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DIGITAL THERAPEUTICS FROM DATA ANALYTICS AND INFORMATION SECURITY PERSPECTIVES

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ABSTRACT

Digital medicines have been developed to fulfill unmet demand resulting from rising societal costs, such as insurance for health money and issues with medical accessibility, as chronic diseases rise with age. Digital healthcare is an industry that uses ICT to control illnesses and personal health by providing medical services. One sub concept within this industry is digital therapies. Digital therapeutics—a subset of digital healthcare technologies—that are able to not only treat but also prevent and manage diseases are anticipated to be essential to the delivery of healthcare in the future. Nevertheless, relatively few individuals actually employ digital therapies since numerous individuals still have little conceptual knowledge of them. As a result, this article outlines strategies for disseminating digital medicines in the areas of data analysis and information security and raising conceptual knowledge of digital remedies. Precise data analysis is a fundamental component of any digital therapeutics' development, application, and design processes. Additionally, because private information is used for analysis, a stringent reaction strategy to cyber risks is required. As a result, it's advised to create educational initiatives for the general public, educators, and students as well as to supply the resources needed to spread awareness of digital therapies. Additionally, it is critical to activate the Korean My Heathway system according to My Data and create a security model appropriate for digital therapies in order to provide a safe environment in which digital treatments may be employed. Those in need of digital therapies will have the chance to obtain them thanks to these techniques.

Keywords: Digital Therapeutics, Data Analytics, Information Security, Korean My Data, My Heathway.

1. INTRODUCTION

All sectors are undergoing a digital transformation as a result of the advancement of digitally based information technology. Digital innovation within the medical profession has garnered attention recently, among other industries. Digital therapeutics is one of the top 10 potential technologies for 2020, according to top popular science publications Scientific American and the World Economy Forum (WEF). A fictitious patient is the other (WEF, 2020). Furthermore, digital therapies have been named as one of the ten innovations that can significantly influence human health by 2040 by the McKinsey multinational Research the Institute, a think-tank of McKinsey & Company, a multinational management consulting organization (Remes et al., 2020). As the rest of the world, Korea is also focusing on digital therapies. Digital therapeutics was listed as one of the top 10 technological developments in healthcare by the Korea Health Industry Development Institute for 2021 (Korea Health Industry Development Institute, 2021). According to WEF (2020) and Remes et al., (2020), digital therapies are now being assessed as new developments which will bring improvements in the field of health care globally. Without digital medicines, it appears hard to understand medicine and humanity's future. It has been discovered that many Koreans are unaware of digital therapies, despite the significance and necessity of these treatments. In a poll conducted in 2021 among 500 adult Korean men and women, Shin, J. et al. found that 83% of respondents were unfamiliar with digital therapies. Thus, from the viewpoints of data evaluation and data security, we suggested strategies for educating people about digital medicines technology in this study.

LITERATURE REVIEW

1.1. Digital Therapeutics

Commercial uses of the moniker Digital Therapeutics were made in 2010 by Welldoc, an American diabetic management services firm, in conjunction with the release of the type 2 diabetic management smartphone app BlueStar. When a study released in 2015 detailing the outcomes of two-year inspections on participants in earlier studies of Internet-based prevention of diabetes programs, digital therapeutics was first employed in the academic setting. Sepah et al., (2015) defined digital therapies as Based on Evidence Treatment (EBT) that is delivered online with a restricted delivery mode that is the Internet. The FDA authorized reset, an app developed by Pear Therapeutics to treat drug addiction, in 2017. The medical community and other organizations started to take an interest in digital therapies as a result. The pharmaceutical industry's current paradigm is predicted to undergo a substantial shift when research and development of digital therapies pick up speed. Digital treatments have quicker development times and less expensive development than current medications.

Big Data and Digital Therapeutics

Data analysis is the process of creating digital therapies. They are enhanced and use data analysis to treat patients. This technology is software that uses various digital stimuli, such sounds and visuals, to alter a patient's behavior and way of life. It then gathers and evaluates the resulting data (Lee et al., 2022). Therapeutic applications used alone or in conjunction with medications or medical equipment, virtual reality, and artificial intelligence-based therapy are a few examples. Artificial intelligence technology is being used in the development of digital therapies to process Personal Health Records (PHRs) and deliver individualized, highly optimized services. PHR includes Gene Data, Genetic Data from Genetic Analysis Institutions, EMR Data from Medical Institutions,

Medical The therapy, Examination, and Imaging Device Data, and Lifelog Data from Wearables and Smartphones. Furthermore, health data are primarily separated into two categories: healthcare big data, which includes publicly available Institutional Review Board (IRB) data, and Common Data Model (CDM), which is based upon electronic health records of medical institutions, and my Data, which includes PHR. The process for allowing illness prediction and prevention using machine training and artificial intelligence using big data is depicted in Fig. 1 to enable tailored therapy.

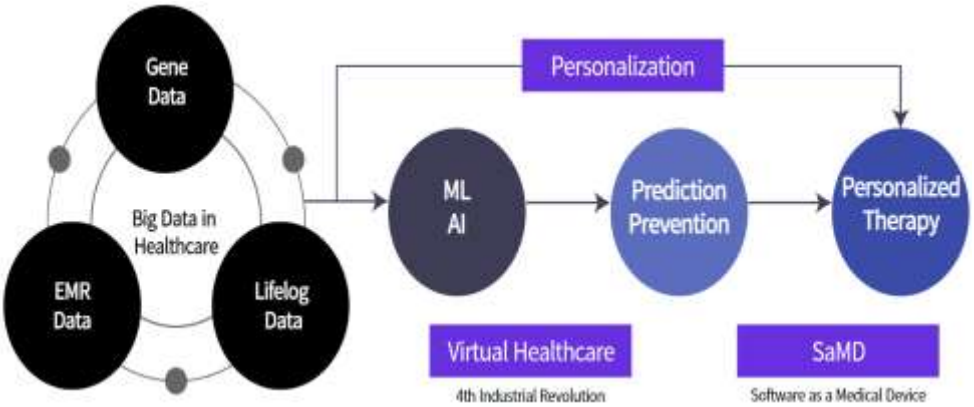

Fig. 1: Personalized Treatment Process through Data Analysis

However, using big data of health information always carries the danger of exposing and abusing bio-information, including physical and disease-specific data. Sensitive personal data, such as medical information, is subject to several security risks during collection, processing, and storage. As a result, careful investigation and action are needed. Sharing medical records, for instance, may leak during transmission. Security risks, such as unauthorized individuals gaining access to systems and data, must be anticipated even when it comes to shared domain authentication.

2. MEASURES TO RAISE AWARENESS OF DIGITAL THERAPEUTICS CONCEPTS

2.1. Development of Digital Therapeutics Education Programs and Textbooks

The general public can be educated in a variety of ways on the principles and uses of digital therapy. There are many different kinds of education, including adult education forums, teacher training, and education centred around the idea of digital remedies for pupils. In addition to providing knowledge for future employment possibilities, it's desirable to teach students the fundamentals of digital therapies like virtual reality exposure treatment (VRET) and brain computer interface (BCI). To improve learning immersion, gamification—the use of games into the classroom—can also be used. Students taking lessons on digital therapies should have access to a variety of course resources throughout instructor preparation. Teaching aids and textbooks created specifically for instructors are displayed in Fig. 2 (Choi et al., 2021). Public education forums encourage speakers, both native and foreign, to extend their perspectives in light with the public's features and level of comprehension regarding digital treatments. In this situation, providing examples from other situations or showcasing digital therapeutic gadgets that have already been created may also aid in their comprehension.

Fig. 2: Teaching Materials and Textbooks

2.2. Revitalization of Digital Therapeutics through Korean My Data

Data is becoming so important that it is often referred to as the "second oil." In light of this, the Korean government introduced that My Data policy in 2021 in an effort to uphold the rights of those whose data they are subject to and to stimulate the data economy, given the growing social and economic significance of data. People own the right to decide how they want their personal data to be used and managed, and this right is known as My Data. In order to safeguard people' private information, uphold their right to personal information, and stimulate the digital economy, the EU also enacted the GDPR in 2018. Additionally, the UK legislated the open banking policy in 2011 and launched the My data initiative, a strategy that digitizes and makes available private data held by businesses. Since its launch, Korea's My Data has spread across a number of areas, including healthcare, transportation, and education, with an initial emphasis on the financial sector (Park et al., 2021). My Heathway serves as the foundation for the use of My Data in the medical domain. With the help of this platform, people may gather all of their medical data in one location, send it to the intended recipient, and utilize it right away. The general population is anticipated to lead the way in adopting digital therapies if My Heathway, which is based on My Data, is soon put into practice.

3.3 Securing the Safety of Digital Therapeutics using Rigid Information Security Policy

The digitalization of healthcare inevitably brought with it the risk of cyberattacks. For instance, spoofing attacks may cause medication injection devices implanted within the body to fail, and cyberattacks that manipulate artificial heartbeats remotely are also a possibility. The Information and Communication Network Act's definition of an information and communication networking connecting device has been extended by the Korean government to include the medical domain. By rearranging the current Internet of Things (IoT) safety certification system in information protection certification, it reacts to the increasingly digitalized society. It will also establish a "security living lab" to test goods for security prior to their release in the digital medical space. Additionally, as part of their premarket filings, medical device manufacturers are required by the US FDA to identify and manage cybersecurity risks. Leading nations in digital therapy also offer cybersecurity guidelines following the sale of medical equipment. According to Bang et al., (2020), they frequently advise procedures including information exchange, monitoring, update development, and termination of support. Cyberattacks are dangerous enough to endanger human lives in digital treatment, which is why a strict information security paradigm is required. More patients will be able to employ digital medicines if the efficacy of these treatments is confirmed using these models.

CONCLUSION

Digital treatments are novel academic domains that have just reached the initial phases of investigation. It also has a good chance of developing shortly. Without talking about digital healthcare within the health care and pharmaceutical domains, the future is unavoidable. But even with this cutting-edge technology, a lot of people are ignorant about it. This article takes a data analytic and cybersecurity approach to suggest strategies for increasing market awareness of digital medicines and bringing them back to life. Creating educational initiatives about digital therapies will raise more people's awareness. More individuals will have safer access to digital therapies if my health way platform, which is built on my data, is actively used and a stringent information security paradigm is put in place.

3. ACKNOWLEDGEMENTS

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