

Digital Health: Awareness, Pro's & Con's: A Review Article

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Abstract- Digital health is a discipline that includes digital care programs, technologies with health, healthcare, living, and society to enhance the efficiency of healthcare delivery and to make medicine more personalized and precise. It uses information and communication technologies to facilitate understanding of health problems and challenges faced by people receiving medical treatment and social prescribing in more personalised and precise ways. The definitions of digital health and its remits overlap in many ways with those of health and medical informatics.

I.INTRODUCTION

Digital health is The integration of computing platforms, connectivity, software, and sensors into healthcare and wellness practices. It aims to democratize access to care, improve diagnostic accuracy, and personalize medicine through technologies like telemedicine, wearable devices, and artificial intelligence.

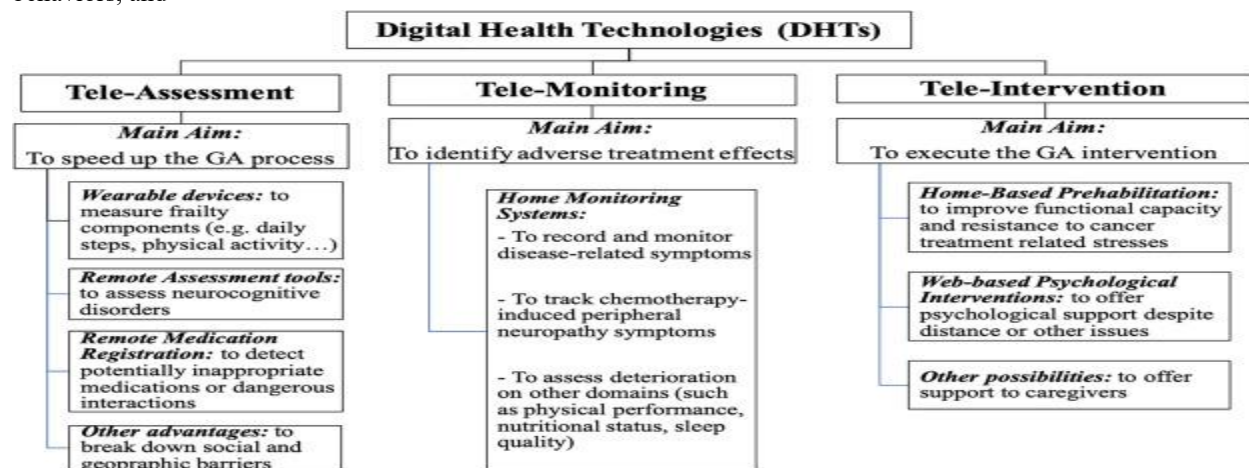
Digital health is described as the use of information and communication technologies in healthcare and medicine. It leverages technology and data to

- (1) Improve healthcare service delivery and patient outcomes,
- (2) Engage patients and support positive health behaviors, and

- (3) Develop health data repositories to expand population-based research.

Digital health includes telemedicine, mobile health, telehealth, health information technology, and the use of wearable devices. Digital health in oncology can facilitate prevention and early detection of cancer, symptom monitoring, adverse event reporting, management of treatment-related events, performance status monitoring, palliative care, and survivorship. Limitations include difficulties using technology, data privacy and security issues, and other factors that preclude access such as inadequate digital literacy and inability to access the internet and digital devices.

The integration of digital health technologies in medical care has increased markedly in recent years, and this trend is likely to continue. Digital health refers to the use of information and communications technologies to manage illnesses and health risks, and to promote wellness. Digital health is a broad field, which encompasses telehealth (tele-assessment, tele-monitoring, and tele-intervention), and the use of wearable devices, internet-based health resources, social media, and electronic patient portals, among others (Fig. 1).



Sources: Fig 1. Digital health technology: domains, aims, and examples.

Key Domains

Telehealth & Telemedicine: Remote clinical consultations and medical monitoring that allow patients to connect with healthcare providers from home.

Mobile Health (health): Health and wellness services delivered via mobile devices, such as medical apps, fitness trackers, and symptom checkers.

Wearable Devices: Smart watches and biosensors that continuously track vital signs (eg, heart rate, blood oxygen, sleep patterns) to proactively monitor health.

Electronic Health Records (EHRs): Digitized, secure patient medical histories that enhance information sharing and care coordination across different medical facilities. **Artificial Intelligence & Analytics:** Machine learning algorithms used to analyze large datasets to predict disease risk, assist in medical imaging, and support clinical decision-making.

Real-World Benefits

Greater Accessibility: Connects specialists with patients in remote or underserved areas, reducing travel and wait times.

Personalized Care: Enables continuous rather than episodic monitoring, shifting healthcare from a reactive treatment model to proactive disease prevention.

Operational Efficiency: Streamlines administrative tasks, reduces overhead costs, and improves communication between doctors and patients.

Primary Challenges

Data Privacy & Security: The digitization of sensitive medical data raises concerns about cyber security risks, data breaches, and unauthorized access.

Digital Divide: Disparities in access to high-speed internet and advanced devices can create inequities in healthcare delivery.

Initiatives

National Programs: Governments around the world are building digital infrastructures to standardize health data. For instance, India's National Health Authority champions the Ayushman Bharat Digital Mission (ABHA), which facilitates unified health records, provider registries, and digital IDs for citizens.

Global Strategies: Organizations like the World Health Organization continuously evaluate and scale digital health tools to ensure they align with equitable and universal healthcare objectives

II.DIGITAL HEALTH WEARABLE'S

Digital health wearable's are Body-worn technologies like smart watches, rings, and patches that monitor physiological data such as heart rate, sleep, and blood glucose. They empower proactive wellness management and allow doctors to continuously track patient vitals remotely.

Digital healthcare interventions

Digital healthcare interventions (DHI) has been used to a wide range of applications across various aspects of healthcare, such as self-management tools, where patients use applications and platforms to manage chronic conditions like diabetes or hypertension; self-education and health promotion tools, that provide educational material designed to leverage the population's knowledge regarding one specific health topic and promote healthy behaviors, and digital therapeutics (software-based interventions designed to prevent, manage, or treat medical disorders)

Consumer-Grade Wearables

Designed primarily for everyday fitness, recovery, and lifestyle insights:

Smartwatches: Devices like the Apple Watch offer comprehensive health tracking, fall detection, and built-in ECGs.

Smart Rings: The Oura Ring specializes in continuous, discreet tracking of sleep architecture, temperature, and recovery.

Fitness Trackers: Brands like Garmin provide detailed activity profiling, heart rate variability (HRV), and body-battery metrics.

Recovery Trackers: Systems like Whoop focus heavily on physiological strain, sleep performance, and long-term recovery trends.

Medical-Grade Wearables

Built with regulatory oversight to aid in diagnosing and managing chronic diseases:

Continuous Glucose Monitors (CGMs): Systems like the Dexcom G7 track real-time sugar levels and send alerts to your smartphone.

ECG Monitors: Devices like KardiaMobile are FDA-cleared, portable attachments that capture clinical-grade EKGs to detect arrhythmias in seconds.

Clinical & Technological Context

FDA Approvals: Regulatory bodies actively authorize sensor-based digital health technologies (sDHT) for non-clinical, at-home use.

Clinical Efficacy: While useful for baseline trends, consumer-grade wearables vary in accuracy and lack total clinical reliability for critical diagnoses.

Actionable Insights: Advanced artificial intelligence and machine learning are rapidly transforming raw wearable logs into personalized clinical recommendations

III.ADVANTAGES OF DIGITAL HEALTH

Improved Accessibility: Telehealth and remote monitoring overcome geographic and physical barriers, providing care to rural or underserved communities without the need to travel.

Personalized Care & Better Outcomes: Wearables and continuous health data allow doctors to tailor treatments, spot early warning signs, and improve overall patient management.

Reduced Costs: By minimizing in-person hospital visits, automating administrative tasks, and streamlining operations, digital health decreases financial burdens for both patients and healthcare facilities.

Patient Empowerment: Mobile applications and health portals enable users to actively monitor vital signs, track nutrition, and manage medications, allowing for more independent health decisions.

Data-Driven Efficiency: Machine learning and electronic health records (EHRs) enhance diagnostic precision, reduce human error, and help health systems make smarter, data-driven decisions

IV.DISADVANTAGES OF DIGITAL HEALTH

1. Privacy and Security Threats

Data Breaches: Digitized patient records are highly valuable to hackers. Breaches can lead to the exposure of highly sensitive clinical data, identity theft, or ransomware attacks that paralyze hospital infrastructures.

Consent and Monetization: Users often do not fully understand terms of use when authorizing health apps. This frequently results in apps selling or sharing personal health data with third-party advertisers or insurance companies.

2. The Digital Divide and Access Inequalities

Unequal Access: Not all demographics have equal access to high-speed internet, smartphones, or wearable's.

Lack of Digital Literacy: Populations like older adults, low-income individuals, and those in rural communities often face steep learning curves, making digital health tools actively disadvantageous for them.

3. Reliability and Information Overload

Technical Failures: Telehealth and digital systems depend heavily on internet connectivity and server reliability. Software glitches or network disruptions can hinder care in critical situations.

Misinformation & Anxiety: The abundance of health information online and in self-diagnostic apps can overwhelm users, lead to hypochondria, or expose patients to fake medical news.

4. Impaired Doctor-Patient Relationships

Loss of Personal Touch: Remote consultations and looking at screens (like Electronic Health Records) can distance physicians from patients, reducing the empathy and clinical observation that are central to traditional medicine.

Increased Workload: For medical professionals, continuous alerts from digital trackers or poorly integrated, crash-prone systems can drastically increase their screen time and overall burnout.

5. Inaccurate Diagnoses and Over-reliance

Unproven Technologies: Many unregulated wellness apps and wearables lack standardized clinical evidence. Sensors can over-predict or misinterpret data, leading to unnecessary panic or, conversely, a false sense of security.

Algorithmic Bias: AI-based health solutions are sometimes trained on limited, non-representative datasets, which can perpetuate or introduce bias against certain minority groups in diagnosis and treatment selection

V.CONCLUSION

The integration of digital health technologies in medical care has increased markedly in recent years, and this trend is likely to continue

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intervention), and the use of wearable devices, internet-based health resources, social media, Digital innovations have improved many lives in the healthcare industry. The true value of healthcare digitization became clear during the covid lockdowns when telemedicine became the main treatment option. Healthcare digitization isn't new. It blends technology and convenience to access medical data. Digital health has changed how patients view healthcare for the better.

As the industry shifts in many areas, we'll explore the benefits and barriers of this digital revolution. But before diving into the pros and cons, let's understand a bit more about digital health.

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