical framework. The interview was conducted in a semi-structured way, using open-ended questions. The two sets of questions were designed based on the theoretical framework for both groups of participants. Therefore, the updated interview protocol is included in Appendix A.

3.4 Procedure

Before the start of all the interviews, the study received ethical approval from the University of Twente BMS Ethics Committee (approval number 250884, dated 17-04-2025). Thereafter, the process of interviewing began.

The interviews were conducted through the online platform Microsoft Teams and via video calls on WhatsApp. Before the interview, participants were asked to sign the informed consent form (see Appendix B). In the introduction, participants were briefed about the study purpose, interview procedure, and participants' rights.

Afterwards, participants from Group I were given a basic explanation of troponin, heart attacks, and wearable devices to help them answer the questions. They were then asked probing questions. These were designed to test whether a participant was open to discussing the given topic, as it could be sensitive for some individuals. These questions helped evaluate whether individuals might feel emotionally uncomfortable or reluctant to engage with certain themes. The probing questions can be found in Table 4.

Table 4

Probing Questions

Questions
Do you tend to avoid using apps or devices that monitor your health?
Do you normally see a doctor right away when something does not feel right?
Do you often feel the need to know exactly what is going on in your body?
Have you ever chosen not to get tested for something because you didn't want to know the result?
Would you like to track as many aspects of your health as possible?
Would you rather not know about a possible health issue unless it becomes serious?

If a person answered “yes” to more than three of these questions, it could have indicated that the person was sensitive to the topic, and the interview would have to be stopped. However, none of the participants showed signs of high emotional sensitivity or discomfort when answering these questions. Therefore, all interviews proceeded as planned, and no interviews had to be discontinued. In fact, the probing questions often helped ease participants into the conversation and opened up space for deeper insights. After the probing questions, general interview questions were asked for both groups of participants.

At the end of each interview, participants were given the opportunity to add any final thoughts or reflections that had not been covered. The researcher also asked if they had any remaining questions about the study or the topic. Participants were thanked for their time and contribution, and reminded that they could contact the researcher later if they wished to withdraw their data or had additional questions. The recordings were then saved for transcription and later deleted in accordance with ethical guidelines.

3.5 Data analysis

After the interviews were completed, the data analysis started. First, the collected data were transcribed and translated into English. Any information that could reveal the identity of participants was removed. Then, the interviews were analysed using ATLAS.ti software.

The analysis followed an inductive thematic coding approach, meaning that no predefined codes were applied. Instead, all codes emerged from the interview data during the process of open coding. This method was chosen to allow the data to “speak for itself”. Therefore, patterns and themes could arise naturally from participants' responses. Such an

approach was well suited for qualitative research focused on understanding meaning and subjective experience (Boeije, 2010).

Each transcript was read line by line, and meaningful segments of text were labelled with short, descriptive codes based on what participants said. As the coding progressed, similar codes were grouped, and some were refined through merging or splitting to better reflect the content (Vears & Gillam, 2022).

Although coding was done by one main researcher, two interviews were also independently coded by a second coder to assess consistency. The level of agreement was measured using Krippendorff's alpha and resulted in a score of 0.68, indicating decent reliability (Hayes & Krippendorff, 2007). Based on this, the codebook was finalised and used to code the remaining interviews. In total, 33 codes were developed and grouped into four main categories: anticipated experience with the device, motivations, trust and data sharing, and clinical use and health system fit (see Appendix C).

4. Results

4.1 Anticipated Experience with the Device

4.1.1 Appearance and Wearability

Although appearance was not a primary concern for healthcare professionals, eight of the ten at-risk participants emphasised that it would play a major role in their willingness to use the device. Two participants expressed a preference for a design that does not "*feel medical*" or "*stand out too much*", suggesting that a more neutral, modern, and already familiar appearance similar to a fitness band would be preferred. As A-RI01 explained, "*If it's on my wrist and draws too much attention, I might not want to wear it.*"

In addition, seven at-risk participants mentioned that the device should be comfortable enough to wear during sleep, as they would not want to take it on and off regularly. However, three indicated they would only want to wear the device when absolutely necessary.

There were differing views regarding placement on the body. The wrist was the most commonly preferred location, mentioned by six at-risk individuals, primarily due to familiarity with smartwatches and fitness trackers. However, four at-risk participants suggested alternatives. A-RI03 noted, "*I might prefer something on my ankle since I don't need a screen on the device itself*," while A-RI01 offered, "*Maybe something like a pendant, something you wear around your neck.*" Two at-risk participants also mentioned the upper arm as a possible location for improved comfort and discretion.

Preferences about having a screen on the device also varied. Five participants supported the idea; they mentioned that it could provide immediate feedback like a smartwatch. Three individuals preferred a screenless option, especially if the device could remain discreet and send

the data directly to an app. Overall, participants consistently emphasised the need for comfort, simplicity, and a familiar, unobtrusive design that could seamlessly fit into daily routines.

4.1.2 Integration and Convenience

Participants showed different views regarding how the device should fit into their lives. Six out of ten at-risk individuals showed interest in daily monitoring and felt more open to using the troponin sensor if it could be integrated into existing technologies they already use, such as a smartwatch. The other group of four people stated they would only consider wearing the device if a clear medical reason existed. As A-RI02 explained, "I would only wear it if there's a clear medical reason."

Both patients and healthcare professionals agreed that integration into a smartwatch or familiar platform would facilitate the adoption process. However, there were concerns about casual use, as HP02 said, "*I think we should not add it just for fun because it will have quite an impact on healthcare usage as well.*" This shows concerns from professionals about increased usage of healthcare systems due to unnecessary monitoring.

Maintenance of the device was also a part of integration and convenience. Six participants shared that they did not want the device to require extra routines or frequent charging. Two participants suggested that charging should be "*quick*" or needed "*only once in a while*", and another noted it should ideally be done at night. A-RI08 summarised this: "*It should be something you charge only once in a while, maybe at night.*"

4.1.3 Desired Functionalities

Multi-functionality was one of the most commonly mentioned features across both groups. Eight patients and all five healthcare professionals expressed a preference for the device to do more than monitor troponin. Participants hoped it could also track blood pressure, oxygen

saturation, or ECG signals. Dashboards showing trends over time were mentioned by six patients, who felt this would help them better understand their health.

Despite the focus on multi-functionality, the topic of alerts (when troponin levels rise) also appeared. Healthcare professionals mentioned the importance of clinically relevant alerts. One professional noted that automatic alerts could be useful if they reflect clear emergencies, such as a likely heart attack, but warned against overwhelming the system with false positives. HP03 stated: "*If the data is valid, it's okay. But if the data has a false positive, maybe it will make some problem because the hospital has to send a lot of ambulances.*" Patients were positive about the alerts, but, like caregivers, they highlighted the importance of only relevant alerts. As A-RI08 mentioned: "*The device should have a sensitivity threshold. When a parameter exceeds a certain limit, it should alert you. Below that, it should stay quiet while the parameter slowly rises.*"

Both patients and caregivers expressed the importance of a clear system for what happens if troponin levels go up. Participants expressed the desire to receive the notification first, and then contact their doctor. HP02 mentioned that this could be seen as more practical than always sending data to healthcare staff: "*We normally aim for patients to get a notification like 'contact your doctor' instead of us checking everything.*" Still, in critical cases, automatic ambulance calls were seen as valuable, but only if the system can reliably assess severity. HP02 added: "*If there is an acute problem, we need to make sure that we step in early.*"

4.1.4 Data Display Preferences

There was a shared preference for simplicity in data presentation. Nine out of ten patients stated they did not want to see raw numbers. Instead, they wanted clearly labelled categories such as "*normal*" or "*abnormal*" presented together with brief explanations. Caregivers also

supported this approach, with all five noting that raw data would likely confuse or overwhelm patients. As HP05 explained: "*It should be really nice if the wearable itself or like a connected app already gives a sort of advice or conclusion about the data so people don't have to interpret it all by themselves.*" Some patients also discussed that it could be convenient if the app could also periodically provide a summary of the troponin parameter and present it in a visual way.

4.2 Motivations

4.2.1 Health Awareness and Prevention

All patients recognised heart attacks as an extremely serious condition. Five of them stated that they feel at risk of heart attack. Four patients explicitly linked their motivation to use the device with previous health scares or a family history of cardiac conditions. These participants described the device as a potential source of peace of mind. Two other patients said they would only consider using it if recommended by a healthcare provider or during symptoms.

Caregivers, in contrast, were more cautious. Three out of five expressed that continuous monitoring might be helpful for high-risk patients but questioned its value for low-risk individuals. HP01 stated: "*Many people would have to wear the device for a long time to detect one case [of a heart attack] early.*"

4.2.2 Information Needs

Both groups expressed strong needs for information and clarity. Seven patients admitted they had never heard of troponin before and would want an explanation before trusting the device. Similarly, all five caregivers indicated that patients would require basic education about what troponin is, what the device does, and what the numbers mean.

4.2.3 Personal Motivation and Openness

Five patients described themselves as proactive about their health and showed openness to using new technologies, particularly if the device fit into existing routines. Others were less enthusiastic but said they would still consider using it if recommended by a doctor or reimbursed. Among caregivers, three expressed a supportive attitude towards innovation, provided it could help reduce the burden on care systems. HP02 said: "*It really has potential to help healthcare.*"

4.3 Trust and Data Sharing

4.3.1 Data Attitudes

Eight patients expressed no major concern about sharing their health data, especially if it could be used to prevent serious events or contribute to better care. A-RI01 said: *"I don't mind sharing everything with my chosen doctor. I'm willing to share any health data because they're the doctor."* However, the topic regarding trust in action from doctors was also mentioned. A-RI01 stated: *"Yes, we have general practitioners too, but honestly? They wouldn't care even if something serious happened"* and *"I think yes, it's a good idea for the doctor to receive the data. But in modern life — at least in the countries I live in, Ukraine and the UK — there aren't enough doctors. I don't see this as feasible."*

Caregivers also mentioned work overload in case they would have to check the patients' data, and highlighted the importance for patients to keep track of their data. HP05 stated: *"Because if we have to check all the data that's collected from all our patients, you have a day job on that. So, what we normally aim for is to lie the responsibility with the patient. For example, that if there are measurements that are outside range, that people get a notification*

from contact your doctor or something, so that we don't have to check all the people ourselves, but that they get a sign from contact with your healthcare professional in case that there's something not normal."

4.3.2 Credibility and Endorsement

Both groups emphasised the importance of professional validation and credibility. Patients said they would only trust or use the device if recommended by their doctor, or other famous doctors, or if there were more research and popularity around the device. Similarly, four caregivers expressed they would not adopt or recommend such a device unless it had been validated in peer-reviewed research or had received official certifications, such as a CE mark.

4.4.1 Perceived Clinical Value

Most caregivers were cautious about the clinical value of such a device. HP01 said: *"I'm not convinced it would make sense to give someone a continuous monitoring device without symptoms."* And HP02 mentioned: *"If you would measure troponin and you confirm it's a myocardial infarction, you still don't do anything. So, it doesn't change the treatment."*

The idea that continuous troponin monitoring might lead to overdiagnosis or anxiety came up several times. HP01: *"There's also a risk of overdiagnosis when measuring such markers continuously. Similar to blood pressure monitoring, sometimes findings suggest a serious condition when there's none."*

Still, there were more positive takes in specific contexts. For example, one interviewee saw clear value in low-resource settings. HP03: *"Not every laboratory can perform evaluation for troponin… so I think the device that can be faster to evaluate troponin will be useful for us."*

Meanwhile, patients generally expressed hope that the device could help prevent emergencies or support early detection, even if they were unsure about how it worked.

4.4.2 Fit with Healthcare System

Participants across both groups agreed that integration into existing care pathways would be crucial. Four caregivers emphasised the need for clear protocols regarding who would receive alerts, who would act on them, and when follow-up was appropriate. Reimbursement was mentioned by both groups as a key requirement. Two patients noted they would not be willing to pay out of pocket, and two caregivers highlighted the potential cost burden on the system if widespread adoption occurred without proper funding and role definitions.

To see the frequency of all appeared themes within the categories, see Appendix D.

5. Discussion

5.1 Discussion of the findings

5.1.1 What are the functional and design-related requirements users express?

Participants consistently valued comfort, discretion, and minimal disruption to daily life. The preferred design was similar to lifestyle accessories (like a smartwatch) rather than a medical device. This shows the participants' desire to monitor their health discreetly, without being identified as ill. It also fits with the Uses and Gratifications Theory, which suggests that people tend to adopt technologies that align with their habits and goals.

The expectation for multi-functionality (e.g., ECG, blood pressure) suggests that users see the device as part of a broader self-monitoring system. However, this system should be simple: it should offer easy feedback (normal/abnormal), require little maintenance (not frequent charging), and have visual clarity. This supports two theories from the framework: perceived ease of use (TAM) and facilitating conditions (UTAUT).

5.1.2 What personal motivations and expectations influence users' interest in the device?

As mentioned previously, all participants viewed heart attacks as serious. Participants at risk, despite being selected based on clinical criteria, only half of them felt themselves at personal risk of MI. According to the Health Belief Model (HBM), low perceived susceptibility would typically reduce motivation to adopt a preventive health tool. However, findings from this study suggest a more complex picture: even those who did not feel personally at risk were open to using the device, especially if it was recommended by a doctor or reimbursed. This challenges

a core HBM assumption and suggests that external cues (like expert advice or system integration) may override internal perceptions of risk.

While some mentioned that they would use the device as a source of peace of mind, others worried about becoming overly focused on their health.

Trust was also pointed out as an essential part of motivation and expectation. Participants looked for validation in the form of certifications, clinical studies, and endorsement from their own healthcare providers. Many also noted they had never heard of troponin, showing a need for basic education alongside any device adoption.

Cultural background influenced the expectations from the device. Participants from Eastern Europe were generally more relaxed about using emergency services, most probably because healthcare in many Eastern European countries is publicly funded and ambulance use often does not result in out-of-pocket costs (Tambor et al., 2021). In contrast, Western European healthcare professionals expressed more concern about unnecessary ambulance calls, false alarms, and the overall pressure such devices could place on already strained systems. This reflects broader differences in how healthcare systems are structured in Western European countries like the Netherlands or Germany, where the emphasis is often on efficiency, cost containment, and gatekeeping (Ntais et al., 2024). In many Eastern European systems, access to emergency services tends to be more direct and less restricted (Rechel et al., 2014). These underlying structural differences may shape not only how users behave but also what they consider reasonable or acceptable when adopting new technologies. Applying the UTAUT model suggests that participants from Eastern Europe may be more motivated to integrate this device

into existing clinical systems, as the less restrictive healthcare structures in their countries make adoption more socially acceptable.

5.1.3 How do the functional and design-related requirements, motivations, and expectations align or differ between healthcare professionals and at -risk individuals?

There was a clear gap between the two groups. While people at-risk saw the device as a personal support tool, an extension of their efforts to stay healthy or regain control over their health, they paid more attention to the design and comfort of the device, which connects to the concept of perceived ease of use (TAM) and personal motivation (UGT). Healthcare professionals, by contrast, were considering clinical utility, integration into workflow, and the impact on healthcare resources. These are concepts connected to performance expectancy and facilitating conditions (UTAUT).

However, both groups highlighted the importance of clear protocols in motivation and expectations from the device. There should be a clear structure about who receives data, who acts on it, and under what circumstances. This isn't just a practical point, it also plays a role in how motivated and confident users feel. From a theoretical perspective, that relates to facilitating conditions (UTAUT) and perceived barriers (HBM). If users know what to expect, and if that process makes sense within their context (clinical or personal), they’re more likely to adopt the technology and use it in a meaningful way.

5.1.4 How do potential users perceive the anticipated adoption of a wearable troponin-monitoring device?

When looking at the results, it might seem that the two groups focused on different things: comfort, reassurance, and usability on one side; clinical utility, workflow, and resource use on the other. They were, in the end, both looking for the same thing: better outcomes. At-risk individuals hoped the device would give them a personal sense of safety and control. Healthcare professionals were more concerned with how it could improve care processes and avoid unnecessary strain. But both groups were, in their own way, trying to make health more manageable, whether for themselves or for their patients. If the device proves to improve health outcomes, is easy to use, and fits into both personal routines and clinical structures, there is potential for adoption by both groups.

5.1 Implications

5.2.1 Theoretical Implications

This study shows that the adoption process of a wearable medical device cannot be fully explained by one single theory. While classical theories for adoption such as UTAUT, UGT, and TAM can describe some aspects of adoption, they do not capture everything. In addition, they separately also cannot explain the adoption process, but the combination of them can. In the example of the adoption of a troponin-monitoring device, users' knowledge and beliefs about troponin, heart attacks, and whether they feel at risk played a crucial role as well. It shapes the way users see the device as necessary and useful.

While the medical gap can be covered by the HBM used, this model alone cannot describe the adoption, as it mostly focuses on the health beliefs of people.

Therefore, this study shows the importance of considering a combination of models, not only traditional ones that describe the adoption process, but also health models, to explain the adoption of medical devices. The combination of these models can help to fully understand user behaviour.

5.2.2 Practical Implications

The findings suggest several practical implications for designers, developers, and health tech innovators. First, developers should focus on creating wearable troponin-monitoring devices that resemble lifestyle accessories rather than medical equipment, to promote daily use and reduce stigma. Aesthetics, comfort, and wearability, in familiar formats like a bracelet or smartwatch, were consistently emphasised by users.

Second, integration with existing health technologies, such as smartwatches and apps, facilitates user convenience and trust. Designers should also prioritise clear data visualisation (e.g., simple categories like “normal” vs. “abnormal”) and avoid overwhelming users with raw numbers.

Lastly, developers should recognise that healthcare system differences (e.g., Eastern vs. Western Europe) influence how users interpret alerts and data responsibility. Co-design with both patients and caregivers, tailored to different healthcare contexts, will be critical for real-world adoption.

5.3 Limitations and Suggestions for Future Research

This study has several limitations. First, while qualitative research provides rich insights, the sample size (n=15) may not capture the full diversity of views among potential users.

Second, the participants came from different cultural backgrounds. Although cultural variation was considered in the analysis, national healthcare systems and cultural attitudes towards emergency care, data privacy, trust in doctors, and technology acceptance should be explored further. Future studies could adopt a cross-cultural comparative design to better understand how healthcare systems and cultural norms influence the adoption of medical devices.

Third, the troponin-monitoring device remains hypothetical within this study. Without a working prototype, participants could only assume their attitudes and behaviours. Future studies should include a working prototype.

In addition, future research should investigate how factors like health literacy, digital familiarity, and previous healthcare experiences influence the adoption of a health device.

Lastly, the findings show that traditional models of technology adoption may not be sufficient to explain the adoption of a medical device. Future studies should focus on developing or refining these models, for example by combining existing theories, to provide a more complete explanation of the adoption process.

5.3 Conclusion

This thesis explored how at-risk individuals and healthcare professionals anticipate the adoption of a wearable troponin-monitoring device. By combining these user groups, the study provides insights into requirements, motivations, and expectations from such a device before it exists in real-world practice.

The findings show that users are generally open to innovation due to the potential for increased safety, control, and convenience. However, concerns around over-monitoring and the risk of added stress remain important challenges to consider.

Adoption is not solely a matter of usefulness or innovation. It is about integration into real life, trust in the system, and shared control between patient and caregiver. The promise of such a device is significant, but in the end it depends on how it can be embedded in users' everyday lives and within current healthcare infrastructures. Designing it together with end users, not just for them, is key to the success of wearable technology.

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Appendix

Appendix A: Interview protocol

“Thank you for partcipation in my research. Before we start, I just want to quickly go over what we’ll be doing today — even though you’ve already seen the consent form.

This interview will take about 30 to 60 minutes. I’ll ask you a few open questions about your experiences or views related to cardiovascular health and how you feel about using health technologies, like wearable devices. There are no right or wrong answers — I'm just interested in your honest thoughts.

With your permission, I’ll audio record the conversation so I can transcribe it accurately. Everything you say will be kept confidential, and your name or identifying details won’t be included in the results.

Just a reminder: your participation is completely voluntary. You can skip any question or stop the interview at any point — no problem at all.

Do you have any questions before we begin?”

For Group I:

Probing questions:

Do you tend to avoid using apps or devices that monitor your health?

Do you normally see a doctor right away when something does not feel right?

Do you often feel the need to know exactly what is going on in your body?

Have you ever chosen not to get tested for something because you didn’t want to know the result?

Would you like to track as many aspects of your health as possible?

Would you rather not know about a possible health issue unless it becomes serious?

Questions on the knowledge and expreience with wearable technology:

Can you tell me about any wearable devices you’ve used to track your health, like a smartwatch or fitness band? What did you use them for?

What comes to mind when you think about using wearable devices for monitoring health?

In what ways do you think wearable technology could contribute to early detection of health issues?

What kind of situations or features might motivate you to start or keep using a health-tracking wearable?

How do you feel about the idea of wearing a wristband that monitors your heart health on a daily basis?

Questions on motivations to use the device:

If you had the chance to design this wristband yourself, what would you want it to look like or be able to do to suit your lifestyle?

Who or what would likely influence your decision to start using a device like this, and why?

What personal reasons would make you interested (or not interested) in using a device that monitors heart health?

Questions about health belief:

What have you heard or do you know about troponin and its role in the body?

How would you describe your own risk of having a heart attack, and what makes you think that?

What do you know about heart attacks — for example, their symptoms, causes, or impact on people's lives?

Questions about the functionality:

In your opinion, what should a modern wearable health device be able to do?

What are your thoughts on features like automatic alerts to doctors or ambulances, would that be helpful for you?

If a device like this gave you a warning or alert, what would influence whether you trust it and take action?

How would you feel about receiving regular data on your heart health and what kind of information would be most useful for you?

How would you prefer that data be shown to you? (e.g., numbers, color coding, visual graphs, simple notifications?)

What role would an app play for you in using a wearable device and how would you expect it to work together with the wristband?

What are the most important features you think a device like this should include?

Questions about the design:

How important is the appearance of the device to you, and why?

Where on your body would you prefer to wear a device like this? What makes that location appealing or not?

How would you like the device to look — in terms of size, shape, color, or materials?

When during the day or night do you think you'd want to wear this device, and why?

What would make a device like this feel comfortable or acceptable enough for regular use?

For Group II:

General questions on wearable technologies

What wearable health technologies have you seen being used in your clinical practice or research?

How do you generally feel about incorporating wearables into patient care or hospital systems?

In your opinion, which types of patients or health conditions could benefit the most from wearable devices?

What opportunities and challenges have you encountered when working with digital or wearable health tools?

Questions about troponin and current monitoring practices

How do you currently monitor troponin levels in patients who are at risk of a cardiac event?

What are the main limitations of the current methods (e.g., serial blood testing, timing, accuracy, logistics)?

What is your first impression of a wearable device that could continuously monitor troponin through the skin?

Device-specific questions

Clinical Practice Challenges
What practical or clinical challenges do you think such a device could help address?
Are there specific patient groups or situations where this type of device could be especially useful or not useful?

Reactions and Motivations
Would this kind of device interest you as a clinician or researcher? Why or why not?
What would motivate you to adopt such a tool in your daily practice or recommend it to colleagues?

Concerns and Caution Points
What concerns would you have about depending on this type of wearable for patient monitoring?
How would you feel about potential issues like false positives, unnecessary alerts, or patient anxiety?

Requirements for Adoption
What conditions would need to be met for you to feel comfortable using or recommending such a device?
What role would things like reimbursement, EHR integration, or institutional approval play in your decision?

Professional Recommendations
If you could advise the development team, what would be one feature, safeguard, or design principle you'd consider essential?
How should a system like this handle critical alerts or medical responsibility in real-world scenarios?

Appendix B: Informed Consent Form

Consent Form for Participation in the Study on Factors Influencing the Adoption of Wrist-Worn Troponin-Monitoring Devices

Purpose of the research:

The purpose of this study is to investigate the factors that influence the adoption of wrist-worn troponin-monitoring device. The research will examine the functional and design-related requirements that potential users consider essential, as well as the personal motivations and expectations that shape their interest in these devices. The findings aim to provide valuable insights into the adoption process of wearable health monitoring technologies and contribute to the development of more user-centred and effective medical device.

Procedures:

If you agree to participate, you will take part in an interview lasting approximately 30–60 minutes. The interview can be conducted online or in person, depending on what is convenient for you. You will be asked questions about your experiences with cardiovascular health, perceptions of risk, and views on the use of technology in healthcare (e.g., digital apps, devices).

The interview will be audio recorded with your permission. The recordings will be used only for transcription and analysis purposes, after which the audio files will be deleted. The recordings will be treated confidentially.

Voluntary participation:

Your participation is entirely voluntary. You can choose to stop the interview at any time or skip any question that makes you uncomfortable. You also have the right to withdraw from the study at any point without giving a reason. If you withdraw, your data will be deleted.

Confidentiality and data protection:

All the information you provide will be treated as confidential. Your name and any identifying details will be removed or pseudonymized. Data will be stored securely and will only be accessed by the researcher. The results of the study may be used in academic publications, but individual participants will never be identified.

Risks and benefits:

There are no known risks associated with participating in this study. However, discussing personal health experiences might be emotionally sensitive for some participants. You are encouraged to speak only about what you feel comfortable sharing. While there may be no direct benefits to you, your input will contribute to improving health technologies and support systems for people with cardiovascular risks.

Questions and contact:

If you have any questions about this research or your participation, you may contact the researcher: Alona Raskina (a.raskina@student.utwente.nl)

Or thesis supervisor: Mark Tempelman (m.h.tempelman@utwente.nl)

Contact Information for Questions about Your Rights as a Research Participant If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee- hss@utwente.nl

YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM Taking part in the study

I have read and understood the study information dated 11/04/2025, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions, and I can withdraw from the study at any time, without having to give a reason.

I understand that taking part in the study involves participating in a semi-structured interview about my experiences or professional insights related to cardiovascular health. The interview will be audio recorded to ensure that the researcher can accurately transcribe what is said. These recordings will be used only for transcription purposes, after which the audio files will be deleted. The transcriptions will be treated confidentially and stored securely.

Use of the information in the study

I understand that information I provide will be used for a bachelor thesis submitted to the University, which will be publicly accessible through the university's repository. The findings may also be shared in academic presentations or reports related to health technology research. All information will be treated confidentially to protect the identity of participants. There are no planned commercial or secondary uses beyond these academic purposes.

I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.

I agree that my information can be quoted in research outputs

Consent to be Audio Recorded

I agree to be audio recorded.

Future use and reuse of the information by others

I give permission for the confidential transcripts that I provide to be archived in University of Twente data repository so it can be used for future research and learning.

I agree with everything mentioned above:	**Yes**	**No**
	□	□

Signatures

_____ _____ _____

Name of the participant Signature Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____ _____ _____

Researcher name: Alona Raskina Signature Date

Study contact details for further information: Alona Raskina a.raskina@student.utwente.nl

If you are not able to sign the form, email to the researcher (Alona Raskina) with the text that you approve the informed consent form.

Appendix C: Codebook

1. Anticipated Experience with the Device

Code	Theme	Description
1.1.a	Positive anticipated experience with wearability	Participant expresses comfort or willingness to wear the device in daily life.
1.1.b	Negative anticipated experience with wearability	Participant finds the device inconvenient, prefers not to wear it full time.
1.1.c	Aesthetic importance	Aesthetic appearance influences willingness to wear the device.
1.2.a	Integration with existing devices	Preference for the device to be part of already used devices like smartwatches.
1.2.b	Ease of maintenance	Device should require little effort to maintain or charge.
1.3.a	Dashboard and trends	Desire to see personal health trends over time.
1.3.b1	Critical alert: patient notification	Preference for personal alerts in case of abnormal data.
1.3.b2	Critical alert: automatic care activation	Support for automatic help activation (e.g., ambulance).
1.3.b3	Alert overload concern	Fear that too many alerts could overwhelm users or systems.
1.3.c	Multi-functionality	Expectation that the device can measure additional health indicators.
1.4.a	Avoid raw data	Preference for simplified, labelled results (e.g., “normal” vs. “abnormal”).
1.4.b	Explanation of results	Expectation that the app will interpret and explain results.

2. Motivations

Code	Theme	Description
2.1.a	Risk awareness	Participant identifies personal or family risk factors as motivation.

2.1.b	Symptom-based use	Participant would use the device only when experiencing symptoms.
2.1.c	Peace of mind	Device seen as a source of reassurance.
2.2.a	Need for explanation	Request for explanation of what troponin is and how the device works.
2.2.b1	CE/FDA certification	Trust depends on regulatory approval.
2.2.b2	Clinical research evidence	Trust depends on availability of scientific studies.
2.2.b3	Doctor endorsement	Participants would use the device if a trusted clinician recommends it.
2.3.a	Interest in self-tracking	Participant is proactive and enjoys monitoring their own health.
2.3.b	Openness to innovation	Participant is willing to try out new technologies.

3. Trust and Data Sharing

Code	**Theme**	**Description**
3.1.a	Low concern about privacy	Participant is willing to share health data if it improves care.
3.1.b	Shared data access	Data should be visible to both patient and doctor.
3.1.c	Caregiver data access need	Caregivers need access to data for timely intervention.
3.1.d	Concern about sole patient access	Risk of limiting data only to patient, excluding clinical oversight.
3.2.a	Trust in authorities	Trust increases if the device is validated by professionals.

4. Clinical Use and Health System Fit

Code	**Theme**	**Description**
4.1.a	Doubts about added value	Concerns about whether continuous monitoring will improve outcomes.
4.1.b	Concern about overdiagnosis	Fear that continuous tracking could lead to excessive alerts or anxiety.

4.1.c	Usefulness in low-resource settings	Device seen as useful in areas lacking access to labs or diagnostics.
4.1.d	Device doesn't change treatment	Belief that even with early detection, the care approach may not differ.
4.2.a	Reimbursement and care pathways	Concern about financial accessibility and integration into care systems.
4.2.b	Protocol and responsibility clarity	Need for clear guidelines on who acts on data and how.
4.2.c	Concern about cost burden on system	Worry that mass adoption could overwhelm the system financially.

Appendix D: Frequency of themes appearing in the interviews

1. *Overview of users' anticipated experience with the device*

Code	Theme	Frequency	Quotation(s)
1.1.a	Positive anticipated experience with wearability	6 respondents	"As long as I don't have to take it off all the time, I'd use it regularly."
1.1.b	Negative anticipated experience with wearability	4 respondents	"I wouldn't wear it all the time, only when it's necessary." "People forget to put the wristband on and that kind of things."
1.1.c	Aesthetic importance	7 respondents	"If it's on my wrist and draws too much attention, I don't know..." "I'd want it to look good."
1.2.a	Integration with existing devices	5 respondents	"If it integrates into my smartwatch, I'll definitely try it."
1.2.b	Ease of maintenance	3 respondents	"How difficult it is. What we see in practice is that user engagement or adherence is also a very difficult point."
1.3.a	Dashboard and trends	4 respondents	"I'd love to see how my troponin changes over weeks or months."
1.3.b1	Critical alert response: patient notification	4 respondents	"It should alert me directly when something goes wrong."
1.3.b2	Critical alert response: automatic care activation	5 respondents	"If it could automatically call help during a heart

			attack, that would be great."
1.3.b3	Alert overload concern	3 respondents	"We don't want 10,000 false alarms in a hospital system."
1.3.c	Multi-functionality	7 respondents	"If this device would allow me to run or swim and get notifications, that would be really cool."
1.4.a	Avoid raw data	6 respondents	"If I tell you, oh, my heartbeat is 150... what does it mean?"
1.4.b	Explanation of results	5 respondents	"I want it to explain what abnormal means, not just show numbers."

2. Overview of users' motivations

Code	Theme	Frequency	Quotation(s)
2.1.a	Risk awareness	8 respondents	"Heart problems run in my family—my father has heart issues, and my grandfather died from a heart attack."
2.1.b	Symptom-based use	4 respondents	"If I have symptoms, I'd wear it. But not before that."
2.1.c	Peace of mind	5 respondents	"It just gives peace of mind knowing something is monitoring."
2.2.a	Need for explanation	7 respondents	"Without a report or picture, I don't know what it means. It requires explanation."
2.2.b1	CE/FDA certification	3 respondents	"Before using, I'd like it to be CE certified."

2.2.b2	Clinical research evidence	2 respondents	"I would only advise it if there's a paper about it, like real studies."
2.2.b3	Doctor endorsement	4 respondents	"I'll use it if my cardiologist recommends it."
2.3.a	Interest in self-tracking	6 respondents	"I already track my heart rate, sleep, everything. I'm all in."
2.3.b	Openness to innovation	4 respondents	"I love testing new gadgets, so I'd be curious."

3. *Overview of users' trust and data sharing*

Code	Theme	Frequency	Quotation(s)
3.1.a	Low concern about privacy	5 respondents	"I don't care if they see my heart numbers if it helps."
3.1.b	Shared data access	6 respondents	"That people get a notification... so that we don't have to check all the people ourselves."
3.1.c	Caregiver data access need	3 respondents	"As caregivers, we must have access to intervene in time."
3.1.d	Concern about sole patient access	2 respondents	"If only the patient sees it, it's not useful clinically."
3.2.a	Trust in authorities	6 respondents	"Good evidence... doctors find it very important that there's enough evidence that it's safe and reliable."

4. Overview of clinical use and Health System Fit

Code	Theme	Frequency	Quotation(s)
4.1.a	Doubts about added value	5 respondents	"It might not help if people don't know how to interpret or act on it."
4.1.b	Concern about overdiagnosis	4 respondents	"We risk generating false positives that overwhelm emergency services."
4.1.c	Usefulness in low-resource settings	2 respondents	"We don't always have labs available here. A wearable would help."
4.1.d	Device doesn't change treatment	3 respondents	"It doesn't really change treatment unless symptoms are present."
4.2.a	Reimbursement and care pathways	4 respondents	"It can become very expensive if everyone in the Netherlands has to walk with such a wearable device."
4.2.b	Protocol and responsibility clarity	2 respondents	"You need to know who gets alerted and who acts."
4.2.c	Concern about cost burden on system	2 respondents	"If this scales up too fast, costs could explode without control."

Appendix E: Literature study log

Date	Database	Search String	Total Hits
27-03-2025	PubMed	burden of cardiovascular diseases	47,550
27-03-2025	PubMed	myocardial infarction	303,471
27-03-2025	Google Scholar	"cardiovascular disease" cvd	1,560,000
27-03-2025	PubMed	troponin measure	11,859
27-03-2025	PubMed	poc troponin testing	118
29-06-2025	UT library	"troponin evaluation" AND "myocardial infarction"	7
01-04-2025	PubMed	wrist worn troponin	1
01-04-2025	PubMed	wrist worn health technology	427
01-04-2025	Google Scholar	wrist worn health technology	122,000