

Title: Effectiveness and acceptance of wearable sensors in prediction and early detection of cancer.

General context: Factors of everyday life affect a person's health greatly, such as sleep, physical activity, stress etc. However, health problems are usually only addressed in the hospital. This approach is highly inefficient, since hospital care only addresses the effects and not the causes of illnesses. Many diseases, e.g., cancer, are usually only detected in its later stages when patients start having serious symptoms. Cancer is a leading cause of death worldwide, and early detection of the disease significantly improves the chances of successful treatment and survival. With the rapid advancements in technology, wearable sensors have emerged as a promising tool for real-time, non-invasive monitoring of physiological and behavioral data. These devices offer the potential for early detection and prediction of cancer, providing valuable information for timely intervention and improved patient outcomes.

Problem: There is not enough academic overview and general knowledge about the implementation of wearable sensors in early detection of cancer. Even though many studies have arisen in the past decade regarding usage of wearables in healthcare, few have provided a summary and main indications of current studies and research in this field. Furthermore, only few qualitative and quantitative studies have been conducted, regarding the user, in this case patient, acceptance of wearable sensor technology in cancer prevention.

Research questions: To what extent can wearable sensor technology accurately detect early signs and symptoms of cancer? What are the factors influencing patient compliance with wearable device use?

Objectives: The motivation for this study on the effectiveness and acceptance of wearable sensors in predicting and detecting cancer early is multifaceted:

1. **Enhancing Early Detection:** Cancer prognosis is closely linked to the stage at which it is detected. Early diagnosis of cancer allows for prompt treatment initiation, potentially leading to better clinical outcomes and survival rates. Wearable sensors could facilitate the continuous monitoring of various physiological parameters and identify abnormal patterns that might indicate the presence of cancerous cells, thus aiding in early detection.
2. **Personalized Healthcare:** Wearable sensors enable the collection of individualized data, which can be used to develop personalized healthcare plans tailored to each patient's unique needs. By assessing the effectiveness of these devices in predicting and detecting

cancer, this study aims to contribute to the development of personalized healthcare approaches that optimize patient care.

3. Improving Quality of Life: Cancer treatment and its side effects can significantly impact a patient's quality of life. Early detection through wearable sensors may lead to less aggressive treatment options, minimizing the physical, emotional, and mental health.
4. Encouraging Preventive Measures: Wearable sensors may help identify individuals at higher risk of developing cancer by monitoring specific physiological markers or behavioral patterns. This could encourage users to adopt preventive measures, such as making lifestyle changes or seeking regular medical check-ups, ultimately reducing the incidence of cancer.
5. Acceptance and User Experience: Understanding the acceptance and user experience of wearable sensors is crucial for their successful implementation in cancer prediction and early detection. This study will explore factors influencing user acceptance, such as comfort, ease of use, and perceived benefits, which can inform the design and development of future wearable technologies that cater to users' needs and preferences.
6. Cost-Effectiveness and Accessibility: Wearable sensors have the potential to offer a cost-effective and accessible alternative to traditional cancer screening methods. By evaluating their effectiveness, this study can contribute to the development of affordable and easily accessible cancer screening solutions that could benefit a wider population, especially in resource-limited settings.
7. Interdisciplinary Collaboration: The development and evaluation of wearable sensors for cancer prediction and early detection require collaboration among various disciplines, including medicine, engineering, computer science, and psychology. This study can foster interdisciplinary collaboration, driving innovation and knowledge exchange among experts to advance the field of wearable technology in healthcare.

Tasks: To thoroughly research state-of-the-art technology and implementation of wearable devices in preventive healthcare, in form of a scoping review. In addition, to conduct a patient survey on wearable device (e.g., smartwatch) usability and technology acceptance.