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IJIEMR Transactions, online available on 25th Dec 2023. Link :http://www.ijiemr.org/downloads.php?vol=Volume-13&issue=Issue4

10.48047/IJIEMR/V13/ISSUE 04/51

TITLE: Digital Transformation in Healthcare

Volume 13, ISSUE 04, Pages: 450-464

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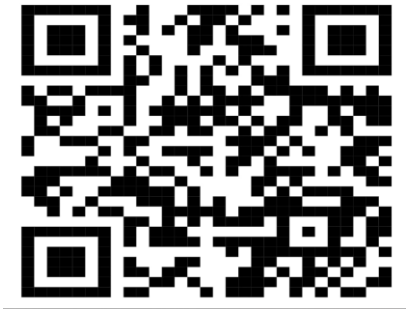

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Digital Transformation in Healthcare

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Abstract - *Technological innovation has become an integral aspect of our daily life, such as wearable and information technology, virtual reality and the Internet of Things which have contributed to transforming healthcare business and operations. Patients will now have a broader range and more mindful healthcare choices and experience a new era of healthcare with a patient-centric culture. Digital transformation determines personal and institutional health care. This paper aims to analyse the changes taking place in the field of healthcare due to digital transformation. For this purpose, a systematic bibliographic review is performed, utilising Scopus, Science Direct and PubMed databases from 2008 to 2021. Our methodology is based on the approach by Wester and Watson, which classify the related articles based on a concept-centric method and an ad hoc classification system which identify the categories used to describe areas of literature. The search was made during August 2022 and identified 5847 papers, of which 321 fulfilled the inclusion criteria for further process. Finally, by removing and adding additional studies, we ended with 287 articles grouped into five themes: information technology in health, the educational impact of e-health, the acceptance of e-health, telemedicine and security issues.*

1. Introduction

The term "digital transformation" describes technological advancements in digital media that improve society and the healthcare sector. Digital technology must be used by healthcare systems to find creative ways to solve medical issues and enhance the delivery of healthcare. The internet and digital technology, as well as how they connect to new treatments and best practices for improved health management techniques, are all part of the digital transformation of healthcare. Ensuring the quality control of vast amounts of data can both lower healthcare costs and enhance patient outcomes. Experts will invent innovative methods of training individuals,

and digital technology will have an impact on medical education as well. Practitioners will now encounter fresh chances in this approach.

Digital health can help to drive health innovation by allowing patients to participate in the process of providing health care. When the patient is no longer in a condition of well-being, they can overcome their poor health. In this instance, the patient has the opportunity to take part in the choices that affect their medical care. To make the best decisions regarding their health, patients must conduct online research or use digital health applications (such as those on their phones).

The digital revolution in health is currently expanding and solidifying quickly. This paper's objectives are to evaluate the body of knowledge on digital health transformation and to pinpoint any potential weak points that might prevent its adoption. Finding out how digital technologies help people participate in their health and well-being is the ultimate goal.

The swift advancement of e-health and digitization may render data from earlier research projects potentially obsolete. The majority of evaluations of digitalization have mostly depended on quantitative research-based techniques. While quantitative assessments are necessary, it is possible to ignore some of their impacts.

Key Drivers of Digital Transformation in Healthcare

Change never takes place in a vacuum, and a range of factors has also influenced healthcare’s digital transformation. To learn why there is this industry-wide shift toward digital healthcare solutions, we must examine the causes of its rising popularity. These are the key drivers of digital transformation in healthcare.

New and Emerging Technology

The last year has been an exciting one for technological breakthroughs. A world seamlessly interconnected over the internet has never seemed more within reach. Healthcare digital transformation services like artificial intelligence (AI), the Internet of Things (IoT), and big data hold great promise to bring positive change. Here are just a few examples of the ways technology is going to accelerate digital transformation in healthcare in the near future.

AI

The most obvious use of AI in digital healthcare services is for automating record-keeping tasks while eliminating human error. But AI can also be used in predictive diagnostics and creating personalized patient treatment plans. Another way AI will transform digital healthcare is through the widespread use of AI healthcare chatbots.

IoT

The use of IoT devices has many possible applications in the medical context. Firstly, health wearables that collect important biometric data will provide the basis for real-time, accurate patient profiles in the future. Also, hospital environments will soon be filled with IoT-connected devices, making operations much more efficient with a steady stream of real-time data and insights.

Robotics

The development of medical robots that can perform complex yet precise actions will revolutionize surgery. Surgeons will be able to perform advanced procedures, even remotely, by using specialized robots.

3D Printing

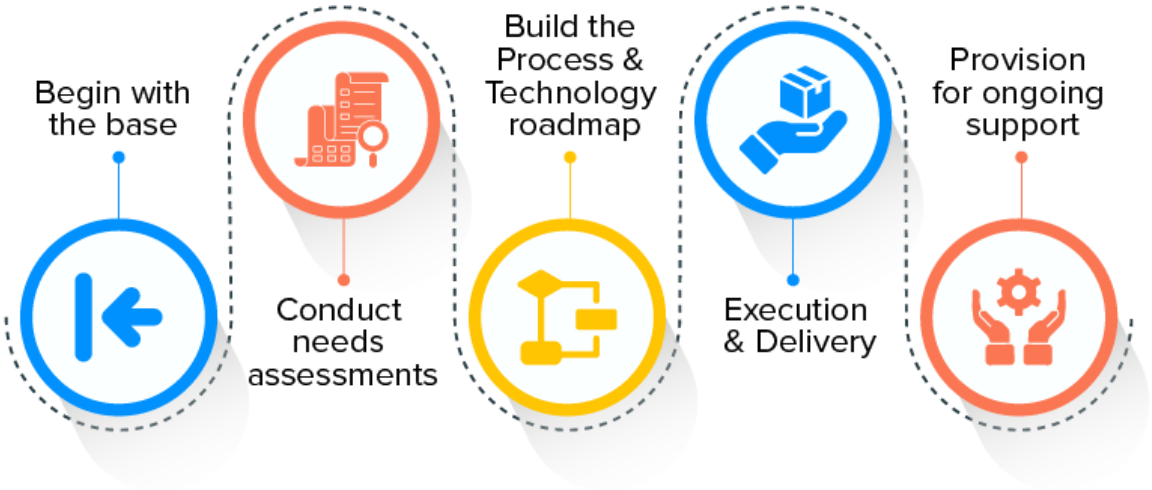
3D printing has made the possibilities for creating prosthetics and custom implants almost limitless. It's an exciting design technology that has found a fresh purpose in digital healthcare transformation.

The technologies listed above are only a few examples. Others include big data (helps in creating patient profiles and providing treatment options), cloud computing (remote healthcare services), and blockchain (verified electronic health records). As innovation continues, new and exciting possibilities for digital healthcare transformation continue to emerge.

The Five-Step Process for Innovation in Healthcare Industry

With the ever-evolving digital transformation in the healthcare sector, there is an urgent need to drive positive change and address complex challenges to embrace innovation strategically. Here is the five-step process for fostering innovation in the healthcare industry. By following these steps, medical

institutions can seamlessly address the intricacies of healthcare innovation and pave the way for transformative advancements. Accordingly, hospitals can advance their clinical capabilities, streamline processes, improve patient outcomes, and redefine healthcare digital transformation services delivery.



Begin with the Base

Look into what you already have, which includes the existing legacy systems, real-time location systems, patient engagement software, EHR, telemetry, etc. Once you have the information, figure out what works well for you and what could be improved.

Conduct Needs Assessments

Once you have all the information, engage the design team in prioritizing each department's wish lists while considering the allocated budget. Next, consider the essential metrics such as HCAHPS scores, ROI, and patient and staff safety satisfaction. Lastly, devise strategies to leverage technologies for achieving those key performance indicators.

Build the Process and Technology Roadmap

Now, it is time to work on the design of the process and tech mapping to determine which aspects can be solved and which should be integrated into technology. Then, move forward with an integrated delivery method, where you clarify the important questions like who would own the project and who would take responsibility for the integration or modernization of legacy healthcare application.

Execution and Delivery

For the successful execution and delivery of the process, partner with a reputed healthcare digital transformation company. The IT consulting firm you partner with must possess comprehensive knowledge of complex aspects, track project progress, strive towards achieving a shared vision, and ensure key performance indicators are fulfilled. Also, your chosen agency for healthcare consulting services should carry the core competency in resolving current and foreseeable challenges.

Provision for Ongoing Support

The final step is establishing a provision to back ongoing support for the smooth digitalization of healthcare. Your digital transformation healthcare provider should provide you with the essential knowledge and expertise to overcome any roadblocks that may come during the digitalization journey.
Now that we have understood the steps that help digitize the healthcare industry, it’s time to dive into some prominent use cases and examples of digital transformation in healthcare.

Telemedicine

Conversely, telemedicine is seen as one of the most significant developments in health services, not just in terms of technology but also in terms of culture and society. It improves organizational effectiveness and healthcare service accessibility. Its job is to address the problems brought about by the 21st century's socioeconomic shifts—the need to manage massive amounts of information, global competitiveness, aging populations, increased citizen mobility, and higher health care demands—in a setting with constrained resources. However, there are major barriers standing in the way of its standardization, full consolidation, and growth.

Currently, telemedicine facilities act as a middleman between a patient and a hospital or physician. But a lot of things prevent this conversation from happening. These variables include the expense of the technology, communication issues, the patient's confidence in the telemedicine system or facility, and reluctance to try new and cutting-edge diagnostics, particularly in remote and rural locations. Consequently, having telemedicine instead of having

a specialist in every rural region of the nation will make it easier to provide healthcare services in remote locations.

If the idea is further examined, it is easy to make the case that the benefits exceed the drawbacks. Thus, in order to overcome every challenge we are now facing, telemedicine needs to be implemented with great effort. Soon, there will be telemedicine centres and services available, including teleradiology, teledermatology, teleneurology, and telemonitoring. This implies that in a few years, the patient will be able to take advantage of the improved quality of healthcare remotely without having to visit a main hospital. This will save a significant amount of time, effectively utilize the resources at hand, reduce patient expenses, and appropriately develop both new and current infrastructure.

"The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for the diagnosis, treatment, and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities" is the broad definition of telemedicine that the World Health Organization adopted in 2007.

Other words that are comparable to telemedicine include e-health and telehealth, which are used as more general terms for remote medical therapy, according to the Canadian Telehealth Forum Wayback Machine. It's important to make clear that telemedicine refers to the delivery of healthcare services. Telehealth, on the other hand, encompasses both clinical and non-clinical services, such as medical science teaching, management, and research. However, according to the American Telemedicine Association, the word "eHealth," which is most frequently used in the Americas and Europe, refers to telehealth as well as other aspects of medicine that use information technology.

Three categories are used by the American Telemedicine Association to categorize telemedicine: storage-promotion, remote monitoring, and interactive services. In order to evaluate the patient's condition and recommend the best course of treatment, the specialized physician uses new technologies to transfer medical data, like as cardiograms and medical photos, to the first category. The patient can be observed remotely thanks to remote monitoring. Chronic conditions such as diabetes, asthma, heart disease, etc. are the main targets of this approach. Direct communication between the patient and the treating physician is made possible by its interactive services.

People who work or live in remote regions can benefit much from telemedicine. It is an effective tool. Patients' access to health care is what makes it beneficial. It can also be utilized as a teaching tool for medical personnel and students.

Because it responds to and adjusts to the essential changes in health that occur within societies, telemedicine is an open and ever-evolving science that takes into account new technology advancements.

The high cost of technology, the need for staff to receive technical training, and the length of a doctor's appointment—which is frequently longer than seeing a regular doctor—are the main barriers to the widespread adoption of telemedicine, according to J.J. Moffatt. However, the World Health Organization claims that telemedicine has great potential for lowering diagnostic variability, enhancing clinical management, and enhancing the delivery of healthcare services globally. Craig et al. and Heinzelmann PJ report that the World Health Organization asserts that telemedicine enhances accessibility, efficacy, quality, and cost-effectiveness. Specifically, by removing obstacles to the physical distance between patients and healthcare providers, telemedicine can benefit historically underserved populations. Furthermore, Jennett PA et al. point out important socioeconomic advantages, such as better patient-provider communication and educational possibilities, for patients, families, medical professionals, and the healthcare system.

However, Wootton R. contends that there have been disparities in the success of telemedicine applications. Few pilot projects have been able to continue once their original financing has ended, and telemedicine has not yet been applied systematically in the healthcare system in either industrialized or developing nation.

However, many challenges are regularly mentioned and responsible for the need for more longevity in many efforts to adopt telemedicine. One such challenge is the complexity of human and cultural factors. Some patients and healthcare workers resist adopting healthcare models that differ from traditional approaches or home practices. In contrast, others need to have the appropriate educational background in Information and Communication Technologies to make effective use of telemedicine approaches. The need for studies documenting telemedicine applications' economic benefits and cost-effectiveness is also a challenge. Strong business acumen to persuade policymakers to embrace and invest in telemedicine has contributed to a need for more infrastructure and program funding. Legal issues are also significant obstacles to the adoption of telemedicine. These include the need for an

international legal framework that allows health professionals to provide services in different jurisdictions and countries. Furthermore, the lack of policies governing data confidentiality, authentication and the risk of medical liability for health professionals providing telemedicine services. In any case, the technological challenges are related to legal issues. In addition, the systems used are complex, and there is a possibility of malfunction, which could cause software or hardware failure. The result is an increase in patient morbidity or mortality as well as the liability of healthcare providers.

Stanberry B. asserts that in order to overcome these obstacles, telemedicine needs to be governed by clear, thorough norms that are preferably implemented globally. Legislation pertaining to provider accountability, data access, and health confidentiality must also be passed concurrently.

What are the Benefits of Digital Transformation in Healthcare?

Medical digital transformation offers several benefits for patients and healthcare organizations. These advancements of healthcare app development allow medical professionals and healthcare facilities to work more quickly and obtain reliable patient data and health measurements. It will enable them to develop a successful treatment in less time.

Let us go through how digital transformation in healthcare benefits patients and healthcare organizations.

Benefits of Digital Transformation for Healthcare Organizations

You must be aware by this point that digital transformation can assist healthcare organizations in developing procedures and systems that are interconnected for both patients and medical personnel, such as Software as a Medical Device (SaMD), and likewise. Thanks to it, they can deliver the necessary treatment and services more effectively and precisely. Keeping all this in sight, let's unleash how it benefits healthcare firms.

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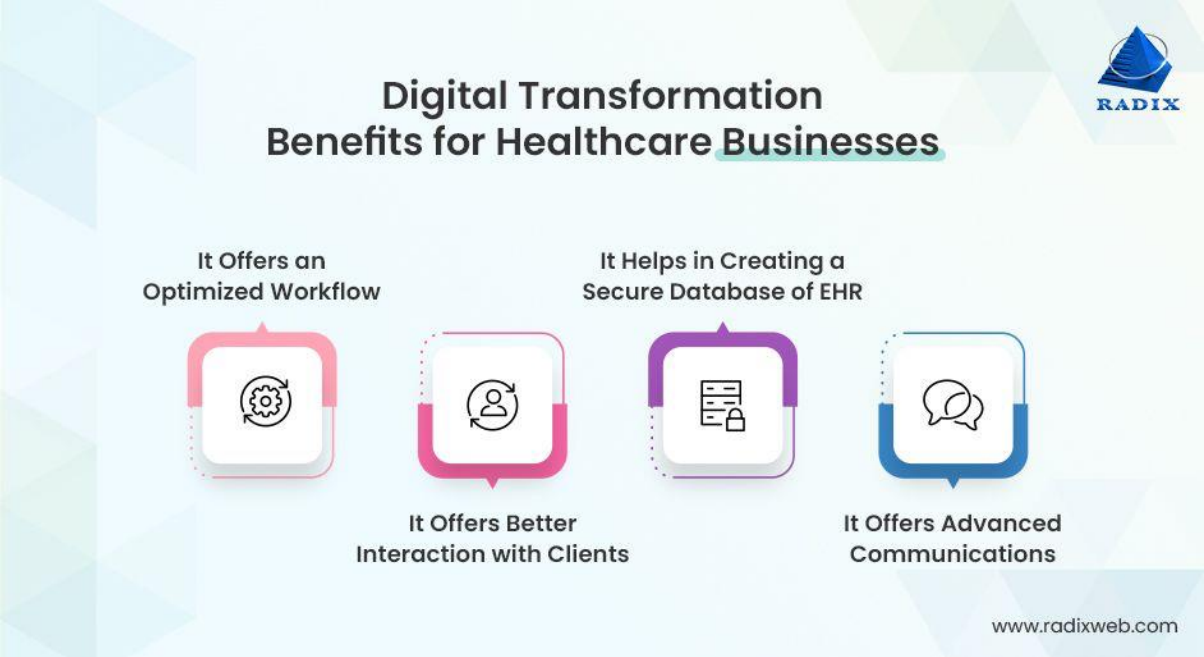

1. It Offers an Optimized Workflow

The digital healthcare software solution helps in cutting down on paperwork. It eliminates the time required for patient examination and enables an easy and convenient way to access accurate patient healthcare data.

2. It Offers Better Interaction with Clients

With digital transformation, healthcare organizations communicate effectively with patients through chats and video calls.

3. It Helps in Creating a Secure Database of HER

The EMH platform helps access the encrypted patient health data and its demand sharing with other laboratories and specialists. EHR software development from Radixweb can help you get started with it.

4. It Offers Advanced Communications

Accurate patient diagnosis, quicker data transmission, and other internal communication are all made possible for organizations because of enhanced communications.

Government grants and other incentives are not the only reasons why embracing digital healthcare transformation is a good idea. Using digital healthcare services is a win-win situation for patients and providers alike.

Digital healthcare solutions benefit doctors, hospitals, medical institutions, and every other type of healthcare provider in the following ways:

- It optimizes workflows by eliminating paperwork, making data more accessible, and reducing the time needed for patient examination.
- It allows for more effective remote communication between doctors and patients.
- It enables efficient communication and data exchange between medical staff.
- It creates a secure database for electronic medical records.

Patients benefit from digital healthcare for the following reasons:

- They can gain access to personalized healthcare services.
- They can track important health metrics in real-time.
- They get easier access to their personal health records.
- Digital healthcare solutions make scheduling appointments convenient.

Benefits of Digital Transformation for Patients

Gone are the days when in-person appointments were the only option for patients. There are several advantages that patients might gain from the digital transition. Let us go over the list of advantages so you can better grasp them.

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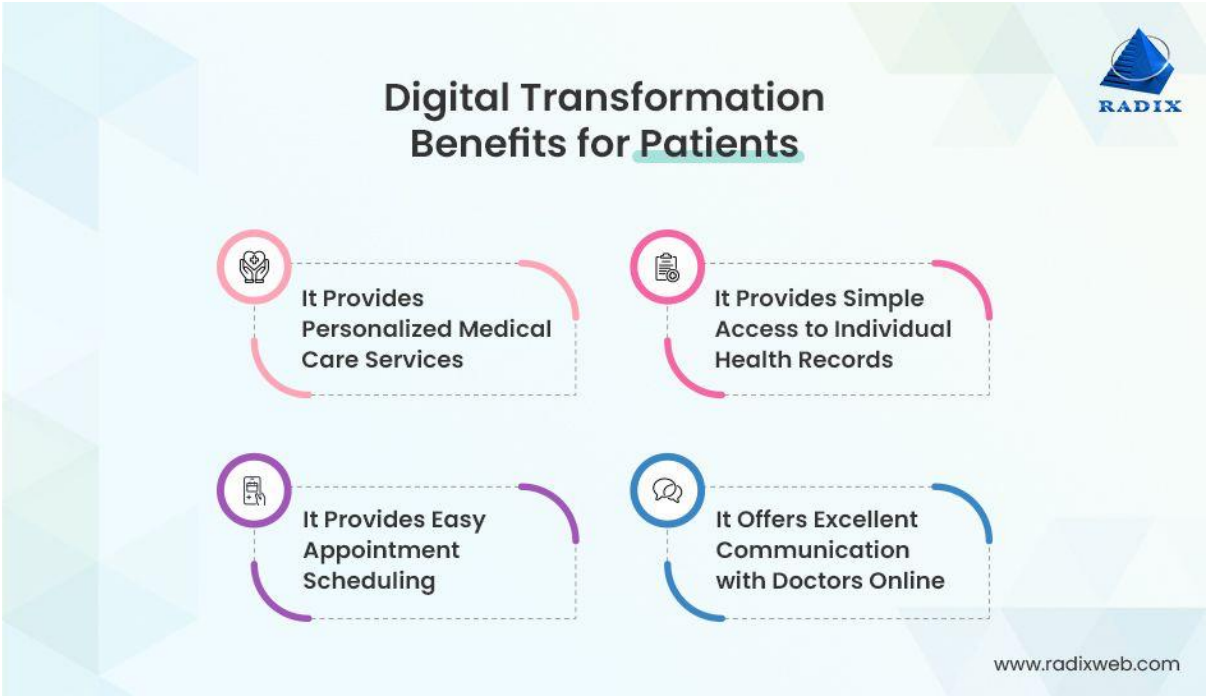

1. It Provides Personalized Medical Care Services

Using digital healthcare enables more precise health diagnosis and provides more efficient treatment. With that being said, you also need to know that custom software development can be the future of the healthcare sector as it also emphasizes providing excellent patient care.

2. It Provides Simple Access to Individual Health Records

Patients can acquire a complete health metrics analysis online with a solution in healthcare web app and monitor and manage their personal health information.

3. It Provides Easy Appointment Scheduling

Thanks to the digital change in healthcare, patients can pick the most convenient time and date for their visit.

4. It Offers Excellent Communication with Doctors Online

Patients can get professional assistance online through chat, or video calls with detailed prescriptions and treatment plans through email or on their personal portal page.

These are a few advantages that digital healthcare solutions can offer to healthcare professionals and patients.

Conclusion

Finally, our study found a timeless examination of systematic research on advancements in digital health. These investigations widen the researchers' perspectives and supply essential data for additional research. Understanding digitalization in healthcare—which mostly involves the digitalization of information—and establishing suitable guidelines for future advancement are the main objectives of this essay. Research on the management implications of digitalization by many stakeholders is desperately needed in order to develop a more comprehensive understanding of the digital health transformation. Ultimately, the growth of telemedicine, the continuous improvement of digital security, and the fortification of technological information systems will help ensure that the digital health revolution is widely welcomed by all parties.

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