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Digital Health Benefits and Challenges an Introspection for Rajasthan

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ABSTRACT

Every facet of the healthcare industry, including e-consultations, health surveillance, health education, and other services, is moving toward digitization. Growing infrastructure is lacking in nations like India, making it difficult to carry out research to determine how these e-health services affect patient outcomes. Electronic health records are widely available in developed nations, which greatly simplifies the assessment of patient outcomes. This essay seeks to assess the impact of e-health on patient outcomes in the context of Indian healthcare as well as the long-term effects of these e-health offerings. Several databases, including PubMed, Google Scholar, and the SCC Web Edition, were used for the integrative literature searches. Keywords such "e-health," "telemedicine," "mhealth," "electronic health records," "patient outcomes," and "data protection laws" were used. Just a small number of the publications that were found examined how e-health services affected patient outcomes. Other studies evaluated e-health based on its practicality, accessibility, and educational medium in clinical practice. It was determined that electronic health services, such diagnostic patient outcomes are improved by telemedicine services including teleopthalmology and teleECG, remote specialist consultations via telemedicine, and adherence tools like voice reminders and visual messaging. E-health services can benefit us in many ways, but they will also create new challenges when it comes to protecting personal data. There are several ambiguities in India's IT regulations regarding the security of digital data.In the future, we will need to review the legal framework for data protection in addition to enhancing the information system's data content to analyze the effects of different patient services.

INTRODUCTION

For the most part, digital health consisted of media and apps with an online focus that enhanced connectivity, commerce, and medical content.[1] Furthermore, a far wider range of medical applications—including diagnosis, treatment, clinical decision support, care management, and care delivery—are being made possible by digital health technologies. [2]

Changes in healthcare delivery and medical practice were sparked by a new phenomenon we refer to as "digital health," which we define as "the cultural transformation of how disruptive technologies that provide digital and objective data accessible to both caregivers and patients leads to an equal level doctor-patient relationship with shared decision-making and the democratization of care."[3]

The decade of the 2010s saw the inevitable digitalization of healthcare, a rapid expansion in medical knowledge, and a shift in patient empowerment at a time when stakeholders were ill-prepared. [4]

In the twenty-first century, life expectancy is increasing, the number of patients with chronic diseases is growing, the costs of modern treatment are rising, and the World Health Organization projects that there is a global shortfall of 4.3 million health workers. Concurrently, technology is developing at a never-before-seen rate. The healthcare industry is undergoing a revolution in hardware and software.[5]

The term "e-patient" was first used by Dr. Tom Ferguson, and interest in it began to grow in 2009. Patients who feel empowered regard themselves as engaged, equal, and desire to actively participate in choosing their own medical care. They seek a second opinion, consult with other caregivers and

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patients, gather data, make decisions, and assess how the treatment will affect their lives. [6]Six we must develop the necessary knowledge and mindset for digital health to fill in the gaps and operate as intended. As a result, helping patients and caregivers integrate digital health into routine treatment is one of the most important responsibilities of the healthcare industry's stakeholders.[7]

On the other hand, widespread m-health adoption represents advances in innovative digital health in low- and middle-income countries. The global expansion of mobile technologies is largely to blame for this.[8]

Technology that uses mobile telecommunication infrastructure to improve health is referred to as m-health. Its uses extend beyond smartphones to smart gadgets, which, through the use of telecommunication technology, have enabled m-health solutions for data gathering and monitoring in both personal and medical contexts. As a result, m-health innovation's potential and reach are constantly expanding. Strengthening supply and demand are two examples.[9]

Technology that uses mobile telecommunication infrastructure to improve health is referred to as m-health. Its uses extend beyond smartphones to smart devices, which through the use of telecommunications technology have enabled m-health technologies to monitor various parts of the health systems and to create sizable datasets to enhance the delivery of healthcare. and the creation of data, in both private and medical contexts. As a result, m-health innovation's potential and reach are constantly expanding. Examples include building large databases to enhance health delivery and bolstering the supply and demand sides of the health systems.[10]

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The term "big data in healthcare" describes the vast amounts of health information gathered from various sources, including as payer records, medical imaging, genetic sequencing, and electronic health records (EHRs).[12]

Wearable technology, medical devices, and pharmaceutical research are a few examples. It differs from conventional electronic medical and human health data utilized in decision-making in three ways.[13]

It spans the vast digital world of the health business, travels at a fast pace, and is incredibly abundant. Its structure and nature are also highly varied due to its multiple sources.[14]

DEVELOPMENT IN MEDICAL DEVICES AND ALLIED TECHNOLOGY TOWARDS DIGITAL HEALTH

Medical Devices

Medical devices that use digital technology to enhance healthcare and well-being are known as digital health-focused gadgets. Through the provision of remote patient monitoring, increased accessibility to medical services, and decreased healthcare expenses, these technologies are becoming more and more crucial to the improvement of healthcare delivery. They also provide the opportunity for better patient outcomes by making it possible for medical issues to be detected and treated early.[15]

Wearable devices

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Recent years have seen many advancements in the active field of wearable technology research. These gadgets, which include fitness trackers and smartwatches, keep an eye on a number of health-related variables, including heart rate, sleep habits, and physical activity.[16] Wearable technology with augmented reality (AR) incorporated It's a sector that's grown significantly in the last few years. In order to improve user experience, researchers are looking for ways to incorporate augmented reality technology into wearable technologies. This could involve adding more context to the real environment or displaying information directly in the user's field of vision. [17]

Wearable technology with integrated artificial intelligence (AI) Wearable technology is also incorporating AI to give people access to more sophisticated features and functionalities. Wearable technology, for instance, might employ AI to evaluate information from numerous sensors, forecast a user's health, or offer tailored advice.

Wearable technology that harvests energy This is an additional field of wearable technology study. Researchers are working on creating gadgets that can produce energy from other sources, like as movement or body heat, to increase their self-sufficiency and decrease the need for charging.

DIAGNOSTIC DEVICES

These include diagnostic tools including portable ultrasound equipment, respirometer devices for pulmonary function tests, and glucose meters for diabetic patients. Here are a few of the most recent advancements and trends in this field. [18]

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Non-invasive medical examinations The development of non-invasive diagnostic tools will give patients a more convenient and comfortable testing experience. For instance, technology is being developed to identify ailments using skin sensors or breath analysis, doing away with the need for intrusive procedures like blood tests. [19]

Diagnostics based on nanotechnology More sensitive and effective diagnostic tools are being developed thanks to nanotechnology. For instance, technologies based on nano particles are being developed to identify particular biomarkers in bodily fluids like blood, enabling the early identification of diseases like cancer.

THERAPEUTIC DEVICES

These are medical gadgets, like deep brain stimulation machines, insulin pumps, and implanted cardiac pacemakers. Here are a few of the most recent advancements and trends in this field.

- Wearable medications Since they enable ongoing, non-invasive treatment, these devices are growing in popularity. For instance, wearable technology is being developed to administer medication directly to the location of an injury or electrical stimulation to the brain to treat diseases like depression.[20]

  Non-intrusive stimulants Trans cranial magnetic or electrical simulators are examples of non-invasive stimulation devices that are being developed to treat a range of disorders, such as chronic pain, anxiety, and depression. These gadgets offer a secure and non-invasive substitute for conventional therapies by stimulating particular brain regions with magnetic or electrical fields.

- Regenerative medicine Research in the field of regenerative medicine is expanding, and technologies intended to help injured tissue grow and regenerate are being developed. Devices that send growth factors to the site of an injury, for instance, are being developed to encourage tissue regeneration and repair.[21]

REVIEW OF LITERATURE

To find m Health, a literature search was conducted. A thorough search of the literature was conducted using predefined MeSH (Medical Subject Heading) terms and keywords, guided by the PICO (Population, Intervention, Comparison, Outcome) framework, on the MEDLINE, PsycInfo, and Embase databases on the Ovid platform. Digital health technologies draw attention to the fact that diverse citizens do not have equal access to and usage of interventions, which has an impact on population health outcomes.Previous research indicates that there may be no longer be any variations in internet

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use by gender or ethnicity in the general population. Due to the challenges associated with using the internet in daily life, industry training facilities and specialists ought to be assembled to conduct specialized training aimed at enhancing their proficiency with digital health technologies. Medical facilities should make it easier for friends, family, and doctors to schedule appointments by streamlining the web-based service process.[22]

RESEARCH GAP

Discovered that there were still some research gaps in the literature this study included.

The majority of the selected literature confirmed the impact of different characteristics, like age, on health disparities by statistical analysis and a qualitative approach.

Some aspects, such a person's attitude toward the internet and readiness to employ digital health tools, have not been researched. The current digital health era has led to a growing desire for more individualized and superior health care services.

In order to help people access better health care services, the integration of various digital health technologies, such as virtual reality and internet multiparty voice call technology, could be used in telemedicine, surgery, disease diagnosis and treatment, and virtual reality in surgery.[23] Research can investigate the effects of more indicators on health inequality, delve deeper into the incidence link between indicators, and then examine the causative relationship of associated indicators to suggest more focused countermeasures using machine learning, deep learning, and other techniques.

OBJECTIVES

The aim of this systematic review paper is the to find the

(1) Identify the benefits of the digital health.

(2) Accepting the challenges of the digital health.

(3) Mitigate the challenges of the digital health and resolve them for the better result .

METHODOLOGY

By using data mining to quickly synthesize the available evidence using a few keywords from PubMed databases, such as "digital health" and "medicine." This exercise acted as a first step toward investigating research activities in the relevant fields. By defining arbitrary review parameters that fell within the study's time and budgetary constraints, it helped to focus the search. As a result, we arrived at three conceptual frameworks—digital health, medicine, and review study—to direct systematic searching for research on digital health on high-quality medical care.

DATA ANALYSIS

A systematic mapping of all included reviews based on a standardized data extraction method was created, along with a PRISMA flowchart19 for the selection process. For every study goal, data were examined and narrative described using descriptive statistics in tables or graphs. Microsoft Excel20 was utilized to compute descriptive statistics, and Microsoft Power BI21 was employed to visualize spatial data.

FINDINGS

BENEFITS OF DIGITAL HEALTH

IMPROVE HEALTH CARE ACCESS

Access to healthcare services has improved because to digital health solutions, particularly in Rajasthan's outlying areas. Patients can consult with healthcare providers virtually through telemedicine and mobile health applications, eliminating the need for travel.[24]

Increased Productivity and Financial Savings

Digital health technology result in cost savings by streamlining administrative procedures and minimizing paperwork.

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Healthcare practitioners can obtain patient information more efficiently and with fewer errors thanks to electronic health records.[25]

Improved Illness Control

Digital health solutions enable proactive illness management by enabling remote monitoring of patients' health problems. [26]

People can track their health data and obtain individualized advice with the aid of wearable devices and smartphone apps.

CHALLENGES

The rise of mobile health apps and connected systems raises critical concerns in privacy, security, ethics, interoperability, regulatory frameworks, and public awareness. Safeguarding personal health information from breaches and unauthorized access is vital to maintain patient trust and privacy. Ethical issues, particularly data ownership, consent, and transparency, question who rightfully owns and can use the health data generated.[27] Interoperability challenges hinder seamless communication and data exchange between disparate digital health platforms, affecting the quality and continuity of care. Regulatory frameworks struggle to keep pace with rapid technological advancements, complicating compliance and governance. Additionally, raising public awareness about these issues is essential to ensure informed usage and trust in digital health solutions.[28] Addressing these challenges is crucial for the safe and effective deployment of digital health technologies.

CONCLUSION

As health services increasingly integrate technology and digital communications, it is crucial to consider barriers to accessing digital healthcare. This review examines various surveys used to assess digital health literacy, highlighting the need to address digital divides that may affect public access to healthcare. [29]Among the measures identified, the eHEALS questionnaire is the most commonly used; however, it is limited in scope. Future research should explore objective methods or ability thresholds to assess digital health literacy and other factors influencing public engagement with digital health services. Identifying individuals who may struggle with digital access is essential for understanding their healthcare needs and guiding resource allocation to support equitable access. Ensuring equity in healthcare is fundamental, and failing to address variations in digital ability, digital capital, and digital literacy can perpetuate inequities. Therefore, it is critical to consider assessment tools for digital health literacy, their ease of deployment, and practical utilization of their results.[30] As digital health care delivery continues to evolve, robust assessment and support mechanisms will be vital to ensuring all individuals can benefit from these advancements equitably.

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