

LEVERAGING WEARABLE HEALTH DEVICES FOR ENHANCED PATIENT CARE: REAL-TIME MONITORING, EARLY DETECTION, AND PERSONALIZED INTERVENTIONS

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Paper Received: 29.01.2025 / **Paper Accepted:** 01.03.2025 / **Paper Published:** 04.03.2025

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Abstract

Background: The integration of wearable health devices within healthcare has also come as a revolutionary strategy towards patient care that can provide immediate monitoring and evidence-based information on how to make better clinical decisions and improve patients' outcomes. With increased application of smartwatch and technologies, the medical practitioners, especially nurses, have become heavily dependent on them for the surveillance of vital signs, the recognition of early signals of change in the patients, and individualized care. Yet, despite their potential advantages, some obstacles such as limited training, technological issues, and organizational support can limit their extensive application. The study seeks to evaluate the nurses' attitudes toward the wearable health devices, with emphasis on their effects on patient care, clinical efficiency, and healthcare delivery in general. Through the evaluation of these attitudes, the research aims to determine obstacles and opportunities for the maximizing the integration of wearable devices into the nursing practice.

Methods: This study utilized a quantitative descriptive correlational research design, with data collected through structured questionnaires distributed via Google Forms to 200 nurses. The survey focused on nurses' perceptions of wearable health devices, assessing their impact on patient care, clinical decision-making, and workflow efficiency.

Result: The results of the study indicated that the nurses have a positive view of wearable health devices, with a high agreement regarding their capacity to improve the patient monitoring accuracy, enhance treatment decisions, and lead to a quicker patient recovery. Nurses also recognized the role of the devices in simplifying the workflow and enabling more direct patient care. Yet, there were some areas of uncertainty, most notably the devices were efficient in early detection of health problems and their capacity to save time on the routine monitoring. In general, while wearable devices were viewed as useful tools for enhancing the clinical outcomes and patient care, there is a requirement for further optimization in certain areas to achieve their full potential.

Conclusion: Wearable health devices are widely regarded by nurses as beneficial tools that enhance patient care and improve clinical efficiency. However, further advancements are needed to optimize their use in early detection and reduce the time spent on routine monitoring tasks to fully realize their potential in healthcare settings.

Keywords: Wearable Health Devices, Patient Care, Real-Time Monitoring, Detection, Personalized Intervention.

Introduction

In the fast changing healthcare scenario of the day, harnessing emerging technologies for the improvement of patient care has become ever more

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essential. Wearable health devices, such as smartwatches, fitness trackers, and biosensors, have emerged as significant tools for monitoring patient health in real time. These devices can provide critical data on vital signs, activity levels, and other health metrics, aiding in timely diagnosis and intervention (Lee et al., 2023).

The proliferation of wearable health technologies is evident in the global healthcare market, with projections estimating a value of \$195 billion by 2027, underscoring their perceived value in improving health outcomes and operational efficiency (Grand View Research, 2023). An examination of 179 studies with more than 10 million participants indicated that fitness trackers and accelerometers were among the wearables most widely used, monitoring mainly steps, heart rate, and sleep (Johnson et al., 2022). Affordability and simplicity further add to their capability to become standard components in patient care processes. Even with such developments, clinical adoption of wearable devices is not without challenges. Frontline clinical staff, such as nurses, frequently face hurdles in the form of insufficient training, technical sophistication, and data privacy, interoperability, and organizational support issues (Smith et al., 2021; Garcia & Fernandez, 2022). These hurdles can stifle successful deployment and diminish the potential benefits wearables can make to patient care delivery. Understanding human factors that affect technology acceptance is critical. Martin et al. (2023), understanding the human factors involved in technology adoption is crucial for designing effective implementation strategies. However, there is a lack of empirical evidence on the specific challenges nurses face and how these influence the broader outcomes of wearable device integration in healthcare. This research intends to assess the role of wearable health devices in improving patient care through their real-time monitoring, capacity to enable early detection, and delivery of tailored interventions. It further intends to determine the factors impacting nurse adoption and suggest approaches that can maximize integration into day-to-day healthcare practice.

Methods

Research Design

The study uses a descriptive-correlational quantitative research design to investigate the ways in which the wearable health devices improve patient care by looking at their adoption by nurses and their effects on clinical outcomes. It seeks to evaluate the correlation between the factors related to nurses and the adoption of wearable technologies, with outcomes including the enhanced vital sign observation, hospital readmission reductions, and improved workflow optimization. By considering both the facilitators and hindrances to the adoption,

the study aims to yield evidence in favor of the large-scale use of wearable devices within healthcare environments (Creswell, 2013; Polit & Beck, 2017).

Respondents of the Study

The study will involve 200 nurse who are actively involved in using wearable devices to their patients' respondents selected using Slovin's Formula with a 0.05 margin of error. A purposive sampling method will be applied, allowing the selection of participants based on relevant traits and experiences aligned with the study's objectives. Data will be collected via a structured questionnaire administered through Google Forms, with informed consent obtained electronically to ensure ethical compliance.

Instruments of the Study

The research instrument is self-formulated and self-structured and undergo content validation. Pilot testing will also be done to check the reliability of the content to the geographical location; it will then be submitted for analysis to determine the reliability and consistency of the content. Expert validation is required for researchers to address obstacles impeding performance or the capacity to complete tasks and develop workable solutions to these issues.

Result

Demographic Profile

Age

The respondents are primarily young and middle-aged adults, with 26.7% falling within the 21-31 years old age group.

Gender

The sample shows a slight gender imbalance, with 53.4% of the respondents identifying as female.

Years of experience

In terms of professional experience, the majority of respondents 29.8% have 6-10 years of experience, followed by 28.2% with 11-15 years, and 20.6% with 1-5 years of experience.

Educational background

Regarding educational background, the largest group of respondents holds Bachelor's degrees 33.6%, followed by those with Doctoral degrees 38.2% and Master's degrees 28.2%.

Importance of Wearable Health Devices in Patient Care Real-Time Monitoring

The results suggest a generally favorable attitude toward wearable health devices from the nurses. Nurses highly agreed that the devices enhance the accuracy of patient monitoring and facilitate the early detection of changes in patients' conditions. They also accepted that wearable devices facilitate timely clinical decisions, increase the efficiency of monitoring multiple patients, and raise confidence in

assessing patients. In general, nurses acknowledge the utility of wearable technology in real-time monitoring, but also envision room for improvement in utilizing it in clinical practice.

Similarly, the use of wearable devices also supports evidence-based nursing practice by generating large datasets that can be analyzed for trends and patterns in patient health. Such data facilitates predictive modeling, allowing nurses to anticipate complications and intervene proactively (Taylor & Nguyen, 2023). These capabilities are especially valuable in high-acuity settings, such as intensive care units, where continuous monitoring is critical to patient survival (Hernandez & Diaz, 2023).

Early Detection of Health Issues

The data indicates a mixed view of wearable health devices among nurses. Although there is consensus on their efficacy in a critical care scenario specifically in enhancing a timely intervention and minimizing patient morbidity, nurses are unsure about the devices' capacity to identify potential health problems early and avoid complications. There are also some concerns about the reliability of data from these devices for the purpose of directing preventive care. Generally speaking, wearables are valued for acute situations, but in early detection and prevention, their perceived worth is still low.

The data link with the result indicates that the adoption of wearable health devices in nursing practice has the potential to significantly enhance

patient care by enabling real-time health monitoring and personalized interventions. Devices such as smartwatches, fitness trackers, and biosensors provide continuous data on vital signs, activity levels, and other health metrics, which can aid in early detection of complications and improve patient outcomes (Li et al., 2023).

Personalized Intervention

The data interpretation indicates that the nurses have a high positive attitude toward the wearable health devices. They view these devices as being effective in enhancing the clinical workflow, improving the accuracy of treatment decisions, enabling quicker patient recovery, and providing more time for direct patient care. Yet, there is some of neutrality about their capacity to decrease the time spent on a routine monitoring activities, suggesting an area where there is an additional development or support might be necessary. Generally, wearable devices are appreciated for their contribution to the advancement of a personalized care and enhanced patient outcomes.

This also indicates that the health trackers can collect and transmit patient data, enabling proactive management of health conditions (Parker et al., 2023). These wearables can provide continuous health monitoring, which supports early intervention and personalized care (McCormack & McCance, 2022).

Real-Time Monitoring	Mean	SD	Verbal Interpretation
1. I believe wearable health devices improve patient monitoring accuracy	4.53	0.50	Strongly Agree
2. I feel that wearable devices help me detect changes in patients' conditions earlier.	4.52	0.50	Strongly Agree
3. I rely on wearable health devices to make timely clinical decisions.	3.96	0.81	Agree
4. Wearable health devices enhance the efficiency of monitoring multiple patients.	3.95	0.82	Agree
5. I feel more confident in my patient assessments when using wearable health devices.	4.02	0.81	Agree
Category Mean	4.20	0.69	Agree
Early Detection of Health Issues	Mean	SD	Verbal Interpretation
1. I find that wearable health devices help in identifying potential health issues before they become severe.	3.02	1.27	Neutral
2. Using wearable health devices reduces the likelihood of preventable complications.	3.13	1.39	Neutral
3. Wearable devices improve my ability to intervene in critical patient situations.	4.50	0.50	Strongly Agree

4. I believe wearable health devices contribute to reducing patient morbidity.	4.51	0.50	Strongly Agree
5. I trust the data from wearable health devices to guide preventive care measures.	3.19	1.38	Neutral
Category Mean	3.67	1.01	Agree
Personalized Interventions	Mean	SD	Verbal Interpretation
1. I find that wearable health devices reduce the time spent on routine monitoring tasks.	3.18	1.41	Neutral
2. Using wearable health devices allows me to focus more on direct patient care.	4.44	0.50	Strongly Agree
3. I feel that wearable health devices improve the overall workflow in the clinical setting.	4.51	0.50	Strongly Agree
4. Wearable health devices enhance the accuracy of treatment decisions.	4.53	0.50	Strongly Agree
5. I believe that wearable health devices contribute to faster recovery outcomes for patients.	4.52	0.50	Strongly Agree
Category Mean	4.24	0.68	Strongly Agree

Legend: 1.00-1.80 - Strongly Disagree; 1.81-2.60 - Disagree; 2.61-3.40 - Neutral; 3.41-4.20 - Agree; 4.21-5.00 - Strongly Agree

Conclusion

In conclusion, the study indicates the favorable adoption of wearable health devices by nurses, especially for improving clinical workflow, enhancing decision-making, and aiding patient recovery. Nurses appreciate the devices because they enable real-time information, timely interventions, and more effective patient care. There is, however, some doubt about their ability to cut down on a routine monitoring activity and in early warning of a possible health problem. To realize the full potential of the wearable devices, more optimization must occur, especially in the domains like preventive care and relieving routine task burdens. In general, wearable health devices have a great potential to enhance patient care, but in realizing the full potential of such devices in the clinical practice depends on overcoming these outstanding challenges.

Conflicts of Interest

The authors declare that there is no conflict of interest in this manuscript. Results have been deduced objectively; nothing influenced this result by any individual, monetary, or institutional interests. In effect, utmost endeavors were in order to conduct a bias-free operation of gathering and analyzing the data into interpretation and producing a study based on merit, away from research inconsistencies.

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