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NAVIGATING THE CHALLENGES OF WEARABLE HEALTH DEVICE ADOPTION IN NURSING: TECHNOLOGICAL BARRIERS, TRAINING DEFICITS, AND THE NEED FOR ORGANIZATIONAL SUPPORT

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Abstract

Background: In healthcare environment the wearable health devices like smartwatches, fitness trackers, and biosensors are emerging as important tools for real-time patient monitoring and enhanced clinical decision-making. These technologies hold high potential for the enhancement of patient care, particularly by offering continuous data for vital signs and physical activity. Nevertheless, the success of these devices depends on significantly upon the frontline health professionals who implement them especially nurses. Despite of these advantages, few nurses have faced obstacles in their acceptance of a wearable health devices from technology complexities, low training levels, and disparate organizational support. Though some centers support the acceptance of these gadgets, uncertainty remains concerning the scheduling of wearable technology within regular practice. An understanding of the experiences and perceptions of the nurses is the key to spanning the chasm between technological advance and practice and to guarantee that such innovation ultimately contributes to substantive patient outcome enhancements.

Methods: This research employed a descriptive-correlational quantitative design, gathering data from 200 nurses using structured questionnaires administered through Google Forms. The survey aimed to explore nurses' perceptions of wearable health devices, specifically examining their effects on patient care, clinical decision-making, and overall workflow efficiency.

Result: The findings indicate that nurses are a little ambivalent with regard to wearable health devices. They don't think they are too hard to use, but they're not really easy either. Most acknowledge that they struggle to use the devices independently, which indicates that there is definitely a need for more practical training. While some assistance and resources exist from their organizations, it's not always apparent whether or not there's a high degree of commitment to adopting this technology to the fullest. Nurses well understand the positive benefits that these devices have the potential to make to patient care, but concerns with usability, insufficient training, and conflicting signals from leadership are keeping adoption wider in their daily practice.

Conclusion: In conclusion, although nurses see the promise of wearable health devices, their successful implementation is impeded by usability issues, insufficient training, and ambiguity regarding organizational commitment. Improving training and more robust institutional support will help overcome these obstacles so that wearable technology can be fully incorporated into nursing practice.

Keywords: Wearable Health Device, Challenges, Nurses, Technological Barriers, Training Deficits, Organizational Support.

Introduction

In contemporary medicine, wearable devices can provide critical data on vital signs, activity levels, and other health metrics, aiding in timely diagnosis and intervention (Wynn, M. et al., 2023). These technologies enable timely diagnosis and intervention, thus enhancing patient outcomes. However, the potential benefits, many nurses face challenges in adopting wearable health devices due to a lack of training, resistance to change, and technological complexities (Johnson et al., 2022).

Despite their benefits, many nurses encounter significant obstacles in adopting wearable health devices. These include technological complexities, a lack of adequate training, and resistance to change (Johnson et al., 2022). Organizational issues like inadequate support systems, device interoperability, and privacy over data concerns also hold up implementation (Smith et al., 2021). These challenges not only impact the effectiveness and reliability of the nurses but also undermine the possible benefits wearable technologies have in providing higher levels of patient care.

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Though studies have examined the usability and efficacy of wearable technology - where evidence documents their capacity to track steps, heart rate, and sleep among millions of participants in diverse global health settings (Grand View Research, 2023) - only limited empirical studies address the unique issues nurses encounter in embracing them (Garcia & Fernandez, 2022). This disparity highlights the importance of a comprehensive strategies that involve training, technical assistance, and organizational preparedness (Martin et al., 2023). Resolving these challenges is a paramount to ensure optimal use of wearable health devices to improve nursing practice and facilitate improved patient outcomes.

The research seeks to explore the uptake of the wearable health devices among nurses, focusing on the technological limitations, training deficits, and organizational support required for successful integration. Through the identification of the drivers of the uptake and their implications for patient care, the research seeks to shape policy and practice in technology-enabled healthcare provision.

Methods

Research Design

The study uses a descriptive-correlational quantitative research design to examine how the wearable health devices enhance patient care by exploring their adoption among nurses and their impacts on clinical outcomes. It aims to assess the correlation between the nurse-related factors and the adoption of wearable technologies, with results being the increased vital sign monitoring, reductions in hospital readmission, and enhanced workflow optimization. Through an examination of both the facilitators and the barriers to adoption, the research hopes to provide evidence in support of the extensive use of wearable devices in healthcare settings (Creswell, 2013; Polit & Beck, 2017).

Respondents of the Study

The research will engage 200 nurse actively practicing the use of wearable devices to their patients respondents chosen according to Slovin's Formula with a margin of error of 0.05. Purposive sampling will be used, and participants will be chosen based on applicable characteristics and experiences that match the goals of the study. Data will be gathered through a structured questionnaire using Google Forms, and informed consent will be electronically obtained to maintain ethical standards.

Instruments of the Study

The research tool is self-formulated and self-structured and undergone content validation. Pilot testing also be conducted to test the reliability of the content to the geographical location, it has been forwarded for analysis to ascertain the reliability and consistency of the content. Expert validation is necessary for researchers to deal with challenges hindering performance or the ability to do tasks and formulate workable solutions to these problems.

Result

Demographic Profile

Age

The respondents are mostly middle-aged and young adults, with 26.7% belonging to the 21-31 years old age bracket.

Gender

The sample is slightly gender imbalanced with 53.4% of the respondents being female and the rest were male.

Years of experience

Regarding professional experience, most respondents 29.8% have been in the field for 6 to 10 years, followed closely by 28.2% with 11 to 15 years of experience, and 20.6% who have worked for 1 to 5 years.

Educational background

In terms of educational background, the highest proportion of respondents hold Doctoral degrees (38.2%), followed by those with Bachelor's degrees 33.6%, and Master's degrees 28.2%.

Barriers to Adoption of Wearable Health Devices

Technological barriers

The findings indicate that the nurses perceive wearable health devices as neither too difficult nor totally easy to use, on a neutral basis overall. Most of them confess that they cannot use the devices independently, which indicates a major impediment to the autonomous use. Although the interface is not perceived as overly complex, neither do they regard it as being very user-friendly. Troubleshooting was found to be moderately difficult, and nurses are not sure if they require additional time to master the devices. These findings indicate the necessity of easier design and improved training for facilitation of effective use and minimization of frustration.

A similar study indicates big machine learning and data analysis enhance the use of technology in practice by offering evidence based recommendations and forecasting of patient outcomes. Advanced analytical tools can also make use of big data and complex patient histories to give recommendations on preventive measures, outcomes, and treatments. These capabilities are not only useful for clinical decision making but also for rationing care and allocating available resources. For example, machine learning, such as screening tools, can assist nurses in recognizing poor sepsis patients and increase the chances of their survival

through early treatment (Rony et al., 2024). However, the adoption of technology in nursing practice is not without some difficulties.

Training deficit

The information indicates that nurses overall have a neutral perception regarding the training they receive on wearable health devices. They neither feel adequately trained nor feel well-supported by their organizations regarding learning resources. While they do recognize the potential benefits of additional training and possess some awareness of the applications of the devices in healthcare, their answers still demonstrate uncertainty. Notably, there is a consensus that more training would enhance their confidence in working with the devices. This reflects directly on a gap in existing training programs and identifies the necessity for more formal and all-embracing programs to further prepare nurses in embracing wearable health technology.

A similar study indicate that wearable health technologies not only enhance patient care but also have a transformative impact on nurses' workflows. Technologies such as portable monitors and smart beds enable nurses to respond quickly to emergencies while reducing manual checks (Western Governors University, 2021). Additionally, these devices allow for continuous monitoring, improving the efficiency of patient care and ensuring better access to healthcare, particularly for patients in remote areas or with chronic conditions (Al Zaidy et al., 2024).

Organizational support

The result shows that nurses consider organizational support for the use of wearable health devices as neutral. While most concur that their organizations support the use of such technologies and offer requisite resources, they do not concur that inadequate support or excessive workload is a significant discouragement. However, the neutral response regarding whether the organizations prioritize wearable devices for enhancing the patient care suggests some of uncertainty about the level of the institutional commitment. While there are encouraging signs of support, these findings point to a need for a stronger, more consistent organizational backing to fully integrate wearable health technology into nursing practice.

The data also linked with despite their advantages, the adoption of wearable devices in nursing practice faces several barriers. Rahman and Wang (2021) highlighted that nurses often encounter difficulties related to the usability of these devices, insufficient training, and concerns about data privacy and security. Organizational support, including training programs and investment in technology infrastructure, plays a crucial role in overcoming these challenges (Smith & Gonzalez, 2023).

Technological Barriers	**Mean**	**SD**	**Verbal Interpretation**
1. I find wearable health devices challenging to operate without assistance.	4.48	0.50	Strongly Agree
2. The interface of wearable health devices is user-friendly for healthcare professionals like me.	2.92	1.46	Neutral
3. I feel overwhelmed by the complexity of wearable health devices.	2.81	1.47	Neutral
4. I find troubleshooting wearable health devices to be difficult.	3.19	1.50	Neutral
5. I need more time to familiarize myself with the functions of wearable health devices.	3.05	1.35	Neutral
Category Mean	3.29	1.26	Neutral
Training Deficit	**Mean**	**SD**	**Verbal Interpretation**
1. I feel adequately trained to use wearable health devices in patient care.	2.80	1.43	Neutral
2. I would benefit from additional training programs on wearable health devices.	2.97	1.31	Neutral
3. My organization provides sufficient resources for learning about wearable health devices.	2.91	1.36	Neutral
4. I am aware of the potential applications of wearable health devices in healthcare.	2.89	1.51	Neutral

5. I believe that improved training would increase my confidence in using wearable health devices.	3.94	0.82	Agree
Category Mean	3.10	1.29	Neutral
Organizational Support	**Mean**	**SD**	**Verbal Interpretation**
1. My workplace encourages the adoption of wearable health devices in daily practice.	4.03	0.81	Agree
2. I feel that my organization provides the necessary resources to integrate wearable health devices effectively.	3.98	0.80	Agree
3. The lack of organizational support discourages me from using wearable health devices.	2.00	0.85	Disagree
4. I feel my workload is too high to focus on learning new technologies like wearable health devices.	1.95	0.81	Disagree
5. I feel that my organization prioritizes the use of wearable health devices in improving patient care.	2.98	1.40	Neutral
Category Mean	2.99	0.93	Neutral

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 findings shows that nurses have identified the usefulness of wearable health devices in patient care, several issues prevent the effective uptake. The complexity in operating the device, low usability, and moderately high difficulties with troubleshooting indicate that more user-centered designs and better support systems need to be achieved. Also, the neutral attitude towards training and absence of robust organizational support reflect that efforts now are not enough in preparing nurses with the required skills and confidence. While workplaces are indicative of encouragement and resource provision, doubt regarding institutional commitment still exists. On the whole, successful incorporation of wearable health devices in nursing practice necessitates less complicated technology, more rigorous training programs, and more aggressive involvement on the part of healthcare organizations to totally help nurses to accept this innovation.

Conflicts of Interest

The authors declare that there are no significant competing financial, professional, or personal interests and might have influenced the performance or presentation of the work described in this manuscript.

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