DIGITIZED HEALTH CARE

Abstract

Digitized healthcare refers to the revolution of traditional healthcare practices through the integration and utilization of software/hardware technology. It encompasses diverse aspects of healthcare such as mhealth, electronic health records (EHR), telehealth/ telemedicine, wearable devices, teledentistry etc. Medical information and communication are digitized and stored in electronic formats, fostering an efficient and accessible healthcare system. mHealth involves the use of software programmes called as Mobile apps that promote disease prevention, aids people to manage chronic illness and also improves treatment adherence. EHR is a digital version of an individual's medical history. It centralizes patient information and ensures accurate up-gradation of records whereas Telemedicine and telehealth assist in remote patient consultations as it has the potential to blend audiovisual interaction of the health care professional and the patient. Wearable devices which are trendy now-a-days, help the individuals to monitor their health in real-time by providing valuable data for both patients and healthcare professionals. Another budding branch among the digital health care system is Teledentistry which is a fusion of telecommunication and dentistry. Hence, Digitized health care has the potential to revolutionize the entire health care sector as it enhances patient care and improves the quality of life of the patient.

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I. INTRODUCTION OF DIGITAL HEALTH CARE

Digitized Health Care or digital health is a multidisciplinary concept which includes the merger of both health care and the technology. It's an amalgamation of the hardware /software technologies with health care. It encompasses numerous domains like wearable devices, artificial intelligence(A.I)[1]. Digital health also encompasses various domains like mobile health, telemedicine, telehealth etc [2].

According to WHO, Digital health care is defined as "the transfer of health resources and healthcare by electronic means". From more than 20 years, digital health care has surfaced to the top [3] and has been serving as a digital platform service where in health related data can be obtained from any place at anytime [4]. Now-a-days 'digital health' is frequently being used as a broad umbrella term that encompasses e-Health, use of highly developed computing sciences like A.I and genomics [5].

Digital health includes the use of information as well as the communication technology in medicine and different health professions to monitor ill-health, health related risk and to uphold the wellness of an individual[2]. This technology is reassembling the relationship between health care system and the patients as it continuously helps to gather real time data of the patient, provides access to accurate information of the patient which in-turn is beneficial to plan treatment of the patient and enables the health professionals to take necessary action if required [6].

E Health in a broader way demonstrates a way to enhance health care locally, at the national and international level by utilising information and communication technology[7]. Digital Health is attaining thrust as it intends to provide better access to health care, to improvise the quality of health care, to diminish inefficiencies if any, cost effective and to provide personalised health care to the patients. [2]

Over the past decennium, digitization in this field of dentistry had a quantum leap[8,9] due to the utilization of advanced technologies. This has acquired the attention and has increased the enthusiasm of research scholars all over the world in the field of dentistry [8]. Objectives of digital health are as follows:[2]

- To improvise the quality of health care and services
- To boost the health of the people
- To improve the experience of the physician
- To achieve health equity

Digital health has a very broad spectrum of scope and it comprises of utilization of mobile health, wearable devices, tele-health and telemedicine etc[2]. Other categories of digital health are platforms for digitized health records, health information, bioinformatics, modification tools for health and wellness behaviour[2] .

II. HISTORICAL MILESTONES AND DEVELOPMENTS IN DIGITAL HEALTH

Digitized health care has a rich history that spans several decades. Below is a brief history with relevant milestones:

1. **1960s-1970s:**

   - The initial individuals to employ video communication for medical objectives were healthcare professionals at the University of Nebraska. In 1959, the university implemented a two-way television system to convey information to medical students across the campus, and after five years, they connected with a state hospital to conduct video consultations[10].
   - During the early 1960s, telemedicine has emerged in urban areas, particularly within the field of emergency medicine [10].
   - In 1967, the University of Miami School of Medicine collaborated with the local fire department to send electrocardiographic rhythms via radio to Jackson Memorial Hospital during rescue operations [10].
   - During the 1970s, the International Federation for Information Processing introduced the phrase 'medical informatics' [11].
   - From the beginning of the 1970s, telematics emerged as the primary term for the integration of telecommunication and informatics, enabling data exchange between at least two distinct information systems [12].

2. **1980s -1990s:**

   - During the late 1980s and into the 1990s, digital health experienced a flourishing period. Throughout this era, numerous professional associations emerged in the United States and globally, with the aim of enhancing healthcare delivery through digital communication. Notable examples include the International Medical Informatics Association, the American Telemedicine Association, and the European Health Telematics Association (EHTEL) [13].

3. **2000s:**

   - In 2004, the ONC (Office of the National Coordinator for Health Information Technology) established the Nationwide Health Information Network (NHIN) with an intention of setting up standards, services, and policies for Health Information Exchange (HIE) [14].
   - In 2007 (timeline 2022), the pioneering physician Tom Ferguson was responsible for the creation of the E-patient white paper. He single-handedly initiated the consumerist movement in medicine and coined the term "e-patient." Additionally, he authored one of the earliest White Papers that delved into the concept of e-patients [15].

4. **2010s-2020s:**

   - In 2016, the World Economic Forum proclaimed the rapid expansion of digital technology as the 'Fourth Industrial Revolution,' presenting the 'potential to enhance the quality of life for global populations [16].

- A notable achievement in the advancement of digital health occurred in 2017 when the US Food and Drug Administration (FDA) established a digital health unit [13].
- In 2017, the FDA has launched its Digital Health Unit, granting approval to diverse technologies and enabling the expansion of opportunities for digital health tools [15].
- In 2020, the FDA granted approval to the first AI-guided ultrasound device, paving the way for this groundbreaking technology in hospitals. This device represents a novel approach and marks a significant advancement in the field of radiology [15].
- As the domain progresses, it is probable that novel discoveries and improvements will influence the forth coming years of health-care provision and patient outcomes.

III. MOBILE HEALTH (mHealth)

The transformation of technologies in the health care sector has led to the emergence of the concept called as mobile Health (mHealth).[17] The term mHealth was originally coined by Robert Istepanian to denote "emerging mobile communications and network technologies for healthcare." Nowadays, mHealth is widely recognized as an abbreviation for mobile health [18]. WHO defines mHealth as "medical and public health practice supported by mobile devices, such as mobile phones, personal digital assistants, wireless devices, and patient monitoring devices"[17].

Digital phone is one of the most important valuable means for communication as it provides a direct channel for the transfer of demographical, clinical, investigation related data to a health professional and immediate guidance/ suggestions to the patients [17].

There are evidences which prove that digital medicine helps patients to have better track of their health and wellness for a longer period of time [2]. mHealth involves the use of software programmes called as Mobile apps that encourages disease prevention, helps people to manage chronic illness and by improving treatment adherence [19]. Many health related apps have been designed for cell phones that help to examine blood pressure, blood glucose levels, to guarantee their compliance with medicines and also aids to track the physical activity [2]. Invent of many health related applications in a way may help to track the onset of a disease at an early stage and also to monitor it at a low cost. Examples include tap test to check the heart rate, pulse rate, blood pressure monitoring etc [20].

Smart phone is a ubiquitous device that offers a chance to acquire health related data [20] and play a pivotal role by connecting the patient and the health care providers, to gather the real time data by providing precise information which in-turn aids the health care provider to take necessary and immediate action if any [6].

But with the day –to-day increase in the use of mobile phones or smart phones, the risk associated with it's use has also increased. Various risks related to the utilization of these devices include security risk, privacy risk, data security and image privacy[21]. To address the concerns like data security, its very important to create and implement this technology so as to build a trustworthy, consistent, precise and secured atmosphere for favourable patient care [17]. Though the utilization of this tool is beneficial but it still requires the assessment with well planned clinical trials [20].

mHealth is an incredible prevailing mobile technology and is the upcoming technological trend that has the ability to revolutionize the present status of health care sector [17]. It is becoming the centre of attraction worldwide due to its inimitable mode of providing details to the health care providers and the patient and hence can be considered as a promising tool to uplift digital health care [22].

IV. ELECTRONIC HEALTH RECORDS (EHRS)

Over the past few decennary, electronic health record (EHR) is being widely used all over the world [23]. It is an archive of electronically maintained information about the patient's life long health care and status [24]. EHR is a digital adaptation of an individual's medical history [25].

Earlier the patient's record consisted of only the record of treatment given by the health care professional for the illness or the disease [24]. Earlier the patients record consisted of only the record of treatment given by the health care professional for the illness or the disease whereas the computer-based patient-record (EHR) system also includes tools to manage information by providing clinical reminder, links for health care decision/ guidance and examination of cumulative data for patients' management of health and additional research purpose. In case of traditional based paper record system, the reader has to mentally manipulate the data to gain clinical information while on the contrary computer-based patient-record (EHR) system provides tools that categorize, interpret the data [24].

EHR includes complete array of information pertinent to a patient like the demographical data, complains, medicinal history, observations made by the physician, vital signs, medical or surgical history, vaccinations, lab investigation data, radiological reports, notes on health improvement and billing details[25].

Components of EHR are Administrative System Components, Laboratory System Components & Vital Signs , Radiology System Components, Pharmacy System Components, Computerized Physician Order Entry (CPOE) and Clinical Documentation [25].

1. **Functions of EHR System: [26]**
   - Identification and maintenance of individual patient record.
   - Manage the demographical data.
   - Manages patient history, clinical documents and medications.
   - To acquire exterior or peripheral clinical documents.
   - To regulate guidelines, rules and health care proposals.
   - Develop and document individual patient specifications/ instructions.

2. **Advantages of EHR over Paper Based Systems are as Follows: [23,25]**
   - Storage and retrieval of patient's data.
   - Improved quality of patient care.
   - Enhances the participation of the patient in the process of maintenance of health.
   - Improves the precision of the diagnosis of the disease, expediting treatment decision and its outcome.
   - Increases the chances of research.
   - Helps to rectify communication related errors.

EHR, a digital health record, is generated either by one or many counters in a health care facility [25]. It is being used by many medium and large health care setups, urban hospitals as well as teaching hospitals [27]. Due to wide installation and extensive use of EHR in hospitals, it can be considered that EHR has an assured and conspicuous future in the field of digitized health care [25].

V. WEARABLE DEVICES

Wearable devices are the minuscule medical devices that are worn on the body to monitor various health parameters of an individual. In the year 1472, First wearable (i.e., pedometer) was designed as per the finding of the researchers. Later in 20th century several wearables were developed. 21st century has evidenced the rapid evolution of wearable devices as a consequence of the involvement of large companies in the field of digital health sector [28].

In the recent decennary, these miniature electronic devices have brewed up a newer type of human – computer based interaction due to speedy development of information science and communication technology [29]. Wearable device is an incorporation of electronic sensors, soft-wares and connectivity [30] that enables the users to access the online information with a great ease [29].

It has numerous applications in the field of health sector, biomedical research, hospitals, individual health habits, development of technology, navigation systems, etc.[30,31] However these devices have gained exorbitant attention in the field of digital health care sector [30,32].

These small electronic devices have the capability to track various activities, record different parameters when placed on different locations of body[31,33] and hence have gained popularity amongst the people as it can either be worn or carried on the body. Therefore wearable devices are frequently being used to monitor the health of a person [30]. Examples: Wrist band/watch, rings, patches, inner soles, headgear etc[20,31,34]. Major functions provided by wearable devices are: [31]

- Monitoring: Example: Monitoring of pulse
- Screening: Example: Cardiac disease screening
- Detection: Example: Detection of levels of physical activity
- Prediction: Example: Prediction of biological age and mortality

Benefits of wearable devices are as follows: They are non-invasive, comfortable, do not interfere with the routine activities, compact size, aids in self monitoring of health and are cost effective [30,33].

Advantages : Early diagnosis, remote health monitoring, possibility of maintenance of patients health status and pattern identification using technologies like artificial intelligence (A.I) and machine learning (M.L), low cost and deployment of efficient precautionary interventions [35].

Disadvantages: Inconsistent and Imprecise readings or measurements, flaws in the design of device inappropriate use of wearable device, privacy and data security risk [30, 35].

Wearable devices have a striking feature of their ability to be worn on the human body which fulfils the personal need of self monitoring, continuously tracks the fitness level of an individual [31] and in-turn encourages healthier lifestyle [30]. Hence it plays a pivotal role in enhancing the access to health services and by boosting health equity[31]. Therefore wearable device fulfils the purpose of providing robust health care to an individual by their continuous scrutiny of physical health and well-being [30,33].

VI. TELEHEALTH AND TELEMEDICINE

Telehealth involves the conveyance of health care and swapping of information related to health care. It encompasses array of activities like diagnosis, management, accessibility to health care, preventive measures, continuing education programmes for health professionals, advanced research and assessment [36].

Tele-health has the potential to blend audio and visual interaction with a patient from a remote place which enables exchange of information[1]. It has now advanced beyond videoconference where the digital data can be stored, monitored and can even be forwarded to a health provider for non-real time consultation [36].

Now-a-days, the terminologies telehealth and telemedicine are interchangeably being used but telehealth encompasses broad range of digital health related services[37]. Oxford's definition of telemedicine: "The remote diagnosis and treatment of patient by means of telecommunications technology"[38,39]. The term "tele" is a Greek word which means "at a distance"[36,40] and the word "mederi' is a Latin term which means "to heal" [40].

According to WHO, telemedicine is defined as "The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities [40]."

Features of telemedicine: Provides longstanding management of health, compliance to prescription, provides services in distant areas and peripheral clinical set ups, flexible clinical practice, ease to obtain second opinions and complex interpretations, over-all care to critical cases, aids in the health care of elderly people. It is a tool to create awareness among people and tool for disaster management, it stores and forwards the health care data [40,41].

Telemedicine system comprises of juncture between software for information acquisition, hardware such as computer, printers etc., and communication technology to connect different locations for exchange of information and hence enables teleconsultancy between various locations.[40] Telemedicine is basically divided into three types:[17]

1. **Interactive Telemedicine:** Permits the communication between patient and the clinician through telephonic consultations or video conference.

2. **Asynchronous Telemedicine:** Investigational reports, videos or other records are conveyed to specialist by the health care professional.

3. **Telemonitoring:** It allows the health care professional to track vital signs and activities of a far –off patient (specifically high risk and elderly people).

Telehhealth has the ability to make the health care sector more efficient and well structured but the research is still in its budding stage but has shown enormous amount of growth in past few years[41].   WHO is promoting the idea of creating global telecommunication system in the field of medicine which is provided by Digitalization of health care system. There are around approximately 250 clinical telemedicine projects in the world. Many platforms are made available for effective and efficient enactment of telemedicine. Example: Doctor-On-Demand is an American project that provides a platform to the health care professionals and the health care seekers or the patients to conduct meetings irrespective of time and place through video conference. One of the unique feature of this system is that not only a doctor diagnoses a disease but also writes an electronic prescription for treatment of the same[42].

Applications: [43,44]
- Diagnosis of the disease
- To analyse and interpret medical images
- Vast data collection
- Further clinical research and trials
- Managing health care records
- To predict disease outbreak

Benefits include reduced time and cost of transportation, remote accessibility, improved communication between the clinician and the patient, far-off critical care monitoring of the patient, aids in continuing medical as well as clinical research, can be used as an tool to educate the students and the health care staff and helps in surveillance of the disease [40,45].

Risks associated with telehealth and telemedicine are documentation related concerns, mediocre triage decision, dysfunctional / malfunctional system, data privacy and security associated risk [37].

It has to be noted that many medical consultations cannot be performed or accomplished by telemedicine, so, the health care provider has to assess the condition that can be preferred for remote monitoring and consultation. Even the patients must be made aware of the functions and limitations of this kind of health care system as they might not be familiar with this health care system [37].

Increased cost of health care and the demand for superior treatment are persuading the researchers to investigate further benefits of this health care system as it is promoting connectivity between the patient and the doctor as well as building the network among the doctors to exchange skills and enhance health care services. Hence, it may be considered advantageous to both doctor and the patient. But still there are technical obstacles and hindrances which need to be solved to make telemedicine a more efficient valuable tool in the field of health care sector [41].

VII. TELEDENTISTRY

Teledentistry is a swiftly growing branch of digital health care which involves the fusion of dentistry and telecommunication [46,47]. In the year 1997, Cook has defined teledentistry as "the practice of using video-conferencing technologies to diagnose and provide advice about treatment over a distance [47,48,49]."

In 1994, it was first used by defence people (Army) as the Total Dental Access Project. Later it was soon recruited by University of Southern California's Mobile Dental Clinic in association with Children's Hospital Los Angeles Teledentistry Project to provide service to the children of remote areas [36].

Digitalization in the field of dentistry has gained a lot of attention due to increase in access to solutions for oral health problems over past decennium [50]. It is evident that there is shortage of medical as well as dental professionals in the developing countries which necessitates the growth of digital health technology at the primary, secondary and tertiary levels[36,50] so as to combat the paucity of health professionals. Computational technologies like artificial intelligence and machine learning have evolved to address the diagnostic concerns, prognostic challenges and to revolutionize numerous domains of digital oral care [44, 51].

Recording of history is an art and is perceived as the keystone of medicine. Electronic questionnaires are being widely used in a health setup. Then it is just small leap to use information from questionnaires to create differential diagnosis with addition of further questions so as to refine probability of diagnosis[20]. It can be used as a screening tool to detect the presence of disease and to obtain specialist consultation. Also used to screen traumatic or non-traumatic lesions in order to reduce waiting period, alleviate pain / suffering and to reduce treatment cost [36].

This trend of digitalization is propelled by soaring exigencies for treatment and diagnosis in this field. Accurate diagnosis is very important due to increasing demand for precise diagnosis and effective treatment in various domains of dentistry like prosthodontics, orthodontics, oral and maxillofacial surgery, periodontics in order to restore patients oral health[44].

1. **Application of Teledentistry in Oral Medicine and Radiology:**

- **Remote Consultations and Diagnosis:** Teledentistry allows oral medicine specialists to remotely consult with patients and provide preliminary diagnosis based on patient history including past medical/past dental history/ medication and family history(if applicable), images of oral lesions, and other relevant data which can be stored as a

textual file for correlation. This approach improves access to expert opinions, particularly for patients in remote areas [52,53].

- **Store-and-Forward Imaging for Radiographic Interpretation**: Digital radiology has become an indispensable component of oral diagnosis. It enables the sharing of radiographic images between dental practitioners and radiologists for further opinion and consultation, commonly referred to as teleradiology. This facilitates remote radiographic interpretation and consultation, leading to faster and more accurate diagnoses [52,53].

- **Teledentistry for Oral Health Education:** Oral medicine and radiology specialists can use teledentistry platforms to provide educational to patients and thus promote oral health awareness and preventive care [53].

2. Application of Teledentistry in Oral and Maxillofacial Surgery:

- **Preoperative and postoperative Consultations:** Teledentistry allows oral and maxillofacial surgeons to Perform teleconsultations conducting comprehensive preoperative virtual assessments of patients for various surgical procedures before they visit the surgical facility and also for post-operative follow-up.[52]

- **Teledentistry serves** as a valuable resource for the diagnostic evaluation of impacted or semi-impacted third molars [52,54].

    Moreover, teledentistry is instrumental in obtaining specialized consultations in emergency cases, ultimately leading to enhanced care for maxillofacial patients. Additionally, telecommunication technology enables the prescription of medications for orofacial infections and further optimizes the management of various oral health conditions [52].

3. Application of Teledentistry in Oral pathology:

- Telepathology is a mode of communication among medical professionals, involving the transmission of pathology images or testing data, along with associated clinical information, for various clinical applications. These applications encompass primary or initial diagnosis, rapid interpretation of cytology, intra-operative and consultations for second opinion, auxiliary study review, archiving/ documentation and quality activities [55].

- Whole slide imaging (WSI) or virtual microscopy, on the other hand, entails the scanning (digitization) of glass slides to create digital slides. This technology proves to be valuable for seeking consultations from remote locations, facilitating seamless access to pathology expertise [55].

- Telepathology serves as a valuable tool for delivering pathology services to distant locations where medical and dental facilities lack on-site or easily accessible pathology services [55].

4. Application of Teledentistry in Orthodontics:

- Orthodontics is not immune to this situation, and the concept of teleorthodontics has emerged to describe the orthodontic care system that incorporates remote management of orthodontic treatment. Integration of teleorthodontics into clinical

orthodontic practice offers numerous benefits, ranging from initial patient screening to a decline in in-office appointments. This reduction in in-person visits proves advantageous for both clinicians and patients, as it optimizes daily schedules [56].

- By leveraging live video chat or a real-timesharing of images, it allows a remote orthodontist to conduct patient examinations, review health histories, diagnose different malocclusions, and to provide treatment recommendations [57].

5. Application of Teledentistry in Periodontics:

- Remote patient monitoring, also known as telemonitoring, involves the continuous monitoring of patients who are far-away from the healthcare provider's physical location. Typically, patients utilize monitoring devices at home to collect relevant health data, which is then transmitted to the healthcare provider[58].
- Tele-monitoring proves to be an effective platform for post-procedural care, including monitoring patients after various procedures like periodontal surgeries [58].
- Tele-education, also known as distance education, represents an additional aspect of tele-periodontics, aiming to enhance knowledge and understanding the concept in the field of periodontics [58].

6. Application of Teledentistry in Conservative dentistry and Endodontics: The potential of teledentistry in the domain of conservative dentistry is yet to be fully explored. Research has indicated that teledentistry can be utilized to identify root canal orifices in mandibular molars through photographic modalities [59,60].

7. Application of Teledentistry in Pedodontics: Schools and child care centres have a significant responsibility in promoting the optimal oral health of children through teledentistry by

- Early screening for dental issues to fend off from escalating into emergencies.
- Assisting children in managing chronic health conditions.
- Facilitating access to essential health and social services for children and their families.
- Offering urgent dental care services [61].

8. Application of Teledentistry in Prosthodontics:

- Telephonic communication proves essential during the prosthesis fabrication process, facilitating seamless collaboration between dentists and laboratory technicians. Colored photographs of patients' teeth captured from various angles can be easily exchanged to aid in shade selection, determining the size, shape, and contours required for the fabrication of the prosthesis [52].
- Additionally, the adoption of digital impressions is gradually replacing conventional methods, where both jaws are scanned and shared with the laboratory for prosthesis fabrication [52].
- Virtual-consultations in dentistry have the capability to enhance the accessibility of dental specialist services in less populated areas, ultimately increasing the overall availability of specialized care [52].

9. Application of Teledentistry in Public Health Dentistry:

- It is employed for the purpose of education (tele-education) and offering diagnoses and treatment recommendations over long distances (teleassistance).
- Remote diagnoses: Facilitates the initial evaluation of dental conditions and the formulation of treatment plans, with the potential to reduce morbidity and mortality rates by promoting preventive and health promotion practices [62].
- It can serve as a valuable tool to disseminate awareness within the community about the significance of maintaining good oral hygiene [52]. Moreover, it empowers patients by providing them with the convenience of online follow-ups with their dentists [62].

10. Application of Teledentistry in Forensic Dentistry:

- Mass disaster victim identification (DVI): Teledentistry has the potential to serve as an innovative, non-invasive identification method in mass disasters, thereby streamlining the procedure of recording post-mortem data by eliminating the necessity for the presence of forensic odontology experts at the autopsy site [63,64].
- It enables the fabrication of an accurate post-mortem odontogram, thereby preserving the integrity of the deceased individual [64].

   In the context of managing various cases, teledentistry presents viable options for remote care, covering both non-emergency and emergency situations. During emergencies, the integration of teledentistry, along with portable or mobile dentistry, becomes particularly crucial for providing oral health care [65].

11. Benefits of Teledentistry: [36,47,50,66,67]

- Cost effectiveness
- Efficient
- Quality oral health care
- Improves delivery of oral care
- Ease of access to dental care
- Provides education to patient and increases awareness
- Increased convenience to the patient
- Preventive care monitoring
- Post-operative follow-up
- Assessment of dental development

12. Limitations of Teledentistry: [59]

- Technological Challenges: Few dentists may find it difficult to adapt to this new technology i.e., teledentistry, leading to a lack of willingness to embrace technological advancements.
- Limited Infrastructure in Rural Areas: In rural settings, teledentistry may be hindered by the lack of adequate infrastructure, such as connectivity issues and unavailability of necessary equipment like x-ray machines.

- Dependence on Attendant Information: Dentists have to rely solely on information provided by the patient's attendant and this may lead to misinterpretation of details, potentially resulting in inaccurate diagnoses.
- Legal and Confidentiality Concerns: Teledentistry raises legal issues, particularly regarding the maintenance of patient confidentiality and security of patient history stored as electronic data.

With the advancement of medical equipment and instruments, teledentistry has become an increasingly convenient means of reaching a vast number of patients by offering teleconsultation support through internet-based media platforms, accessible at any time and location. This approach allows for effective campaigning and dissemination of valuable health information to a targeted group of patients, particularly during emergencies. Teledentistry proves to be an indispensable solution in providing safer patient consultations and alleviating the burden on clinics during times of crisis. Consequently, it plays a crucial role in efficiently managing patients and meeting their treatment needs in the most effective manner [68].

VIII. IMPACT OF DIGITIZED HEALTH CARE INFORMATION ON THE QUALITY OF HEALTH CARE

The integration of technology in the healthcare industry has led to a paradigm shift, moving away from traditional practices towards a technologically advanced approach that incorporates wireless mobile health care. This transformation offers significant potential for diagnosis, prognosis, treatment, and prevention of human diseases, ultimately leading to an improved quality of life [17,69].

Digitized health care information also enables real-time sharing of patient data and diagnostic reports, streamlining the process of consultations and treatment planning, thereby contributing to a better quality of health care and more timely healthcare [70].

As technology continues to advance, various sectors, including healthcare, have embraced opportunities to enhance their operations and overall quality. The digital transformation has brought about significant changes in the healthcare system, leading to benefits such as increased focus on patient care, improved healthcare quality, heightened patient safety, and expanded capabilities in healthcare delivery [71].

IX. CONCLUSION

Digital health represents the integration of a diverse range of technologies. These technologies have been successfully implemented in various aspects of healthcare. The adoption of digital health systems holds the promise of reducing costs, streamlining workflow, and ultimately improving the overall value of healthcare, patient outcomes, and quality of life.

Notably, there has been significant progress in expanding digital health systems in developing countries, driven by the widespread use of cellphones. However, further research is crucial to comprehensively understand both the positive and negative impacts of digital health systems. This research should focus on enhancing and optimizing the effective utilization of digital health technologies to mitigate any potential adverse effects.

Addressing these challenges is of utmost importance for hospitals and decision-makers, as success of Digital Health implementation is vital in providing effective patient care in today's increasingly complex healthcare landscape.

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