Barriers to Implementing and Scaling Wearable Technologies in Women's Health: Perspectives from a Gynaecologist in Switzerland

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Abstract: Women in the EU tend to live longer than men but often spend more years in poor health, mainly due to diagnostic delays and barriers to care, especially in sexual and reproductive health. These gaps are intensified by women's underrepresentation in clinical research, which results in less accurate diagnostics and treatments. To achieve gender equality in health, in line with the United Nations Sustainable Development Goals, there is a need for innovation in medical technology and research. Wearable-based digital health applications can enhance access, enable monitoring, and support personalized treatment for conditions like endometriosis, polycystic ovary syndrome, menopause, and maternal health. However, challenges like limited healthcare professional engagement impede their widespread adoption. This paper explores the main barriers to integrating wearables into gynaecological practice, using data obtained from an in-depth, semi-structured interview with a gynaecologist. Results indicate that several barriers currently prevent scaling digital women's health, including a lack of scientific evidence for the technology, concerns about device reliability and data security, limited reimbursement, and inadequate IT infrastructure.

1 INTRODUCTION

Women in the EU live, on average, 5 years longer than men but spend more time in poor health (Commission, 2024). This gender health gap results from longer diagnostic delays, caused by barriers such as lower income, distance, transportation issues, and caregiving responsibilities, which further impede access to healthcare, especially for sexual and reproductive health services (Parliament, 2025). Furthermore, women are underrepresented in clinical trials, which creates gaps in understanding how different health conditions impact women compared to men (Waltz, Lyerly, & Fisher, 2023). This imbalance might cause diagnostics and treatments to be less accurate, sensitive, or appropriate for women. A shift toward a focused emphasis on women's health is essential to address gender-specific health needs and promote gender equality, as requested by the United Nations' Sustainable Development Goals (Nations, 2023). Addressing gender equality requires innovation, not only in treatments and technologies but also in research designs and methodologies (Grace, Wise, Nieroda, Egbunike, & Usman, 2025). Promoting women's health involves addressing female-specific gynaecological health conditions such as endometriosis, polycystic ovary syndrome, menopause, and maternal health (Geller A, 2025). Digital health can promote health and gender equity by providing better access to healthcare and empowering individuals with their health data (Bitomsky, Pfitzer, Nißen, & Kowatsch, 2025; Figueroa, Luo, Aguilera, & Lyles, 2021). There are three types of digital health technologies: remote consultation, remote monitoring, and digital care platforms (Oudbier et al., 2024). Wearable technologies enable remote tracking and can be combined with other systems. Devices such as smartwatches, rings, wristbands, and patches have revolutionized non-invasive health monitoring by allowing real-time, remote data collection (Burmaoglu, Trajkovik, Tutukalo, Yalcin, & Caulfield, 2018). Further advancing women's health by using wearable technology may pave the way for personalized, proactive healthcare management (Moghimikandelousi et al., 2025). Although many

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studies demonstrate the health benefits of wearable technology, implementing these devices remains challenging (Lu et al., 2020). One central challenge is to engage healthcare professionals with innovations (Oudbier et al., 2024). Considering that 68% of physicians in gynaecology and obstetrics are female (FMH, 2022) and that the OECD identifies a persistent "gender-related digital skills gap" (UNESCO, 2022), this position paper examines the key factors influencing the implementation and scale-up of wearable technologies in women's health from a gynaecologist's perspective. Accordingly, it addresses the following research question: What are the main barriers to implementing and scaling up wearable technologies in gynaecological practice?

2 METHODS

For this position statement, we conducted a semi-structured interview with a 28-year-old female gynaecologist with 4 years of work experience based in Switzerland and working at a public hospital. The development of the interview guide was guided by the Consolidated Framework for Implementation Research (Guyatt, 2021). The CFIR guides formative research on complex health care interventions by systematically identifying factors across multiple levels of context that influence implementation. It collects data from influential individuals and organizes the different constructs into five domains, helping stakeholders improve interventions and their implementation (Keith et al., 2017). The interview took place on the 27th of August 2025 and was conducted online.

The interview began with general questions about the participant's workplace, followed by a discussion on experiences with wearable technologies. Each CFIR domain -innovation, outer setting, inner setting, individual, and process implementation- was addressed separately, focusing on barriers to implementing and scaling these technologies in clinical practice. At the end, the participant was encouraged to ask questions or share additional insights about her experience with the digital tool that had not been previously covered. The interview was audio-recorded on the author's phone, and the record was de-identified. Next, the record was imported into the AI-based software ATLAS.ti and transcribed verbatim. The transcript was checked for accuracy, and the participant had the chance to review it. Ethical approval was granted as part of a larger study through the main author's educational institution, and the participant provided oral consent to participate.

The themes identified during the interview were consolidated into five main insights, which were structured according to the existing CFIR domains and constructs. All information is drawn directly from the original interview data and reflects the interviewee's expert opinion, based on her extensive experience in the healthcare industry and her work as a gynaecologist. Finally, we analyse and position these insights within the broader context of related research to inform our conclusions.

3 BARRIERS TO IMPLEMENTING WEARABLE TECHNOLOGY FOR WOMEN'S HEALTH

According to the female gynaecologist interviewed, current patterns of wearable use differ between private and professional settings. In her personal life, she uses an Apple watch and a Garmin sports watch mainly to track physical activity, including heart rate during exercise, and occasionally to get hydration reminders. In her professional work in a clinical setting, however, such devices are not part of daily practice. The interviewee notes that although her own clinic does not use wearables, some outpatient gynaecologists use continuous glucose monitoring sensors for patients with poorly controlled gestational diabetes. She also reports that digital health applications, especially ovulation and menstrual-cycle tracking apps, are widely used or well-received in the care of patients with cycle irregularities or fertility issues. Overall, the interviewee indicates that she sees the potential benefits of wearable technology use in her professional role as a women's health doctor. Still, wearables currently play a larger role in her private life than in standard clinical practice.

3.1 Innovation Domain

The interviewee identifies several major barriers to implementing wearable technology in gynaecological practice within the innovation domain, including device features, the evidence base, and costs. First, she highlights the lack of sufficient scientific evidence to support their clinical use. According to her, current wearables are not designed to meet the specific needs of gynaecology, such as pregnancy-related blood pressure monitoring or glucose measurement, nor are there reliable devices for tracking menstrual patterns or hormonal changes.

"The devices are simply not tailored to the specific needs in gynaecology."

She also raises concerns about measurement accuracy, noting that heart rate data during pregnancy can be difficult to interpret and that wrist-based blood pressure readings, such as those from smartwatches, are generally less reliable than those from traditional upper-arm cuffs. Lastly, she mentions high patient-level acquisition costs as another barrier, especially since these devices are usually not covered by health insurance.

3.2 Outer Setting Domain

The external environment, including local attitudes, policies, regulations, and financing structures, poses several challenges to implementing wearable technologies in clinical practice in Switzerland. First, she highlights the lack of national and international clinical guidelines for the use of wearables in areas such as preeclampsia monitoring and routine pregnancy care. The interviewee notes that having such guidelines could either support or hinder technology adoption, but their current absence creates uncertainty and slows acceptance. Second, she emphasizes that strict data protection laws significantly limit the clinical use of wearables, particularly because these devices generate and transmit sensitive health information. This regulatory environment, in her view, creates significant hurdles for wider implementation. Third, the interviewee points out that patient acceptance is another obstacle. She observes that younger patients are generally more willing to use wearable devices and related applications, while older patients may struggle to engage with such technologies, making them less practical for routine care.

"Younger women are certainly more open to these kinds of technologies, including apps and the device itself. I think it is difficult to implement this with an older patient population."

Finally, the interviewee stresses the importance of health insurance reimbursement. She argues that whether insurance covers the costs of devices like blood pressure monitors or continuous glucose sensors heavily influences patients' willingness and ability to use them, making reimbursement policies a key external barrier.

3.3 Inner Setting Domain

The inner setting, including information technology infrastructure, work infrastructure, and available resources, presents several challenges for implementing wearable technology. She emphasizes that hospitals currently lack sufficient technical infrastructure to support the integration of these devices. Specifically, she notes that existing clinical information systems are not designed to facilitate the transfer and incorporation of data generated by wearables, such as glucose sensors. She stresses that the lack of interoperable systems and limited IT support significantly hinders the adoption of these technologies. Successful implementation would require efficient, straightforward data integration processes to prevent disruptions to clinical workflows.

"Another barrier is the team's willingness to adopt a new technology, because time resources in everyday clinical work are limited."

Additionally, the initial use of wearable technologies likely increases healthcare professionals' workload. Given the time constraints in everyday clinical practice, this extra burden represents a significant obstacle and further reduces the feasibility of deploying wearables within the current inner setting.

3.4 Individual Domain

The individual domain, which identifies the roles relevant to the implementation project, situates them within the inner or outer setting, and specifies their motivation and capabilities, presents several barriers and requirements for the successful adoption of wearable technologies. The interviewee outlines several role-specific requirements. She emphasizes that medical leadership must be directly involved in defining the indications for wearable use and in determining their clinical relevance. Their endorsement is considered essential for establishing clear protocols and ensuring their proper application.

"Medical leadership definitely has to define both the indications and the relevance, for example, when it should be used."

In addition, she highlights the need for IT support to facilitate data integration and to develop or maintain the necessary interfaces between wearable devices and clinical information systems. Furthermore, nursing staff, including midwives, play an important

role in instructing and supporting patients in using wearable devices and associated applications. Their involvement is considered critical for ensuring patient competence and adherence. Finally, the interviewee stresses the importance of medical coding, particularly in determining how the use of wearable technologies can be appropriately billed or submitted to health insurance providers. Adequate financial and administrative coordination is therefore regarded as another essential component of successful implementation within the individual domain.

3.5 Process Implementation Domain

The interviewee was asked to describe the specific steps involved in implementing and scaling up wearable technologies in clinical practice. It was emphasized that implementing wearable technologies in a clinical setting can be viewed as a multi-phase process. It begins with assembling a diverse interdisciplinary team (Teaming), typically initiated by a motivated team member. Next, a needs assessment is conducted to determine the requirements of key stakeholders such as patients and clinicians. Simultaneously, the clinical context should be analysed to identify relevant and feasible use cases for wearable technologies.

The planning stage is central to the process. It involves setting clear goals, outlining milestones, and developing internal guidelines, obtaining institutional approval from the chief physician, and providing staff training. Additionally, information technology and data security compliance must be verified, and appropriate patients should be selected. Before implementation, fostering collaborations is essential to engage relevant stakeholders. Midwives and nurses could play a key role at that stage, for example, by teaching the participant how to apply it.

"Nurses, or in our case, midwives, can show patients how to use the devices or connected apps and train them accordingly."

4 DISCUSSION AND CONCLUSIONS

This position paper employed the Consolidated Framework for Implementation Research (Guyatt et al.) to analyse a gynaecologist's view on the barriers to implementing and scaling wearable technologies in women's health. As highlighted by Guyatt et al., using a determinant framework such as the CFIR provides a perspective for understanding, influencing, and explaining the complex variables involved in women's health services (Guyatt et al., 2021). This study's findings across the CFIR domains are consistent with existing CFIR constructs and

Table 1: Summary of the main barriers to integrating wearables into gynaecological practice.

Domain	Construct	Description
Innovation	Innovation Evidence-Base	Insufficient scientific research
	Innovation Relative Advantage	Lack of trust in wearable technology reliability
	Innovation Cost	High device costs
Outer Setting	Local Attitudes	Older patients may oppose wearable technology implementation
	Policies and laws	Data security concerns
		Lack of representation in medical guidelines
	Financing	Lack of reimbursement for wearable technology implementation costs
Inner Setting	Information Technology (IT) Infrastructure	Insufficient IT infrastructure including clinical information system and IT support
	Work infrastructure	Additional Workload
	Available Recourses	Financial resource constraints
Individual	High-Level Leaders	Senior leaders required
	Implementation Team Members	Involved individuals include IT, Nurses, Midwives
	Motivation	Motivated individuals required
Implementation Process	Teaming	Assembling a team
	Assessing Needs and Context	Identify stakeholder needs to find use cases and barriers.
	Planning	Outline milestones and set goals
	Engaging	Foster engagement through teaching
	Doing	Implement in small steps

broader digital health research in women's health. Medani et al. highlight that the primary barrier is not a lack of interest in innovation but a complex combination of evidence, workflow integration, interoperability, regulatory, and financial issues that affect the technology's practical feasibility in a clinical setting (Medani et al., 2025). Concerns about device reliability, data security, limited reimbursement, and inadequate IT infrastructure in Switzerland's clinics are identified as barriers to implementation. Furthermore, as shown in a study conducted in the US, our findings emphasize the importance of using context-specific technologies to manage women's health disorders (James, 2025).

These concerns are especially important in obstetrics and gynaecology, where remote monitoring and telehealth are often seen as ways to improve access barriers (James et al., 2025). Although these technologies are increasingly recognized for their potential, their adoption in fields such as obstetrics was largely limited until the COVID-19 pandemic (Atkinson, 2023). However, during the pandemic, the use of home monitoring has expanded globally, including Dopplers for fetal heart rate monitoring and glucose monitors for gestational diabetes. According to IMD's digital competitiveness ranking, Switzerland is considered the most innovative country in digital transformation (IMD, 2025). We therefore aimed to examine the Swiss context, representing a modern, digitally oriented high-income country, to gain insights into the reported adoption of digital women's health. Against this backdrop, the results of the current study are sobering, showing that the healthcare system lags and that the COVID-19 crisis did not provide a sustainable push to significantly transform women's health services in Switzerland.

Although the expert opinion approach limits the extent to which these findings can be applied, the interviewee can be seen as a representative of the future of doctors managing women's health. Not only does it offer insight into the lived experiences and mindset of a female gynaecologist working in Switzerland, but it also demonstrates healthcare professionals' interest in expanding the use of wearable technologies to promote women's health. Moreover, with this approach, we follow the first two design principles proposed by Bitomsky et al. for future digital health innovation, specifically regarding wearable technology for women's health, prioritizing health equity in the deployment of future wearable technology from the beginning (Bitomsky, Nißen, & Kowatsch, 2025). The interview identified the key needs of an important stakeholder in women's health and provided us with firsthand insights into upcoming challenges. Achieving sustainable implementation requires stakeholders to collaborate more closely and prioritize advancing digital health in women's health services from all relevant perspectives, as mentioned above.

CONFLICTS OF INTEREST

AL and TK are affiliated with the Centre for Digital Health Interventions (CDHI), a joint initiative of the Institute for Implementation Science in Health Care, University of Zurich; the Department of Management, Technology, and Economics at Swiss Federal Institute of Technology in Zürich; and the Institute of Technology Management and School of Medicine at the University of St Gallen. CDHI is funded in part by CSS, a Swiss health insurer, MTIP, a Swiss investor company, and MavieNext, an Austrian healthcare provider. TK is also a co-founder of Pathmate Technologies, a university spin-off company that creates and delivers digital clinical pathways. However, neither Pathmate Technologies, CSS, MTIP nor MavieNext was involved in this research.

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APPENDIX

Interview guide
Project name: Healthcare professionals' experience with the implementation of wearable technology for patient management in Switzerland

Thank you for agreeing to participate in our interview.
Our survey is split into six sections.
Our goals are:
1) To get insights into your experience with wearable technology in your medical practice.
2) To learn more about barriers to the implementation of wearable technology for patient management

Section 1: Personal Information
This first section starts with basic information about your profession.
1. What is your profession?
2. How many years have you been active in your profession?
End of Section 1

When evaluating the implementation of new technologies, there are five essential domains to consider (1) Innovation domain (2) the outer setting (eg, regulations, laws, and patient needs), (3) the inner setting (eg, the direct implementation environment, social factors, networks, and communication), (4) the individual health professionals, and (5) the implementation process. The upcoming sections will ask questions about your views on each domain.

Section 2: Innovation Domain
This second section concentrates on your personal attitude toward and experience with the innovation, specifically Wearable Technologies (WT).
Wearable Technology includes electronic devices with sensors worn on the body, combining

computing with daily tasks. They perform non-invasive monitoring of vital parameters. Devices like smartwatches, rings, wristbands, and patches transfer data wirelessly. Applications cover prevention, diagnosis, management, and rehabilitation of different disease groups.
3. Do you use a wearable device in your private life and if yes, what kind of device do you use? (Click, all that apply)
4. What purpose does a wearable device serve in your private use?

While WT offers benefits such as remote and longitudinal real-time monitoring, personalized care, increased patient engagement, and potential cost savings, obstacles to broad clinical adoption persist. The following questions will therefore address your perspective on implementing WT in your medical practice, specifically regarding features of WT devices.
5. Are you using WT for patient management in your work life and if yes, what relative.
6. What advantage did WT add to your current practice? If no, why not?
7. What are the main barriers to implementing the WT device regarding its features? Please describe in your own words. Possible obstacles include the device's costs, lack of evidence, or technical issues.
End of Section 2

Section 3: Outer Setting Domain
This third section emphasizes the factors of the outer system (such as the healthcare system, national regulations, sociocultural values, etc.) that may influence the implementation of WT devices in medical practice.
8. What factors in the outer system may influence the implementation of WT devices in medical practice and how?
End of Section 3

Section 4: Inner Setting Domain
This fourth section focuses on factors of the inner system (in this case, your workplace, eg, team, infrastructure, etc.) that may influence the implementation of WT devices in medical practice.
9. What factors in the inner system may influence the implementation of WT devices in medical practice and how?

End of Section 4
Section 5: Individual Domain
This fifth section focuses on the roles and characteristics of individuals involved in implementing WT at your workplace.
10. Who should be involved and who should lead to implement WT in your clinical practice (this could be the medical chief, administrative staff technical staff)? Please name all roles that apply.
End of Section 5

Section 6: Implementation Process Domain
This fifth section focuses on the activities and strategies used to implement WT in your clinical practice.
11. Outline specific steps and activities needed for implementing WT in clinical practice.
End of Section 6

This is the end of the interview. Thank you for your time and effort.