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Future Well-Being with Digital Health Technologies

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Abstract: ***A wide range of opportunities are presented by digital healthcare, and it may lead to better patient care. Tools like machine learning, mobile applications and sensors, wearables, and telemedicine may be able to enhance the conventional paradigm of clinical history, examination, differential diagnosis, and therapy. The current epidemic has accelerated the transition to this future, although significant issues still exist.***
Since the start of the twenty-first century, the cultural shift known as digital health has shaped the fundamental principles of healthcare. The traditional hierarchy between patients and doctors is evolving into a collaboration on an equal footing. In the following years, this transition will dominate the significant developments in healthcare. Patients will become the point of care, receiving diagnosis and treatment wherever they are thanks to portable diagnostic devices, or artificial narrow intelligence-based algorithms.
These advancements will redefine what is meant by "well-being," as patients will seek medical attention prior to the onset of their first symptoms, requiring the creation of preventative strategies by professionals using a vast quantity of information about the patient and data from studies. Such innovations would invariably bring with them enormous concerns in terms of privacy, freedom of choice, and patient safety. This article examines probable future scenarios for digital health and seeks to address the key issues therein.

Keywords: Digital Healthcare, Artificial Narrow Intelligence-Based Algorithms, Portable Diagnostic Devices, Virtual and Augmented Reality

1. INTRODUCTION

The COVID-19 pandemic has advanced the healthcare industry's digital revolution, which will change many of the core tenets of medical treatment. We are aware that there may be numerous detours on this route to advancement.[7] the terms "health" and "well-being" have always had a close relationship since they both have an effect on one another. In 1948, the World Health Organization defined health as “not merely the absence of disease or infirmity but a state of complete physical, mental, and social well-being.”

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Changes to health and well-being in the 21st century:
The fundamentals of healthcare and the practice of medicine have undergone a cultural revolution in the 21st century as a result of the democratization of knowledge, the migration of empowered patients, and the advent of digital health technology.

The doctor-patient relationship used to be hierarchical, but this is beginning to change into a collaboration on an equal footing. Patients now have access to previously unavailable research, information, and technology as the medical ivory tower begins to crumble. Health sensors, genetic information, artificial narrow intelligence, and other cutting-edge technology are now widely used. There are grounds to think that what well-being implies will fundamentally shift as we look to the future of this century.

Early in the 21st century, people who have access to care focus on delaying receiving treatment as long as they can. Finding the appropriate therapies and receiving an accurate diagnosis might be difficult for persons who do not have enough access to modern healthcare. Healthcare is fundamentally ill care, where the majority of resources must be used to treat those who have a medical problem. People who want to lead a healthy lifestyle fall behind and are labeled as simply caring about their well-being.

According to how digital health technologies have begun to influence healthcare, it appears that most people will seek medical attention long before any symptoms or diseases manifest. To maintain a healthy lifestyle under specific conditions like the level of healthcare where they live, their economic situation, or their own personal habits and behavior, they will require data, knowledge, and expertise.

A Day in the Life of Human in Future
Customized smartwatch with a chatbot powered by artificial intelligence that works all day long. All of individual data, activities, and digital channels are accessible to it. It will use a smart alarm to wake up from light sleep in the morning at the ideal moment so that person feels energized for the day. Based on the results of microbiome and genome sequencing, a vast database is used to match the mood with the ideal meal that will provide energy.The gadget keeps the user motivated throughout the day, whether he is working or spending time with his family, and it displays graphs that illustrate how mood changes when going for a run at this time of day. The chatbot alerts the user if any important health parameters or vital signs change, and it compares the findings to millions of medical studies and the cloud-based knowledge of medical experts. Users are provided with detailed instructions if they need to perform any tasks.

The usage of chatbots might include voice pattern analysis to pick up on emotional undertones. With major financial investment raised to develop this technology, businesses (like Babylon) have heavily invested in the use of chatbots to diagnose patients in primary care.[7]

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Speech recognition technology has been around for a while, but with advances in processing power and machine learning, it may now be used in clinical settings during consultations for purposes more than merely transcribing letters. When you examine the patient's eardrums and say out loud, "Red, inflamed eardrum," the system suggests the diagnosis of otitis media and then provides a list of antibiotics from the formulary based on the patient's age and allergy status. This is how you might imagine talking to a patient while the system is transcribing as you speak. Ambient voice recognition is causing a lot of enthusiasm and has obvious uses for

increasing productivity and documenting therapeutic encounters. Microsoft just acquired Nuance, one of the industry heavyweights, for slightly around $20 billion.[7]

Fig 1: Digital health and medical technologies

Digital Health's Potential

With healthcare's current advancements, we may anticipate being able to treat most diseases within a few decades and beginning to concentrate on preventing illness rather than treating it when individuals become ill with the use of artificial intelligence (A.I.) based assistants. The question is not whether digital health can help move the focus from treating illness to enhancing wellbeing, but rather how we will need to change our notion of well-being in a time where cutting-edge technology continually look out for us to stop health problems from occurring.

Sleep alarms allow us to get up when it's most convenient and help us get better sleep over time. Gamified fitness trackers help us stay active and healthy for a long time. Data from the sequencing of the genome and the microbiome can help prevent illnesses, bad therapies, or negative effects. Mobile diagnostic tools and digital tattoos can quickly identify problems. The waiting lines for transplants are eliminated via three-dimensional bio printing. Better decisions and health advantages are infused into our lives by artificial intelligence.

Patients may become the center of care thanks to digital health technology. Doctors might help their patients navigate the minefield of digital tools, health information, and choices. The provision of healthcare will become more universal in a world where physical and geographical barriers do not limit available treatments and diagnostics. Patients who are aware of their options will want specialized therapies that are based on their unique demands and molecular/genetic composition. All of these will require a new level of data analysis that is

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beyond the capacity of a person. As a result, our lifestyles and the provision of healthcare will be overrun by artificially limited intelligence-based algorithms.

Fig 2: Digital health

Digital tools are available to help with remote assessment. These technologies range from software that can diagnose COVID-19 by listening to your cough to an app on your phone that can evaluate your gait stability. With the categorization of skin lesions using image analysis to quickly increase diagnosis accuracy, dermatology is at the forefront of this movement. In order to determine whether a mole may be malignant, Google already has software that employs machine learning from its enormous picture library.[7]

The true problem is figuring out how to take advantage of this new state of wellbeing without sacrificing the emotional connection, human touch, and freedom of choice.

TECHNOLOGIES THAT WILL SHAPE HEALTHCARE'S FUTURE

Mobile

In western nations, mobile phone ownership is widespread, with up to 65% of those over 65 and over 90% of those under 65 using smartphones.

These provide a huge possibility for healthcare as a continually carried personal communication device that may either actively or passively collect data on a patient's health.The phone's sensors have been used to create specialized health applications. This has created a significant opportunity to evaluate progress, detect illness onset sooner, and perhaps provide remote, affordable patient-centered treatments. With over 100,000 apps accessible on

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the Apple and Google app stores combined, there has been an explosion of programmes (apps) as a result of the obvious potential benefits. Numerous ailments have been handled, ranging from the tracking of Parkinson's disease with gait analysis and tap testing to cardiovascular care with heart rate, heart rhythm, and blood pressure monitoring, and to apps that support mental health.

A personal profile can be created on many health and wellness applications, and this profile will track important statistics like weight, calorie intake, and blood sugar levels. People can regulate their health more thanks to the accessibility of tailored healthcare. Additionally, consumers and their professionals can exchange health information.[8]

During the COVID-19 outbreak, a revolutionary idea called the contact tracing app was quickly prototyped and implemented. This made advantage of a phone's Bluetooth functionality to determine people's proximity to one another and to anonymously alert anyone who had come into touch with a virus-infected person. Only 28% of people downloaded the app, yet between September 2020 and December 2020, it saved almost 600,000 illnesses.[7]

IoT and Medicine

The Internet of Things (IoT) is a developing network of real-world items that can link to other internet-connected devices and systems and share data with them by using software, sensors, and other technologies. Wearable technology, monitoring, and integrated apps are used in the rapidly expanding sector of medical IoT to meet healthcare demands. The smart inhaler, a gadget that syncs patient usage with a smartphone app, is one example of how medical IoT might deliver improved versions of conventional medical products.

IoT for healthcare has several advantages, Improved convenience, Remote monitoring, Lower costs for patients and hospittals.[8]

Wearable

Consumer wearable technology is becoming more and more common. Typically, these have been rings, wristwatches, gloves, inner soles, or headgear, Through embedded sensors, they collect physiological data . Then, either on the device itself or connected to a smartphone app, data are translated. As a result, professionals now have access to more data than ever before An example of this is guided-exercise programmes, which have already showed potential in supporting mental health-related difficulties. Telehealth These could prevent unneeded medical visits, but they might also mislead patients, so they should be carefully considered.[7]

Telehealth

The delivery and facilitation of health and health-related services (such as medical treatment, provider and patient education, health information services, and self-care) using telecommunications and digital communication technology is known as telehealth.[7] Telehealth is the practise of delivering healthcare services via the use of digital communication tools including computers, mobile phones, and tablets.

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Healthcare professionals had to make a swift change when the pandemic decreased in-person visits. Over 43% of Medicare primary care visits in April 2020 were carried out via telehealth services.[8]

The COVID-19 virtual early discharge wards serve as one such. A nurse or doctor called these patients on the phone or connected them via video calling software. They received an oxygen saturation monitor and information on who to contact if their clinical condition worsened. This method of treating patients at home was discovered to be secure, well-tolerated, and economical.[7]

Augmented and virtual reality

Virtual reality was formerly thought of as a gimmick that belonged in video games. In addition to games and entertainment, virtual reality (VR) and augmented reality (AR) technologies now provide a wide range of useful applications. Virtual reality (VR) aids in surgical planning and training in healthcare, making treatments more pleasant for both patients and healthcare professionals. Numerous studies have examined the effectiveness of VR in managing chronic pain and maintaining mental health.

In a research on the anticipated growth of AR and VR in healthcare, MarketsandMarkets predicted a 30.7% annual growth rate between 2017 and 2025.[8]

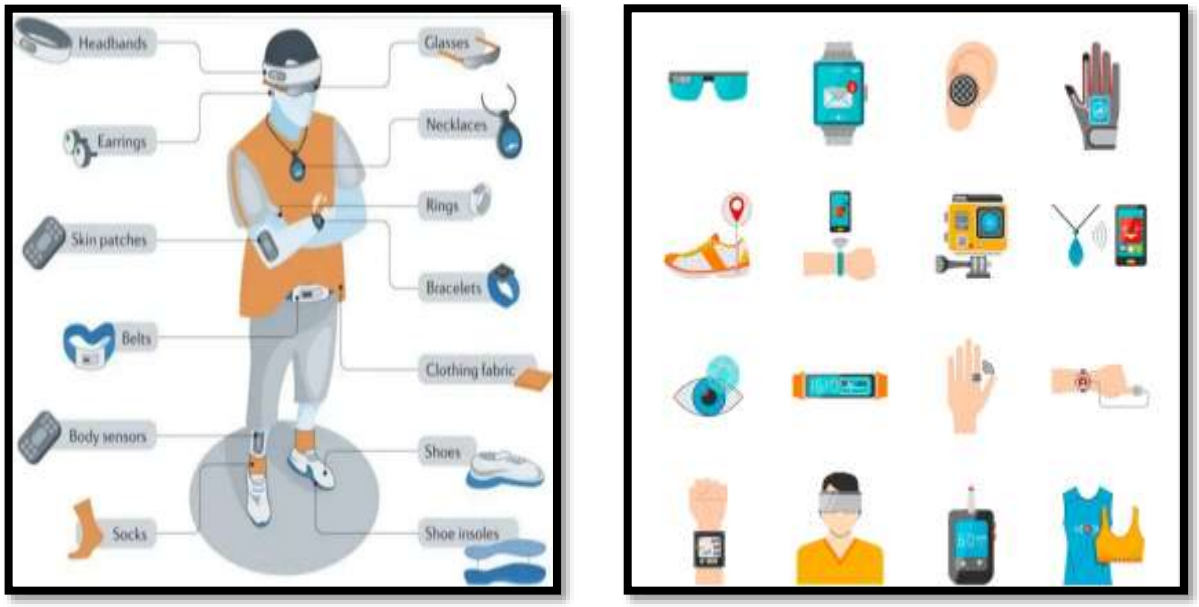

Fig 3: Smart devices in healthcare and we'll being

The Challenges

Without significant risks and difficulties, we would not be able to achieve such advantages. The problem of privacy presents one difficulty. A significant quantity of personal data is needed in order to improve medical judgments, provide specific recommendations for a healthier lifestyle, and generally give people the possibility to live longer and in better health.

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Networks, businesses, and AI algorithms will all exchange this data. One may argue that it should be fine as long as the patient ultimately decides how much of their privacy they are ready to give up in return for a longer life, but given those health advantages, the loss of privacy seems nearly unavoidable.

Access to these technologies is unequal. The richest 1% of Americans and UK today live 10 years longer than the poorest 1%. 5 That distinction might be attributed to the availability of care. People may have biological disparities due to financial inequality when access to bio printing human tissues or A.I.-based medical decision assistance becomes a possibility.

Appropriate data storage and security compliance with all applicable data protection remains of utmost significance, but they shouldn't effect the ease of data but eventually will be optimised for national healthcare systems. Though initially more difficult, tools and records will eventually be optimised for national healthcare systems.[8]

2. CONCLUSION

Telemedicine, internet of things (iot), and healthcare applications are all supported by technology that has existed for some time before the pandemic. However, it required the pandemic to advance healthcare and encourage medical organisations, professionals, pharmacist and patients to use emerging digital health trends and technologies.

Now that rapid research and development techniques, remote services, and iot devices are fully operational, both patients and providers are aware of the importance of digital health services. Activity in funding and investing demonstrates that other people appreciate digital health trends as well.

The opportunity for improvement is still enormous. However, the healthcare sector is actively embracing innovation and putting a strong emphasis on building a brighter future and enhancing health equity for everyone.

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