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Review Article

From Analog to Digitization: Rethinking Management and Operations Through E-Health Integration in Industry 4.0

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ABSTRACT

Healthcare is considered one of the most critical areas that contribute to the development of the global economy, as it has made significant developments in science and technology. The remarkable development in information technologies and the digital revolution has revolutionized the development of health institutions through the digitization of all medical records and the management of clinical operations. The process of automating medical records is one of the most important processes that are significantly developed in healthcare services. Artificial intelligence technologies contribute to the operation of digitizing medical records through a set of applications that rely on artificial intelligence to help specialists complete work quickly and with high efficiency. These applications are vital in simplifying operational procedures and reducing costs in administrative or clinical contexts. Artificial intelligence contributes to speeding up diagnosis and treatment tasks, improving the quality of health services, and reducing human errors. This paper explores the importance of digitization in healthcare and the role of artificial intelligence in administrative processes. This paper concluded that digitization contributes to developing the environment of health institutions and assisting doctors in diagnosing diseases and tracking patients accurately.

1. INTRODUCTION

Health services are one of the basic requirements of every human being in this universe [1][2]. In Maslow's hierarchy of needs, healthcare is the first step towards material existence and human survival as long as possible in this world. It is an integrated service that can be diversified socially, culturally, and economically as it contributes to saving human lives. The quality, cost and accessibility of services provided in this field to the target audience (patients) is one of the most critical growths today as governments seek to develop the environment of hospitals and clinics. Healthcare benefits is a global market that has grown beyond the ability of the internal conditions of countries to deal with it and contributes to the development of skills and experience of healthcare workers [3-5]. In the areas of health and digitization, the significance of open communication and transparency is particularly evident in processes that affect the entire world, such as epidemics and chronic diseases [6][7]. Technology and the gains it has brought have always had a positive impact on the quality of life. From a health perspective, new technologies and practices can improve treatment processes, communication with patients, processes related to health protection, management processes in health institutions and organizations, disease diagnosis, and remote patient tracking [8-10]. Rapidly evolving internet and mobile broadband solutions have led to the emergence of virtualized processes that contribute to the development of healthcare services such as appointment booking, tracking, and reporting. At the same time, cloud computing has overcome the physical need to store and analyse such data and give accurate patient details [11][12]. Digital technologies can exist in various domains, such as portability, integrability, machine-to-machine (M2M) communication, cloud computing, Internet of Things (IoT), and artificial intelligence [13][14]. These modern technologies are used in healthcare services by digitizing processes within health institutions. These transformations automate traditional healthcare operations that were managed in the past and transform them into digitization processes by applying the latest applications that contribute to digitization. The digitization of the infrastructure and systems utilized paves the way for live-in healthcare workers to achieve skills in maintaining patient records and tracking medical histories.

Artificial intelligence techniques have become increasingly important in providing healthcare and developing health institutions [15][16]. Healthcare workers are adopting new approaches to diagnosis, treatment selection, rehabilitation and patient protection using machine learning and deep learning technologies [17][18]. These methods provide convenience to

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patients in terms of cost and health professionalism. In the past years, many studies have appeared on the application of AI techniques in healthcare, and cooperation between universities and hospitals, public-private partnerships, and research and development laboratories continue to deepen the development of techniques and their integration into health institutions [19][20]. This paper describes the importance of applying digital transformation and artificial intelligence in health services and administrative operations. Digital transformation in the health domain has become a scorching matter, and the application of artificial intelligence in various functions has dramatically promoted the digitalization of medical institutions.

2. DIGITALIZATION IN HEALTHCARE

Digitization is one of the most significant things that contribute to the development of the healthcare sector by integrating modern techniques into the environment of health institutions. These techniques aim to improve patient care, enrich and enhance operational efficiency, and develop medical research. Digitization seeks to build on electronic health records (EHRs), telemedicine, digital imaging, wearable devices, and artificial intelligence (AI). Electronic records replace paper records, allowing healthcare workers to access patient information quickly and safely and exchange data between other medical facilities. This reduces the need for redundant tests, time and effort and improves patient outcomes. Telemedicine is one of the matters that contribute to the use of modern techniques to provide medical services remotely, where the patient can consult doctors via video calls, phone calls, or online chatting. Telemedicine is one of the things that contributes to the development of healthcare in rural areas that suffer from a lack of medical resources. Digital imaging contributes to the analysis and diagnosis of diseases through imaging techniques such as X-rays, magnetic resonance imaging, and CT scans, where digital images can be stored, transmitted, and analysed by specialists with less effort and quickly. Wearable devices track the physical fitness of individuals and display their health metrics such as heart rate, walking steps, and more. These devices collect data and send it to healthcare professionals in real-time. In recent years, many smartphone applications that concentrate on health and fitness have appeared, as they assist users in tracking their medication and exercise schedules and provide them with a diet that is beneficial for their health. These applications rely on artificial intelligence and machine learning to analyse individual data and assist physicians in interpreting medical images, discovering drugs, and predicting patient outcomes. Artificial intelligence techniques analyse datasets and give accurate details with new patterns that help doctors make the right decisions. Big data analytics helps healthcare professionals identify trends, practices, and correlations in the data set, leading to conclusions and strategies to provide more effective treatment and improve patient care. Moreover, remote monitoring devices can continuously monitor patients with chronic conditions, collect data on their condition, and send it to healthcare workers in real-time. Robots contribute to achieving minor surgeries as they provide greater accuracy and shorter recovery times. This leads to the reduction of human errors, the simplification of administrative tasks, and the improvement of patient care. Healthcare systems are essential systems that may be exposed to electronic hacking. Health institutions must protect patient data and not allow unauthorized access. Healthcare workers must securely share data with patients through a secure digital environment.

Digitization in healthcare is essential to transforming the environment of hospitals and clinics, improving patient outcomes, and reducing costs and managing paper records. Moreover, digitization includes applications that help automate operations outside hospitals and transfer them to the Internet through a secure virtual environment to assist specialists in conducting appropriate treatment in real-time. Digitization practices provide the ability to monitor the health status of the individual as well as provide systems for diagnosing the disease and determining the appropriate treatment in the virtual environment. In this environment, the patient is satisfied with online virtual health services, such as treatment selection, reporting, and home care. Through wearable devices, patient data is transmitted to medical centers via the Internet, and healthcare professionals can access this data remotely and perform the required operations. The applications provide reports, examination information, and medical prescriptions. Individuals can access and view these reports via a computer or mobile. Through these applications, physicians can access data on treatments and examinations that patients perform (with the patient's permission) in different places. This reduces time spent in health institutions, prevents unnecessary testing, reduces costs, and enhances the doctor-patient relationship. Likewise, all healthcare services are recorded in a centralized virtual environment to follow up with patients' physicians and continuously protect their data and information through artificial intelligence. These applications provide the possibility to make the right decision by examining different models of disease data. Moreover, these applications enable the systems to offer administrative choices integrated with the systems that produce data for health institutions. Also, there are applications for setting up appointments to meet physicians, as patients can access all hospitals via the Internet and book appointments that suit them. The primary purpose of these applications is to reduce crowding in hospitals and medical clinics, to collect disparate appointment systems under one roof, and to reduce stress on healthcare workers. Artificial intelligence contributes to the creation of demographic reports through the development of systems in partnership with companies such as Microsoft and Oracle, where documents can be managed in health care, with the creation of a file for each patient that includes diagnostics and prescriptions. It is expected that nearly 20 billion dollars will be saved by using applications supported by artificial intelligence. The Watson for Health

application, which is used in the diagnosis of diseases, has a multi-modal structure through which it can support physicians in conditions that are difficult to diagnose. AI can be used in clinical terms such as health maintenance, diagnosis and treatment, early diagnosis, home care, etc. Finally, some applications contribute to focusing on chronic diseases such as Alzheimer's, kidney disease, and heart disease, as they can monitor patients and provide doctors with test results in real-time.

3. CONCLUSIONS

Artificial intelligence can design virtual health institutions' environments through digitization. The dataset collected and analysed through AI-based applications and display reports can be used to identify people's health risks. All dataset is stored in the cloud and then distributed to all devices through the Internet of Things. Digitization contributes to managing costs and the quality of health services in hospitals and medical clinics through applications that assist physicians in predicting and determining drug doses and enhancing healthcare. Moreover, artificial intelligence and the Internet of Medical Things (IoMT) support elderly individuals to monitor their health by tracking heart rate, blood pressure, and calories and providing a range of fitness tips. Thus, governments must aim to develop health services in hospitals and clinics and rely on artificial intelligence to transform the traditional environment into a safe virtual environment by digitizing procedures within health institutions.

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Conflicts Of Interest

The author's disclosure statement confirms the absence of any conflicts of interest.

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