EDITORIAL

Advancements and Challenges of Wearable Technology in Healthcare

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INTRODUCTION

The extensive use and utilization of wearable technology have increased many folds, bringing about innovative changes in human health. In the wake of this usage, the movement in medicine to external devices like smartwatches is in medical service areas and beyond, with findings that these devices enhance better care and management of diseases, ensuring one's overall well-being. We are just among those who employ wearable technology in health practice, and therefore, we have first-hand the advantages and disadvantages of this modern health innovation. The focus of this editorial paper is to briefly address the multi-faceted area of the application of wearable technology in medicine and health, discussing the pros and cons as well as opposing views on its use.

PERSONAL EXPERIENCE

We entered the wearable health technology business when we became owners of a smartwatch with embedded health monitoring features. The possibility to manage our pulse, activity levels, and sleep patterns with precisely timed surveillance attracted us to make it part of our routine. Monitoring our heart rate during exercise, addressing the number of steps we have made during the day, and setting reminders of standing straight and moving became the main activities in our routine. This awakening to the importance of our health, in turn, allowed us to make our lifestyle better by making informed decisions that would beef up our health and well-being.

ADVANTAGES OF WEARABLE TECHNOLOGY IN MEDICINE

Wearable technology is emerging as a non-time-consumable recreation tool in the medical and healthcare industry, offering many benefits to patients and healthcare professionals within healthcare solutions. The various advantages of wearable technology in medicine are discussed below.

Health Monitoring Made Personal

Individuals can get power over their health personally through small devices that provide customized information regarding their health indicators. These personal devices continuously record the key signals, i.e., heart rate, blood pressure, sleep quality, and activity level, making it possible for users to monitor their progress (1). With immediate access to the data, individuals can spot patterns, deduce their future health risks, and promptly pay attention to the need for timely medical assistance when abnormal figures in the data are detected. For example, a heart rate faster than usual or poor-quality sleep of the massive kinds can inform these women early enough to prompt them to seek medical help. Through wearable technology that promotes early intervention, many healthcare issues can be precisely measured, and health outcomes and overall well-being can be improved.

Remote patient monitoring

The use of wearable technology in medicine is spearheaded by the fact that it facilitates remote patient monitoring. This is specifically convenient for people with chronic conditions or those who must be under constant healthcare surveillance (2). In the past, patients with chronic illnesses of diabetes, hypertension, or cardiovascular disorders have been obligated to visit medical centres often for control and modalities. Consequently, wearable items with intelligent sensors and connected features enable medical service providers to keep track of patients' vital signs and health parameters continuously and remotely. This remote monitoring is characterized by not only being manageable for patients so that they need to visit hospitals less frequently, but also the nurses and doctors on duty can intervene immediately if there are any abnormalities or emergencies. Additionally, remote patient monitoring spreads the level of autonomy and independence among people living with the diagnosis and within the limits of their current home.

Promotion of an Active Lifestyle

Activity-tracking fitness bands and smartwatches are well adapted with these features to help propel the movement towards leading an active, healthy lifestyle to fight against the increasing number of chronic diseases. These devices motivate individuals to exercise regularly because they are set to be achievable, provide instant feedback about their actions, including how many steps they have taken, and encourage responsibility. Likewise, users can choose a limit of steps per day, track their progress, and be reminded to move when they have been stationary for quite some time. Engagement and fun are encouraged by the living of wearables such as challenges, rewards, and social app sharing of devices (3). Whether it functions as a supplement in the long term or the information is provided various times, the person can collect enough enlightenment to trigger changes in the adoption of healthy habits, leading to boosted cardiovascular health, weight management, and improved fitness levels.

Integration with Telemedicine

Wearable gadgets make it easier to run monitoring through telemedicine platforms, which improves the deliverance of health services, especially in areas that are difficult to get to or where people don't have access to medical services. Telemedicine is a computer-mediated consultation that can be done between a doctor and patient without considering the barriers of location and the provision of healthcare services (4). Wearables create innovative teleconsultation capabilities by giving the specialists needed health information who can then have objective decision-making conversations. For instance, one can easily monitor lung functionality through devices like wearable spirometers, and with real-time data, their health provider can assess them remotely. Wearable technology boosts healthcare accessibility and patient involvement and reduces healthcare expenditures associated with physical trips to healthcare settings.

Research and Data Analysis

The pooled information from these wearables used in research can advance medical sciences and allow a better comprehension of health trends, morbidity, and treatment performance. Researchers can benefit from combining the large-scale data generated by wearables and the vast data (2). They can show the connections and forecast the health outcome by analysing those. These analyses will help to develop individualized interventions. Likewise, academics can explore the outcome of physical activity on mood using activity patterns collected from runners' sensors or improve diabetes management methodology, which considers the data from continuous glucose monitoring with wearable sensors. Observational studies in natural settings where data are collected directly from the real world with attributes that provide a better understanding of the dynamics of health and disease than conventional clinical research methods.

KEY ISSUES AND GAPS

Data Ownership and Patient Trust

Ownership of health data from wearable digital health technologies (DHTs) can be blurred, as they involve the body - both private and public - as the patients, device manufacturers, and healthcare systems can be the potential owners of that data. The role of the patients in ownership rights should be particularly successful given the available evidence reflecting both individual patient treatment and population research. Public trust toward wearable DHTs, namely, their popularity, is also paramount for their implementation. Data security and privacy should be discussed to ensure patients' confidence in the system. In addition, initiatives to empower patients, particularly those with insufficient tech exposure, to effectively use digital technologies will be indispensable to ensure their adoption.

Interoperability and Patient Empowerment

Specifying the criteria for wearing DHTs is crucial as it would make the data reliable with high accuracy and simultaneous interoperability. Collaboration among regulatory organizations, standards bodies, and technology providers is critical to the sound development and implementation of such standards. Enabling patients to use data derived from wearable DHTs intelligently involves issues relative to private data control, making patients comprehend justifications and developing their trust. The patients should determine the state of data while being informed on how it serves strictly for their health. Trust in wearable bio signals DHT systems that ensure patient agency in making healthcare decisions is an indispensable component.

Integration into Clinical Environments

Applying the data obtained by DHT devices into clinical practice faces multiple impediments because the volume of data should be controlled, data should be accurate, and they should be made a part of the electronic health record (EHR). The efforts to improve data transmission, analysis, and display are being carried out to quicken clinical thinking.

CHALLENGES AND LIMITATIONS

Despite the many benefits, there are some hitches with these technologies. Data accuracy and reliability are still issues since the information users transmit must be accurate to find its way into EHRs for clinical use (5). In addition, there are issues related to privacy and security, as the digitization of health information requires trusted surveillance techniques to avert unauthorized access.

This is problematic since users must comply in the long term and be engaged, which could be challenging. Other considerations bring about the variance of access to wearable devices in socioeconomic and regional setups, which could lead to more health differences. Regulatory issues make it hard for manufacturers to

comply with strict laws and standards to ensure safe and effective products.

FUTURE DIRECTIONS AND CONCLUSION

Artificial intelligence, data analytics, and sensor technologies are poised to offer better diagnosis, personalized treatment, and advanced prevention strategies (6). However, this realization needs due consideration for issues on data privacy, regulatory compliance, and universal access to wearables, and such things will likely be the only means by which the great potential and promise of increasing global health can be translated into reality.

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