Trends in Health Wearables

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Introduction:

In the last decade technology has advanced tremendously in all fields and health sector is equally benefited. Healthcare is more likely known as e-health in this era of information and technology because of its advancements and opportunities given to health sector. E-health proposes more convenient and approachable accessibility for the health providers and patients. Information technology and electric health together have made the health sector more updated and idealized for individuals. Health devices, appliances and wearables are kind of recent innovations in healthcare. With the trend of health devices and health wearables there have been certain challenges in healthcare sector as well when it comes to clinical acceptance and practice. This literature review aims to define current health scope of wearables, challenges and future if wearables in health industry.

Methods:

A thorough study of several literatures have been done to select articles for this literature review. This review consists of 20+ articles. Following web portals were used to search the articles: Google scholar, PubMed, ProQuest and BMJs. Statistical data was taken from Australian Institute of Health and Welfare and U.S health records. Key words for searching the materials were e-health, health technology and health wearables.

Discussion:

Information Technology has privileged many industries in last decades and has rationalized our health industry by various innovations and updates in healthcare sector. There is a great pressure on health care because of chronic diseases patients, aged care sector and disability patients (1). For bringing an equilibrium in healthcare, Information and technology provides a developmental aid by the ideas of digitalizing the healthcare (2). This digitalization is patient centered, keeping quality healthcare services in first consideration. OECD countries tend to have more aged population in the future and aged care is the upcoming threat for healthcare community (3). Likewise, in Australia the aged care is the most concerned challenge and it contributes to one of the most costly parts of the health burdens (4). Besides financial concerns, aged care is highly exacting for the aged population to manage themselves with chronic diseases, disabilities and lifestyle patterns.

Electronic Health (e-health) is bringing revolutionary changes in healthcare sector to establish accessible healthcare for the aged population and people with disability and chronic diseases. Information and communication technology (ICT) contribute much to allow e-health for making advancements in healthcare (5). E-health has shifted the paradigm of healthcare on a wider scale in last decade which has proven to be

effective and beneficial for the practitioners and individuals (6).

Other than chronic diseases and aged care e-health is introducing latest technology for health and fitness as well. Sports medicine, athletics and fitness pros are being facilitated with the innovations of fitness trackers, health bands and wrist wearables (7). Monitoring health status and established goals is way convenient than before enabling individuals to have self-control over their fitness tracking and health planning (8). Literature suggests that military services use health wearables in training sessions and academic processions allowing trainers and individuals to keep a synchronization (9).

Health informatics and Information communication technology fuse together for providing a digitalized platform for healthcare (10). This digitalization has upgraded the patients into digital patients and it has brought more challenges for the healthcare professionals. The ICT based e-health has been adopted readily and been used by many individuals (11) worldwide which has made this sector an emerging technology with its potential challenges. Understanding the nature of digital health and showing skillful proficiency is another demand for the utility of e-health by health professionals as individuals have given a charge for their health maintenance and tracking (12).

The IOT which is known as Internet of Things has proposed potential solutions to the health sector issues of cost efficiency and resources relocation (13) .Wearable technology has made it more accessible for individuals and healthcare researchers, health professionals to monitor, process and collect the data for clinical purposes and research aims (14). With this rapid acceptance in clinical and academic health community, e-health and ICT brings more demand to accept the challenges and unexpected incidents that can support unreliability on e-health in future (15).

Acknowledging the use and acceptance of e-health and its innovations like health devices and health wearables is the first step to explore the technological stream, how e-health works. This literature is focusing more on health wearables and its implication in health sector. Health wearables come in different forms and a huge range of fitness trackers, health monitoring bands, GPS bands for patients of dementia and Parkinson's disease (16). Clinical Data monitoring has been made convenient in hospitals because of health wearables as they can help to monitor clinical data in continuity over a particular span of time in a day or week (17). E-health promotes health wearables to work on the principles of connectivity, localization, communication, constant monitoring and evaluation(18). Health wearables allow the clinical data such as heart rate, pulse rhythms, Blood Pressure monitoring and Blood Sugar levels to be recorded and synchronized with patients' profile and health data at medical centers or with the physicians (19).

How this is possible to monitor and synchronize human data depends upon software sensing integration technology that allows sensing and recording the data by emitting signals from wearables and transmission through skin (20). All these devices and health wearables work upon principles of quantified self-technology QS (21). It is evident from literature that health

wearables are proposing half of the solutions for current health issues, and sharing the burden of healthcare industry, but there are certain challenging risk factors which are associated with this rapidly growing technology (8).

Wearable technology has progressed from the era of invention of first spectacles, back in 13th century to date when this technology has advanced to launch a range of healthcare devices and wearables including contact eye pieces, hearing aids, fitness trackers, health monitors and GPS trackers (22). Latest trends in exchange market of healthcare indicate that health wearables have not only advanced to the current technological revolution but it tends to expand more rapidly in the future (23). And with the rapid acceptance and clinical implementation of this technology there is a great demand to fill the gaps between understanding the ICT based nature of wearable technology and its implementation in clinical practice (24). In some regional practices worldwide Food and Drug Administration (FDA) is highly responsible to take notice of clinical proficiency and eligibility for healthcare providers to permit them prescribing such technological aid in healthcare (25).

Health wearables are assisting in various field of healthcare including chronic diseases, aged care medicine, disability patients and rehabilitation medicine. Starting from chronic diseases, wearables help diabetic patients to keep a good control and record for daily BSL, assisting them to taper life style depending upon BSL. This recorded data can directly be shared with the medical centre or physician via mobile applications or e-health portals (26). Patients with COPD

and OSA demand monitoring of their oxygen levels constantly, wearables and non-invasive devices can help them to record their oxygen consumption and wearable masks can help them administering oxygen when required (27). Aged care is one of the most concerning health issue of OCED countries and Parkinson's disease and dementia patients account to the greatest percentage of aged population (28). Dementia patients are highly challenging to be taken care off and the constant care demand may bring a turnover in care providers but wearable technology has proposed efficient solutions or this. Wearable technology has enabled GPS tracking (29)for patients with memory loss symptoms or dementia. Dementia patients are easily trackable for the care providers or family members, making it convenient for the patients and care providers (30). Parkinson's disease can be managed because of gait tracking wearables, which can enable emergency services upon detecting any falls (31). This data can be recorded and shared with the physicians as well to track progress in medication or gait changes, additionally falls are frequently reported in aged care which has made easy to approach and report with the aid of wearables(31) .

Sleep monitoring has been made more convenient and accessible for patients with sleeping disorders or among infants (32). It is foreseen that in future baby monitoring would be more convenient as wearables are making advancement in healthcare, proposing ideas and solutions or all health issues. Monitoring baby posture, sleeping pattern and vital signs would be more accessible and possible (33) .

Health wearables are markedly being promoted and accepted in health and fitness sector. Health instructors and trainees can have a great communication with data integration of their calories count and workout plans with wearables. Wearables allow individual fitness tracking by enabling features of calories count, physical exercise level and BMI monitoring (34). Every individual is free and in charge to keep a control on self-management and fitness tracking.

The statistical data analysis suggests that health industry has raised millions of financial incoming by implication of wearables. Great brands like Apple, Nike and Adidas are making health wearables too which are being more appreciated by individuals (24). The U.S health market has raised revenue of almost $35 million in last 4 years whereas globally there is a difference of $4 billion (35). This shows how wearables are serving in healthcare community and is expected grow more rapidly in future.

Conclusion:

Health information and technology has made tremendous progress in shape of e-health and health wearables are one of most important aspect of e-health. Wearables are effectively assisting in fields of sports medicine, health and fitness, chronic medicine, aged care, disability and rehabilitation. Efficient understanding and skills are mandatory for the health care providers to understand and prescribe such technology. Besides its efficient usage in healthcare, wearables demand great concept of privacy and confidentiality as well. Information and communication technology is expected to suggest solutions for all the potential challenges as well. From the past to date, it is evident that e-health is making rapid advancement in healthcare and wearables enable health access or every patient and individual more efficiently. Wearables have provided accessibility to digital health monitoring and record keeping.

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