REFLECTIONS OF DIGITAL TRANSFORMATION IN THE HEALTH SECTOR IN THE COVID 19 PANDEMIC WITH THE EFFECT OF INDUSTRY 4.0*

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Abstract

With the influence of Industry 4.0, the whole world and our country are in a digital transformation process. With the effect of the Covid-19 pandemic process we are in, digitalization in health is developing rapidly and is of great importance. In this study, the four main topics of digital transformation in the field of digital health, telemedicine, e-Health, m- Health, algorithmic medicine, e-pulse and the latest developments in this field are discussed. The developments in health with the effect of Industry 4.0, artificial intelligence applications in the health sector are given and the aims of the study are presented. Studies on the subject between the years 2019-2021 are examined. With the fact that only 2% of the studies examined are literature studies and the acceleration of digitalization in health with the effect of the Covid- 19 pandemic process we are in, the need for a literature study of current studies has emerged. In the literature study; studies including current application examples are included and the current status of digitalization in health is given. The rapid development and importance of digitalization in health, also with the effect of Covid-19 is emphasized.

Keywords: Digital Technology, Automation, Industrial Development, Artificial Intelligence, Covid-19.

Endüstri 4.0 Etkisi ile Covid 19 Pandemisi'nde Sağlık Sektöründe Dijital Dönüşümün Yansımaları

Öz

Endüstri 4.0' ın etkisiyle tüm dünya ve ülkemiz dijital bir dönüşüm sürecindedir. İçinde bulunduğumuz Covid-19 pandemi sürecinin etkisiyle sağlıkta dijitalleşme hızla gelişiyor ve büyük önem taşıyor. Bu çalışmada dijital sağlık alanında dijital dönüşümün dört ana konusu, teletıp, e-Sağlık, m-Sağlık, algoritmik tıp, e-nabız ve bu alandaki son gelişmeler tartışılmaktadır. Endüstri 4.0 etkisi ile sağlıkta yaşanan gelişmelere, sağlık sektöründeki yapay zeka uygulamalarına yer verilerek çalışmanın amaçları sunulmuştur. 2019-2021 yılları arasında konuyla ilgili yapılan çalışmalar incelenmiştir. İncelenen çalışmaların sadece %2'sinin literatür çalışması olması ve içinde bulunduğumuz Covid-19 pandemi sürecinin de etkisiyle sağlıkta dijitalleşmenin hızlanması ile mevcut literatür çalışmasına olan ihtiyaç ortaya çıkmıştır. Literatür çalışmasında; güncel uygulama örneklerini içeren çalışmalara yer verilmiş ve sağlıkta dijitalleşmenin mevcut durumu sunulmuştur. Çalışmada sağlıkta dijitalleşmenin hızlı gelişimi ve önemi, Covid-19' un da etkisiyle vurgulanmıştır.

Anahtar Kelimeler: Dijital Teknoloji, Otomasyon, Endüstriyel Gelişme, Yapay Zeka, Covid-19.

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INTRODUCTION

Digital technologies affect people's daily lives in many ways. The way people live and work, their free time, their interactions with other people, their emotions and thoughts are reshaped by digital technologies. These technologies have had profound effects in many sectors as well as influencing people (Dorn, 2015). In healthcare, which is the pioneer of the service sector, digital technologies are used to increase work efficiency, improve service quality and create a safe service (Haggerty, 2017). Digital technologies aim to improve human health using high-end practices and tools (mobile technologies, social networks, internet, e-mail etc.) (Hudes, 2017). In clinical processes, the performance of processes such as diagnosis and treatment is improved, and it is aimed to increase the quality of service by minimizing personal errors (Akalın and Veranyurt, 2020: 128).

Digital health offers numerous possibilities to improve public and individual health. With the rapid progress of digital health, the way health services are delivered and patient-clinician interactions are changing rapidly. With the impact of the Covid-19 epidemic, telehealth services and their needs have accelerated significantly (O;reilly-Jacob et. al., 2021: 100533).). With the impact of the pandemic, 2020 has undoubtedly made digital health a necessity and is no longer an exception (Barnett et. al., 2018: 2147, Wosik et. al., 2020: 957). Many technological developments that seemed futuristic became reality within a few months due to the needs of the pandemic (Silva and Schwamm, 2021: 351).

In this study, it is aimed to present the current status of digitalization in health with the effect of Industry 4.0 and artificial intelligence, to present the effect of the Covid-19 pandemic on digital transformation and to present application examples with current studies in the literature.

In this section, developments in health with the effect of Industry 4.0, digital health transformation stages ranging from telemedicine to algorithmic medicine, artificial intelligence applications in the health sector are explained and the aims of the study are presented. In the second part of the study; the studies related to the subject between the years 2017-2021 are examined and a summary of the studies examined is presented. After the literature study, the importance of digitalization in health is emphasized with the current application examples used in the field of digital health and the effect of the current Covid-19 pandemic process. In the last section, the inferences and advantages of digital health are presented.

1. DIGITAL HEALTH APPLICATIONS EXTENDING FROM TELEMEDICINE TO ALGORITHMIC MEDICINE

Digital health consists of 4 sub-units. In this section, information about these 4 digital health areas is presented. These areas are respectively; telemedicine, e-Health, m-Health and algorithmic medicine. The concepts of telemedicine, e-Health, m-Health and algorithmic medicine, which constitute the foundations of digital health, are explained below, respectively.

1.1. Telemedicine

Telemedicine emerged in 1980 to support health care remotely with the combination of personal computers and video conferencing technologies (Finch et. al., 2008: 86). Telemedicine by the World Health Organization (WHO); in order to improve the health of societies, it is expressed as the provision of health services that provide diagnosis, treatment, preventive medicine, research, evaluation, and continuous education through communication and information technologies.

1.2. E-health

In the beginning, e-health was only expressed as keeping records of data in electronic environment. However, the internet and technology, which later entered the health sector, was expressed as the storage of data, the follow-up of patient diagnosis and treatment, and the evaluation of the results via the web (Eysenbachi, 2001).

It is obvious that e-health service will support increasing sustainability in the field of health, which is carried out with limited resources (Cocır, 2015).

The "e" in e-health does not only cover the meaning of medicine, electronics, and the internet, but the 10-e given below, which reveals what health is about, is given below, respectively (Eysenbachi, 2001).

1. Efficiency: One of the aims of e-health is to reduce the costs by increasing the efficiency of the health service provided. One of the ways to achieve this may be to avoid unnecessary diagnosis or treatment by increasing communication between health institutions.

2. Enhancing Quality of Care: Increasing the quality of care and efficiency not only reduces costs, but also improves quality. With e-health, different service providers can be compared and patients can be directed to places where the highest quality service is provided.

3. Evidence Based: E-health should be evidence-based with effectiveness and efficiency. This is a subject that is open to development and needs to be studied.

4. Empowerment of Consumer and Patients: E-health provides patients with access to medical and personal electronic records databases through the Internet.

5. Encouragement: It is the provision of a new communication network where decisions are made jointly between the patient and the healthcare professional.

6. Education: To provide health education and preventive medicine education to consumers and physicians through online resources (continuing medical education).

7. Enabling Information: To provide information exchange and communication between health institutions in a standard way.

8. Extending the Scope of Healthcare: It is to move the scope of health services beyond traditional medicine. The expression has both a geographical and conceptual meaning. E-health allows consumers to easily obtain healthcare services online from global providers.

9. Ethics: E-health poses new challenges and threats in terms of issues such as informed consent,

confidentiality and equality with the new form of patient-physician interaction. E-health includes new patient-physician interaction and online professional practice. Ethics covers the issues of informed consent, privacy and equity.

10. Equity: Making healthcare more equitable is one of the promises of e-health. At this point, however, there is a threat of a large equality gap between those with e-health and those without. The fact that people with insufficient financial situation, knowledge and technological opportunities cannot benefit from e-health can make the difference. The digital divide currently exists between the rural population and the urban population, between the rich and the poor, between the young and the old, between men and women, and between people with rare and common diseases.

In addition to these 10 items given, e-health; It is also expressed as easy to use, entertaining and exciting (Eysenbachi, 2001).

1.3. M-health

M-health is a component of e-health. M-health is defined by the World Health Organization Global Observatory Pre-Health (GOe) as a medical and public health application powered by mobile devices. Considering that 2.5 billion people in the world have mobile phones, it is thought that using m-health will make a great contribution to rapid access to health. Despite increasing interest in m-health by both patients and healthcare providers, there is little clinical guidance on how m-health practices should be used. Its relationship with the basic building blocks of M-health is given in Figure 1 (Who, 2011).
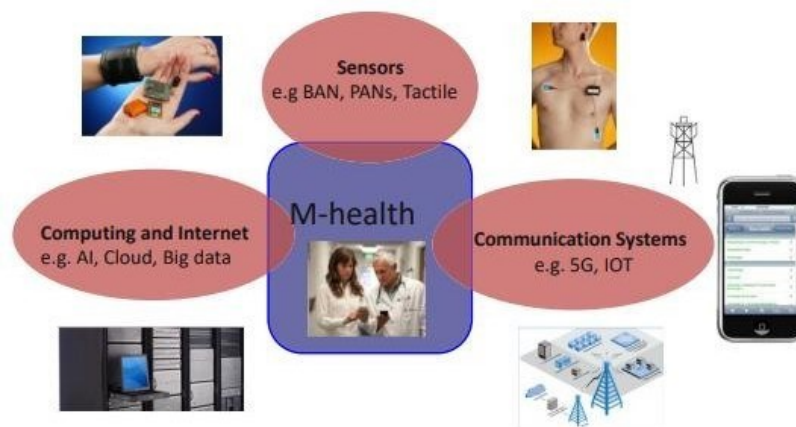
Figure 1. The Basic Building Blocks of M-Health (13)

1.4. Algorithmic medicine

A great deal of capacity is being built by the latest developments in computing, the generation, storage and sharing of data. This age is called the age of 'big data' and its effects are also seen in health (Ruckenstein and Schüll, 2017: 261). In this environment, algorithms capable of filtering, sorting, processing, and automating reasoning have been seen as the main drivers to revolutionize medicine

(Obermeyer and Emanuel, 2016: 1216). Van de Wiel used algorithms to predict, diagnose, and treat individuals' disease risks, and he called this approach "an algorithmic way of seeing." (Van de Wiel, 2019: 193).

1.5. A Mobile Health Application: E-Pulse Application

In Turkey, the Ministry of Health makes use of health technologies so that individuals can receive better quality and faster health services. Thus, while making the work of health institutions easier, it also contributes to the digitalization of health services. As a requirement of digitalization, many applications have been developed in the field of health. They are applications where health meets technology such as e-Pulse, e-Report, Tele Radiology System, Decision Support Systems, SINA (Statistics and Causal Analysis in Health), Spatial Business Intelligence, MHRS (Central Physician Appointment System) (Ministry of Health, 2022). E-Pulse is an application that provides access to personal health data via the internet and mobile devices in line with the information received from health institutions. The application is open to use by healthcare providers and citizens. In practice, all health records of previous examinations, examinations and treatments are stored, regardless of the difference between private and public hospitals. At the same time, the e-pulse application is a personal health record system that allows you to access your medical history from a single place at any time. Health records can be evaluated by physicians within the framework of the time and limited authority given by the person himself. As a result, the quality and speed of the diagnosis and treatment process increases and a strong communication network is formed between the physician and the patient. The application can be accessed securely over the internet, and it draws attention as it is the world's largest and most comprehensive health informatics infrastructure. E-pulse application is also an application where the patient's personal data can be stored as well as various health transactions. The possibilities provided by the e-pulse application and the basic data it contains are presented in Figure-2 (E-nabiz, 2022).
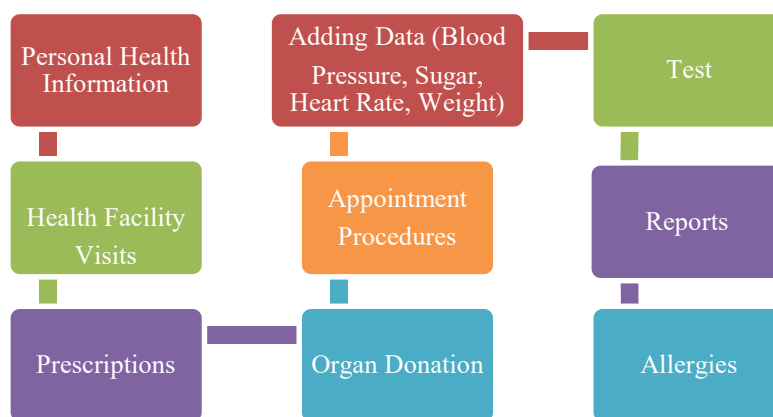
Figure 2. Opportunities and Data Provided by the E-Pulse Application

In addition to e-Pulse, Hayat Eve Sığar, Mental Health Support System and Special Children Support System applications have also come to the fore as other applications that support healthcare services during the Covid-19 pandemic in Turkey (E-nabiz, 2022).

1.6. The Effects of Industry 4.0 on the Health Sector

The concept of Industry 4.0 was first discussed at the Hannover Fair held in Germany in 2011 and has become a very popular topic with the innovations it will offer to many sectors (Korkmaz, and Gedik, 2020). The acronym I4.0, which is commonly used to denote Industry 4.0 and the Fourth Industrial Revolution, refers to a set of digital information and communication technologies aimed at bringing a higher level of automation and connectivity to processes, products, services and people. The use of digital technologies and applications is changing the way organizations are structured and working routines with new business models (Lu, 2017, Xu et. al., 2018). Researchers have reported the benefits of integrating digital technologies into the manufacturing (Kiel et. al., 2017, Dalenogare et. al., 2018) and service (Hofmann and Rüsch, 2017: 23, Schroeder et. al., 2019: 1305) sectors. Since Industry 4.0 in the health sector, the use of digital information and communication technologies has been expressed as Health 4.0 (H4.0) (Tortorella et. al., 2020: 1245). Health 4.0 is based on the innovative approach of healthcare services provided to patients and the use of digital technologies (Thuemmler and Bai, 2017: 23, Chen et. al., 2018: 403).

The need to increase the resilience of hospitals has become clearer than ever due to the Covid- 19 pandemic, which is pushing the limits of available human and material resources (Cao et. al., 2020: 309, Thomas et. al., 2020: 73). For this reason, the use and importance of innovations that entered the health sector with Industry 4.0 have come to the fore today. Industry 4.0 has increased the benefit received by highlighting the more effective and innovative aspects of medical devices. Thus, the process of diagnosing diseases has accelerated and the accuracy of treatments has increased (Sayılgan and İşler, 2017).

Every second that passes, developments in science and technology are also reflected in the health sector. Digital hospitals can be shown as an example of innovation that has entered our lives with Health 4.0. With the paperless model it offers, these hospitals provide patients and healthcare professionals with a data warehouse that can be accessed quickly and easily at any time. Thus, the power of accessing information about patient records has increased. Hospitals must have certain standards in order to be considered as a digital hospital. The control of these standards is carried out by an organization called HIMSS and the digital hospital levels of the hospitals are determined by the EMRAM model used. These levels show the digitality levels of hospitals (Aslan and Güzel, 2019: 650).

Ankara Gazi Mustafa Kemal State Hospital (Ankara GMK State Hospital) was selected as the pilot hospital for the first time in 2012 for the transition to digital hospital in our country. In this context, first of all, the current situation analysis was made. After determining the integrated level of the hospital's digital and non-digital processes and administrative and medical information systems, many transactions were transferred to the electronic environment. It has been ensured that the patients' examination information, analysis results and data and information about their treatments are processed into the system via smart and mobile devices by the hospital staff. This information was then accessed from within the hospital or remotely. At the beginning of 2013, the operation of the hospital was

evaluated and an application was made to HIMSS Europe for accreditation and in April 2013, it was certified by HIMSS as the first EMRAM 6th Level Digital hospital in Turkey (Sağlık Bakanlığı,2012-2014).

1.7. Artificial Intelligence in the Healthcare Industry

Artificial Intelligence (AI) can be expressed as computer and computer software with analysis and learning competencies (Büyükgöze and Dereli, 2019: 7). Thanks to artificial intelligence, people do their jobs faster, more efficiently and at lower costs. Artificial intelligence applications and robots, which are becoming increasingly widespread in every sector, have started to be a part of daily life in the health sector. Many factors such as health-threatening diseases, the increase in the number of people over the age of 65, low quality living standards, advances in information technologies, increased costs and the need for efficient use of time have led to the use of artificial intelligence applications in the health system (Akalın and Veranyurt, 2020: 5).

The fields of use of artificial intelligence and robotic applications in health are examined in two main groups for clinical and management purposes. Artificial intelligence usage areas in these two areas are summarized in Table 1 (Akalın and Veranyurt, 2020: 5, Pwc., 2019).

Table 1. Usage Areas of Artificial Intelligence and Robotic Applications for Clinical and Management Purposes in Health

Management Purposes	Clinical Purposes
General health management	Stay healthy
Documentation management	Diagnosis
	Treatment
Cost and quality management	Research
	Early diagnosis and emergency response
	Elderly care
Improving Negativities in healthcare and management	Education
	Public health management
Rational use of the capacity of health institutions	Follow-up of radiology and test results AI-assisted robotic surgery
Remote preventive and complementary healthcare delivery	Evaluation of pathology results
	Drug development and drug therapy follow- up
	Personalized treatment

2. METHODS

In this section, a literature review of studies dealing with the concept of digital health and its applications is given. The summary of some of the prominent studies examined is as follows; (Marent and Henwood, 2021), in their study, explained the concept of digital health and presented the historical development of digital health and its effects on social life. The potential advantages and disadvantages of digital health are given in the study. It includes the historical development and practical applications ranging from telemedicine to algorithmic medicine. Akalın and Veranyurt, explaining the digital

transformation in health services, presented a study in which the contributions of artificial intelligence to digital transformation in clinical and management stages were explained and examples were given (Akalın and Veranyurt, 2020: 5). With the effect of the epidemic process we are in, they emphasized that health services will be virtualized in administrative and clinical terms thanks to artificial intelligence applications. In addition, the study focused on examples of digital applications used in health in our country. Yıldırım et. al. (2021), focused on the role of telemedicine practices in self-medication management in their studies. It is thought that including drug self-management in telehealth studies and chronic disease management will contribute to the protection of people's health (Yıldırım et. al., 2021). (Popkova and Sergi, 2021), focused on automation based on new datasets and the internet of things in their work. The study includes the practical implications of technology and the automation and management of a new big data on public health. Covid-19 and 2020 economic crisis data were used as sample data (Popkova and Sergi, 2021). Aslan and Güzel (2019) conducted a study to analyze the effects of Industry 4.0 on the health system. In the study, both Industry 4.0 developments and developments in the health sector are given in detail. The study was handled as a scan and enriched with current examples from journals published on digital transformation in health (such as Medical Journal, Media Cat Journal, Medical Technical Journal, Platin Journal) (Aslan and Güzel, 2019: 650). Aceto et al. (2020) focused on the role of Industry 4.0, which provides the integration of information and communication technologies, in health. By analyzing the literature, they discussed how the application of Industry 4.0 technologies in the health sector changes traditional methods (Aceto et al., 2020).

Among the previous studies on the subject, 33 studies conducted between the years 2019-2021 are reached. A brief summary of the studies examined is given in Table-2.

Table 2. Studies on Digitalization in Health

Authors	Subject	Scope	Does it support the increase of Digitization with Covid-19?
Marent and Henwood (2021)	It explains digital health theoretical concepts and potential advantages/disadvantages.	General evaluation	Yes
Korngiebel (2021)	Digital Health Service Inequalities are mentioned in the study.	General evaluation	No
Bond (2021)	In the study, a general evaluation was made on digitalization in health and it was noted that digitalization accelerated with Covid-19.	General evaluation	No
Staples et al. (2021)	Mental health symptoms, characteristics and regional differences for digital mental health service users in Australia during the first 8 months of Covid-19 are discussed.	Special topic	Yes
The Lancet Digital Health (2021)	Members of the World Health Organization emphasized the importance of telemedicine for responding to emergencies such as the Covid-19 outbreak.	Special topic	Yes

Stam (2021)	The issue of digital health has been addressed in international cooperation. Programming and evaluation of digital health in international cooperation, the need for inclusive, interdisciplinary language and guidance, and studies on this subject were mentioned.	Special topic	No
O'Reilly- Jacob et al. 2021)	A conceptual framework is presented to evaluate the potential of digital health to increase low- value care.	Special topic	Yes
Akalın and Veranyurt (2020)	Increasing chronic diseases and epidemics such as the Covid-19 pandemic, the increased need for home care services by the elderly population due to the prolongation of the period, and the changes in the health expectations of individuals have been emphasized.	Special topic	Yes
Köksalan and Hatipler (2021)	In this study, the phenomenon of digital migration, which has come to the fore with its effects in many areas, the Covid-19 epidemic and the effects of the epidemic in general, digitalization and digital migration are conceptually discussed.	General evaluation	Yes
Şahinol and Başkavak (2021)	In this study, the differing care styles and experiences of adults with T1 diabetes (T1D) and parents of children using (CGM), a self- tracking device that produces digital health data, are emphasized.	Special topic	No
Şimşek and Karaismailoğlu (2021)	The use of digital technologies in health services and patient safety are emphasized.	Special topic	No
Yıldırım et al. (2021)	Tele-health practices in self-medication management were conveyed through a systematic review.	General evaluation	No
Popkova and Sergi (2021)	The article includes solutions and applications for implementing digital public health. In the study, data clustering and automation based on the internet of things are discussed.	Special topic	Yes
Chen et al. (2021)	The major role played by the use of digital health technologies in China's early response to the 2019 coronavirus disease (Covid-19) is emphasized.	Special topic	Yes
Mastronardo et al. (2021)	It is a review study on digital health technologies for osteopaths and allied health care providers. In the study, 14 articles were examined and it was seen that the telehealth application of the auxiliary health service providers was used effectively in patient care. The Covid-19 pandemic has also been seen to accelerate the adoption of telehealth.	Special topic	Yes
Bergier et al. (2021)	The place of the use of digital health, big data and smart technologies for the care of patients with systemic autoimmune diseases has been expressed.	Special topic	Yes
Barbosa et al. (2021)	The importance of developing, applying and evaluating different digital technologies in nursing is emphasized.	Special topic	No
Şahinol and Başkavak (2020)	Biomedicalization, digitalization of health and self-monitoring practices in Turkey are presented.	Special topic	No
Uysal and Ulusinan (2020)	Examination of current digital health applications has been applied.	General evaluation	No

Lowery (2020)	"Digital health" is described, which represents new technology-driven and data-driven approaches to monitoring and improving patient and community health. It has made progress in many health services, including gynecology and obstetrics.	General evaluation	No
Aceto et al. (2020)	Industry 4.0 and health care, internet of things, big data and 4.0 health services for cloud computing are emphasized.	Special topic	No
Şahinol and Başkavak (2020)	Biomedicalization, digitalization of health and self-monitoring practices in Turkey are presented.	Special topic	No
Han et al. (2021)	It is a COVID-19 period study evaluating pre-pandemic and post-pandemic for cardiac electrophysiology. In the study, there is a questionnaire containing the answers of more than 500 participants.	Special topic	Yes
Lai ets al. (2020)	The use of digital health in patient monitoring has reached the highest levels during the Covid-19 process. However, the assurance in the protection of patient data is low. The study revealed the limits of information management and digital privacy in the Covid-19 process.	Special topic	Yes
Fahey and Hino (2020)	The place of the use of digital health, big data and smart technologies for the care of patients with systemic autoimmune diseases has been expressed.	Special topic	Yes
Murray et al. (2020)	The study draws attention to the importance of digital data collection in the current Covid-19 pandemic process. Emphasis has been placed on the ability to deliver big information in near real time and the power to coordinate responses in future pandemics and public health emergencies.	General evaluation	Yes
Siriwardhana et al. (2020)	The study highlights the role of effectively using 5G and enabling digital services in e- health. The study also provides a discussion on 5G implementation problems and solutions to alleviate the health challenges associated with Covid-19.	Special topic	Yes
Zamir and Parial (2020)	In general, information is given about the general use of digital health, information and communication technologies (ICT) for health. General evaluation No	General evaluation	No
Hodson (2019)	It has been emphasized that there is a wide-ranging digitalization potential in medicine in our world where artificial intelligence has not touched any area in the last decade. It is underlined that developers should consider equality at the design stage so that artificial intelligence systems provide similar benefits regardless of socioeconomic status.	General evaluation	No
Büyükgöze and Dereli (2019)	The relationship between Society 5.0 and digital health is discussed.	Special topic	No
Demirci (2019)	Digitalization of health is discussed and applications of digital health technologies are exemplified.	General evaluation	No

Gencer et al. (2019)	The effect of social media tools in digital health communication is emphasized.	Special topic	No
Aslan and Güzel (2019)	Industry 4.0 development process and digital transformation in health are discussed.	Special topic	No

While conducting the literature study, the "Research Gate, Google Academic and Science Direct" databases are searched using the "digital health" keyword. As a result of the scan, 41 studies, publication years, scopes and brief summaries are presented. When the studies reached are examined, it has been observed that digitalization in health has accelerated with the effect of the Covid-19 pandemic process, and improvements in health have increased. Considering the scope of the studies examined; It is seen that 37% of the studies are general information and evaluation on digital health, 2% are literature reviews, and the remaining 61% deal with a specific issue related to digitalization in health. In 44% of the studies examined, it is noted that the effects of digital transformation on health accelerated with the Covid-19 pandemic.

2.1. Digital Health Application Examples

In this section, examples of applications that are obtained as a result of literature review and that benefit the health sector with the effect of Industry 4.0 are mentioned.

Unmanned heart massage device: It is a device that is attached to the chest area of the patient and massages by applying pressure in a personalized way. It gives pressure according to the shape, size and resistance of the patient's chest.

Spree Smart Cap: Developed by Idente Group, this hat offers athletes the opportunity to monitor body temperature, movement, heart rhythm and the amount of calories burned without using a chest strap (Platin Dergisi, 2015).

ECG interpretation device: Electrocardiogram (ECG) is a bioelectrical signal obtained by recording the electrical activity of the heart. They are devices that measure and interpret the electrical activity of the heart with deep learning methods (Tomak, 2018).

Pneumatic system: The pneumatic tube system used in hospitals to transport samples to the laboratory is a more practical and automated method compared to manual transport.

Peripheral smear measuring instruments in laboratories: Peripheral smear is a kind of hematology test. It is the visual evaluation of the shaped elements of the blood such as leukocytes, erythrocytes and platelets under a microscope after the blood is stained after spreading it on a glass laboratory material called a slide. However, this test is no longer performed by eye but by an instrument.

Mind Controlled Prosthetic Arm: Despite the recent development of mind-controlled robotic arms, the technology provided by DARPA stands out. DARPA announced that the robotic arm it has developed transmits the sense of touch back to its owner. The difference of DARPA is that it transmits signals such as pressure and temperature received from the arm to the brain again (Platin Dergisi, 2015).

2.2. The Importance of Digitization in the Covid-19 Epidemic Process

The Covid-19 epidemic, which first appeared in the world in December 2019 in Wuhan, China, has now spread all over the world and gained a pandemic dimension. Due to the rapid transmission of the epidemic between people, many measures are taken to create distance between people all over the world. As long as the conditions allow, especially in educational institutions and business centers, the process of home/remote management has begun in all sectors. Remote access and digitalization have become inevitable in health centers, which are one of the most important spreading points of the disease. In countries that manage this process well, it is clearly seen that as the distance between people increases, the risk of transmission decreases and the health level of the country improves. Digitalization, which provides this distance best, creates a competition between countries. For this reason, digital migration has emerged in countries that cannot achieve digitalization equally.

Köksalan and Hatipler (2021), in his study, analyzed the causes and consequences of digital migration, which creates a voice in many individual, social and economic fields during the Covid-19 epidemic. He first presented the Covid-19 outbreak and its effects. Later, he explained the digitalization phenomenon and digital migration, which became more vital with the epidemic. Finally, taking into account his studies, digital migration and its causes, which is a fact of the Covid-19 epidemic process, the effects of the epidemic on digital migration and some areas where digital migration is seen during the epidemic process have been evaluated. As a result, digitalization shows its effect in many areas today (Köksalan and Hatipler, 2021). Digitalization has caused new adaptations and changes in many workflows with the effect of the Covid-19 pandemic. In this new order, digital migration is spreading rapidly between health units and countries.

Integrating digital health into society has many benefits. One of the most far-reaching benefits is the translation of patient outcomes into more efficient and easily accessible healthcare. Digital health has many positive effects on patients, service providers and insurers. These effects are given in (Lowery, 2020: 215).

3. RESULTS

Countries do not have equal opportunity in terms of access, quality and cost in health services. Opportunities in health services are not the same as in all areas in highly developed countries and underdeveloped or developing countries. Since the technology of developed countries is also advanced, they have also adopted technology and digitalization in the health sector. Therefore, the level of health services in developed countries is also higher. The Covid-19 epidemic we are in today also shows us that the high level of digitalization and technologies used in health carries health services forward. This issue is particularly important due to the rapid proliferation of digital health technologies to support healthcare as well as public health during the Covid-19 pandemic (O;reilly-Jacob et. al., 2021).

4. DISCUSSION

One of the fields where digitalization and innovations were initially resisted in history is medicine. However, it was observed that the innovations were understood as time passed. The importance of data has been likened to oil in one study. The greatest progress in digitalization in healthcare has been made during the Covid-19 pandemic. It was emphasized that looking at things with the logic of "this can be done" in digitalization and seeing digitalization as a part of our lives would not be a regret and it was an important issue (Bond and Peace, 2021). Digital transformation in health, which is stated to have accelerated in the last 10 years, has experienced its fastest development in the last 2 years with the effect of the pandemic that spread from Wuhan, China in 2019 and covered the whole world. Social distance, which is of great importance in the spread of the virus, has also affected the patient-doctor and hospital relationship, as in all areas. Patients tended to treatment methods without going to the hospital or with minimal contact. Therefore, healthcare providers have started to seek new technology. This viewpoint has highlighted successful deployment of digital innovations.

5. CONCLUSION

In the study discussed, the stages of transformation in health, the developments in health with the effect of Industry 4.0, artificial intelligence applications in the health sector are given and the aims of the study are presented. Since the study is a literature study, a comprehensive literature review is conducted in the study. 41 studies on the subject between the years 2019-2021 are examined. In the literature study, studies on digital health developments in specific issues such as cancer, osteopath, triage, gynecology, mental health, diabetes, studies containing general evaluation in the field of digital health and literature studies in this field are included. With the fact that only 2% of the studies examined are literature studies and the acceleration of digitalization in health with the effect of the Covid-19 pandemic process we are in, the need for a literature study of current studies has emerged. In the literature study; studies including current application examples are included and the current status of digitalization in health is given. In the study, the rapid development and importance of digitalization in health, also with the effect of Covid-19 is emphasized.

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