The role of electronic health in the coronavirus disease crisis: A systematic review of documents

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ABSTRACT

Introduction: Epidemic diseases have always caused considerable physical and financial casualties for governments. By the end of the year 2019, the Covid19 pandemic emerged for the first time in China and rapidly infected the globe. Objectives: As information technology plays a significant role in the current healthcare system, the aim of the present study was to conduct a systematic review to determine the role of electronic health in the Covid19 crisis.

Material and Methods: This review was carried out on articles published from December 2019 until March 17th 2020 by searching keywords and their equivalents in "MeSH" in PubMed, Web of Science, and Scopus databases and Google search engine.

Results: In total, from 72 found articles, 28 were recognized based on their research topic. After imposing inclusion and exclusion criteria, eventually 6 original articles and 8 reports were selected for further analysis. Results showed that reviewed articles had mentioned the effective role of IT in: diagnosing Corona patients, addressing the spread of the disease, providing sufficient education for the public to prevent the disease, and recognizing high-risk areas. Telemedicine, machine learning algorithms, deep learning, Augmented intelligence, neural networks, Global positioning system, and geographical information system have been the most widely used technologies.

Conclusion: It was shown that defeating the Covid19 is impossible without the help of technology. Experiences with the effectivity of using electronic health in controlling and monitoring the prevalence of Covid19 can be used to deal with other pandemic diseases in the future as well; and to avoid possible casualties and economic regressions while rapidly providing solutions for similar critical situations.

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INTRODUCTION

The emergence and prevalence of pandemic viral-infectious diseases have been a major challenge in the twenty-first century. Over the recent years, the Ebola outbreak, the Middle East Respiratory Syndrome, SARS and avian influenza have caused significant health and economic damages to communities [1, 2]. Based on a report presented by the World Health Organization (WHO), COVID-19 first emerged in Wuhan, China on December 30th 2019 and rapidly infected a great number of its people over a short period [3]. On January 30th 2020, WHO had expressed

its concern about the Corona disease being a public health emergency of international concern (PHEIC) [4], whose control would require a coordinated international response? This new unknown virus has been able to threaten the current advanced world despite its exceptional technologies. Two months after the Coronavirus outbreak (i.e. February 20th 2020), China reported that 75465 individuals had been infected. Centers for disease control and prevention (CDC) reported that the incubation period of this unknown virus was approximately two weeks [5]. Since the Coronavirus is transmitted through the

respiratory system, the virus has infected a majority of countries in less than a month. In order to prevent the prevalence of this virus, infected individuals with symptoms like coughing, shortness of breath, fever and chills were quarantined [6-9]. Yet, the most alarming transmitters of the disease were infected individuals with hidden symptoms, who were passing their incubation period, such as individuals with AIDS, tuberculosis and hepatitis B. The Ministry of Health of infected countries developed national curbing programs and urged all their people to self-quarantine and maintain social distancing to break the transmission chain of the virus. Providing remote health services to diagnose the disease and treat those infected is beneficial for governments when considering the rapid spread of this disease, the lack of a definitive treatment and the lack of sufficient quarantine infrastructures for infected patients.

IT has been widely used in the healthcare system for many years [10, 11] that it is impossible to imagine the system without it. The following studies reflect on the significant role of IT in different healthcare areas. In 2019, a review article stated that data gained from different technologies can contribute to the enrichment of healthcare databases, and also provide more accurate, effective, comprehensive and practical information about the prevalence of a disease, which can eventually contribute to better decision-making [12]. Also, having information about the distribution of patients, by use of the geographical information system (GIS), at an early stage of the pandemic is quite salient to provide early warnings and curb the outbreak as much as possible [13]. Until today, the use of artificial intelligent models has also been effective in the detection of many diseases [14-22]. On the other hand, cell phones and web-based portals have also been successful in collecting health related data [23-28]. Given the effectiveness of technology-related approaches, such methods should be implemented in a timely manner to achieve faster results.

Numerous review studies are carried out on various subjects worldwide, especially in developed countries. As the Corona disease is relatively new, no review has been carried out on the subject ever since the outbreak of the disease. The results of such studies can be promising to programmers, system planners, and also care providers as it will help save time and improve the quality of provided services especially at times of disease outbreaks. The purpose of the present review was to investigate the role of electronic health during the outbreak of the Coronavirus disease.

MATERIAL AND METHODS

A systematic review was used to ensure the accuracy and comprehensivity of both the search and retrieval processes. To search for articles published on the concerned subject from 30/12/2019 to 17/03/2020, a combination of different keywords and their medical titles (MeSH) in English were used when searching PubMed, Web of Science and Scopus databases, as well as Google's search engine.

December 30th, 2019 was selected as the starting date for search because the Corona disease begun on this date. The search strategies are shown in Table 1. The inclusion criteria were as follows: the extracted articles had to be written in English, by human, be brief reports, case reports, letters to the editor, or prospects. Unrelated or repeated articles, or those written in a language other than English were excluded from the study. Among the articles, only those were selected in which the application of at least one IT software was mentioned.

Preferred reporting items for systematic reviews and meta-analyses (PRISMA) diagram was used to select articles (Fig 1). First, 72 articles were selected by use of the search strategies mentioned in Table 1. After adding those to Endnote software all articles were reviewed by two of the authors.

Fig 1: The process of article selection based on PRISMA

Table 1: Search strategies in considered databases

Database	Search strategy
PubMed	(((((COVID-19) OR COVID19) OR 2019-nCoV disease) OR 2019 novel coronavirus infection) OR coronavirus disease-19) OR coronavirus disease 2019) OR 2019 novel coronavirus disease) OR 2019-nCoV infection)) AND ((((((((((((((((((((((((((((((((Telemedicine) OR Tele-medicine) OR Telehealth) OR Tele-health) OR Mobile applications) OR Mobile Apps) OR M-health) OR mHealth) OR Mobile health) OR eHealth) OR Geographic information systems) OR Geographic information system) OR GIS) OR Global Positioning Systems) OR Global Positioning System) OR GPS) OR Registries) OR Registry) OR machine learning) OR deep learning) OR artificial intelligence) OR Medical Order Entry Systems) OR CPOE) OR Computerized Provider Order Entry) OR Computerized Physician Order Entry) OR Medication Alert Systems) OR Decision Support Systems, Clinical) OR Clinical Decision Support Systems) OR CDSS) OR Clinical Decision Support) OR CDS) OR information technology))
Web of Science	TS=(COVID-19 OR COVID19 OR (coronavirus disease 2019) OR (coronavirus disease-19) OR (2019 novel coronavirus infection) OR (2019-nCoV disease) OR (2019 novel coronavirus disease) OR (2019-nCoV infection)) AND ((Telemedicine) OR (Tele-medicine) OR (Telehealth) OR (Tele-health) OR (Mobile applications) OR (Mobile Apps) OR (M-health) OR (mHealth) OR (Mobile health) OR (eHealth) OR (Geographic information systems) OR (Geographic information system) OR (GIS) OR (Global Positioning Systems) OR (Global Positioning System) OR (GPS) OR (Registries) OR (Registry) OR (machine learning) OR (deep learning) OR (artificial intelligence) OR (Medical Order Entry Systems) OR (CPOE) OR (Computerized Provider Order Entry) OR (Computerized Physician Order Entry) OR (Medication Alert Systems) OR (Decision Support Systems, Clinical) OR (Clinical Decision Support Systems) OR (CDSS) OR (Clinical Decision Support) OR (CDS) OR (information technology))
Scopus	1: ((TITLE-ABS-KEY (covid-19) OR TITLE-ABS-KEY (covid19) OR TITLE-ABS-KEY (coronavirus AND disease 2019) OR TITLE-ABS-KEY (coronavirus AND disease-19) OR TITLE-ABS-KEY (2019 novel AND coronavirus AND infection) OR TITLE-ABS-KEY (2019-ncov AND disease) OR TITLE-ABS-KEY (2019 novel AND coronavirus AND disease) OR TITLE-ABS-KEY (2019-ncov AND infection))) 2: ((TITLE-ABS-KEY (telemedicine) OR TITLE-ABS-KEY (tele-medicine) OR TITLE-ABS-KEY (telehealth) OR TITLE-ABS-KEY (tele-health) OR TITLE-ABS-KEY (mobile AND applications) OR TITLE-ABS-KEY (mobile AND apps) OR TITLE-ABS-KEY (m-health) OR TITLE-ABS-KEY (mobile AND health) OR TITLE-ABS-KEY (mHealth) OR TITLE-ABS-KEY (eHealth) OR TITLE-ABS-KEY (geographic AND information AND systems) OR TITLE-ABS-KEY (geographic AND information AND system) OR TITLE-ABS-KEY (GIS) OR TITLE-ABS-KEY (global AND positioning AND systems) OR TITLE-ABS-KEY (Global AND positioning AND system) OR TITLE-ABS-KEY (GPS) OR TITLE-ABS-KEY (registries) OR TITLE-ABS-KEY (registry) OR TITLE-ABS-KEY (machine AND learning) OR TITLE-ABS-KEY (deep AND learning) OR TITLE-ABS-KEY (artificial AND intelligence) OR TITLE-ABS-KEY (medical AND order AND entry AND systems) OR TITLE-ABS-KEY (CPOE) OR TITLE-ABS-KEY (computerized AND provider AND order AND entry) OR TITLE-ABS-KEY (computerized AND physician AND order AND entry) OR TITLE-ABS-KEY (medication AND alert AND systems) OR TITLE-ABS-KEY (decision AND support AND systems, AND clinical) OR TITLE-ABS-KEY (clinical AND decision AND support AND systems) OR TITLE-ABS-KEY (CDSS) OR TITLE-ABS-KEY (CDS) OR TITLE-ABS-KEY (clinical AND decision AND support) OR TITLE-ABS-KEY (information AND technology))) #1 AND #2

RESULTS

After holding several sessions with the two authors who analyzed the collected articles, and resolving contradictions, 6 original articles and 8 reports were included in the study. The descriptive presentation and study results were placed in two categories of original and other articles as shown in Tables 2 and 3, respectively. As it has not been long after the emergence of the disease, the amount of existing data is limited.

Fong et al. [24] attempted to discover an accurate predictive model that could determine the prevalence of any epidemic disease with limited data by use of machine learning algorithms and artificial intelligence. They used group top-down prediction with a set of optimal prediction models with multiple input sources to predict. This procedure consists of 5 predictive models with complex machine learning models with multiple regression, the use of complex machine learning models, and the use of light

machine learning models, simple data analysis and an econometric type of predicting temporal series.

Then, the different neural networks like combinatorial, combi-cf, Multilayer Iterative, and MIA-cf were compared by use of different inputs on how individuals had become infected (multivariate, corrective feedback, repetitive multilayered, and repetitive multilayer with corrective feedback) using different inputs on the stage of their disease (confirmed, treated, deceased, suspicious and critical). Eventually, by use of a self-structured method they succeeded to design a new predictive model called the polynomial neural network with corrective feedback (PNN+cf) which can be used for a limited small sample size at the time of any pandemic outbreak.

The Corona disease, just like SARS, emerged during spring in China [25]. Since the emergence of Corona was concurrent to China's spring season celebration, the number of those infected with Coronavirus began to rise; however, the disease had not yet turned into

an epidemic and was not at its peak. After January 19th, the number of those suspected to be infected had significantly increased over a short period and the test of about 40-50% of these suspected cases turned out to be positive [13]. In order to prevent and control the spread of the disease the collaboration of all China's residents was required. Therefore, one of the salient measures used to prepare the public, especially in regions where the prevalence was low, was recognizing high-risk regions (areas where the number of infected individuals with Coronavirus was high). Relevant to this, Chen et al. [13] investigated the temporal and spatial distribution of Corona disease with use of GIS. Statistics showed that the number of mortalities in China from Corona Disease was 95.77% and 59.91% of which, were from Wuhan City in Hubei Province. Additionally, the highest rate of Corona disease prevalence and mortality was in Hubei; therefore, those who had travelled from Wuhan to other cities were the main causes of its outbreak there. Also, the very first cases reported to be infected in those cities were mainly from Wuhan.

For many, finding the strategies that defeat epidemics has always been a main concern. During pandemics, the rapid increase in the number of infected individuals over a short period of time forces communities to respond rapidly. During the outbreak of epidemic diseases, IT and the media have played an important role in supporting communities and have greatly facilitated the monitoring and control of these diseases [26]. Information about Corona disease has been provided to the people in China via IT communicative channels (e.g. WeChat, mobile apps, etc.). Pan et al. [27] stated that China's reaction - as well as the world's reaction to the Coronavirus disease was faster than SARS. Some of these affective measures applied by the Chinese government was the use of a large data platform called "Close Contact Meter" on February 8th to monitor and control Corona disease [28]. The platform worked in such way that by downloading and comparing national health data, those infected by Corona would be automatically detected. Also, companies like Alibaba and JD.com donated large amounts of medical equipment during the Corona disease outbreak. Scientific achievements, antibodies and antiviral drugs, also had an important role in fighting this epidemic and reducing mortalities.

The diagnosis of the Corona disease depends on different criteria like clinical symptoms, epidemiological history, CT scans, and positive pathological tests. The Nucleic Acid test is an invaluable test used for detecting the virus in the lower respiratory tract; however, the accuracy of this test in detecting the Coronavirus has been 30-50%. Also, radiological scans are the main tools used in detecting the Corona disease as the CT scans of most

infected patients showed similar features. It should be stated that for radiologists, diagnosing this disease has been much harder than diagnosing other viral pneumonias.

Wang et al. [29] searched for a solution to diagnose this disease by use of CT scans and deep learning algorithms. For this, they launched a website and uploaded CT scans accessible to healthcare providers and staff. The results of their study showed that their method was able to detect the virus with an accuracy rate of 83% which was significantly more precise than the Nucleic Acid test; and therefore, this method can help reduce the workload of physicians. Additionally, the developed artificial intelligence system used in the mentioned study can also help reduce the number of quarantined individuals and contribute to providing a timely treatment or controlling the Corona disease. On the other hand, the spread of the current disease and the possibility of the emergence of other Coronas in the future, has motivated governments to develop new treatments and rapid intervention protocols as quickly as possible.

Ton et al. [30] used deep learning algorithms for large-scale virtual screening to discover a new effective drug to treat the Corona disease. Currently, a few research groups have suggested potential suppression strategies and clinically approved drugs as a therapeutic solution for coronavirus [31-33]. In the above study, researchers used 1.3 billion compounds in the ZINC15 library to identify 1,000 potential ligands for the main protein of SARS-CoV-2. Eventually, the structure of the identified transplant compounds was made available to the public.

Today, Tele-Medicine has been recognized as a successful technology used in fighting pandemic diseases [34]. Zhai et al. [35] showed how Tele-Medicine helped the Chinese government in fighting the Corona disease. The Chinese government designed a remote medical counseling app that could be installed on Chinese mobile phones, and established Huawei technologies to monitor and control this disease, called the emergency telemedicine consultation system (ETCS). The results showed that the 654 patients suffering from Corona disease had received counselings from this app, and 420 of these individuals were discharged from the hospital after 20 days.

Another advantage of this consulting center was that direct physical contact among physicians, nurses and patients was avoided and thus the risk of them becoming infected was reduced. Since the specialized treatment team was not easily accessible everywhere, this center kept connected with patients by use of technologies like video conferencing.

Table 2: Descriptive demonstration of the results of reviewed articles

Author	Country	Number of cases	Duration of study	Used Technology	Aim	Results	Outcomes
Fong [24]	China	14	6 days	Machine learning, neural network	Discovering an accurate predictive model based on small information banks	Obtaining a new predictive model named PNN+cf	Using PNN + cf predictive model in critical times of the spread of any epidemic disease when the number of samples is limited
Chen [13]	China	34 in the Province 17 in Hubaei City of China	11 dasy	GIS	Investigating the temporal and spatial spread of the corona epidemic to discover active changes	The number of deaths in Wuhan due to Corona was 59.91% The number of deaths in China due to Corona was 95.77%	Immigrants from Whuan were the main causes of the spread of the disease in other cities Understanding the pattern of prevalence of the disease and its risks in different areas of China, by the government and people considering that spring season celebration was close
Pan [27]	China	Consulting with general health specialists, the government and people	N/A	Big data, deep sequencing, electronic business	What do we learn from China and the global society in dealing with the spread of this pandemic disease when comparing Corona with SARS?	China and the globe's reaction in handling Corona was much faster than their reaction towards SARS	This response consists of: Diagnosing the disease Separating infected patients Providing financial support Building temoroary hospitals Applying traffic curbs
Wang [29]	China	99 patients	N/A	Deep learning	Deep learning algorithm using CT scans to screen corona disease	Domestic credit was gained with 82.9% accuracy and 80.5% specificity and 84% sensitivity; while external experimental data sets showed 73.1% accuracy and 67% specificity and 74% sensitivity.	Using deep learning method to extract radiological features of Corona patients' CT scans is highly valuable
Zhai [35]	China	654	20	Tele-medicine	How tele-medicine can help in defeating Corona disease?	Designing an emergency remote consulting system in 126 hospitals	Remote diagnosing and consulting Remote supervision of patients Remote multidisciplinary caring Remote educating regarding disease prevention
Ton [30]	Canada	N/A	N/A	Deep learning	To discover new drugs to treat Corona By use of deep learning algorithms for large-scale virtual screening	The possiblty of rapidly estimating the protein structure of 1.3 billion chemical elements for SARS-CoV-2 Mpro active site	Making recognized ligand structures accessible to the public

Table 3: Demonstrating the results of other studies

Author	Method	Used Technology	Aim	Outcomes
Rao [36]	A narrative review in form of a letter to the editor	Artificial intelligence, machine learning	Using machine learning algorithms to identify people with corona with the help of mobile polls	Being economical Helping the rapid identification and control of corona patients Faster identification of people with few disease symptoms
Tárnok [37]	A narrative review in form of a letter to the editor	Machine learning	Use of IT to reduce travelings during the Coronavirus outbreak	Reduce travels Reduce the risk of disease spread Reduce expenses Reduce air pollution caused by traveling Reduce the insomnia and discomfort caused by air traveling
Boulos [40]	A narrative review in form of a letter to the editor	GIS	Introducing a variety of geographic trackers and mappings of the Corona disease, The disease turning into an epidemic and its related events around the world: GIS technology in fighting Corona	Introducing Johns Hopkins University-centric dashboard Introducing the World Health Organization dashboard Introducing HealthMap to display geographic updates and disease progression Introducing the “close contact detector” program in China Introducing the WorldPop program and analyzing the amount of risk by determining the movement of people from Wuhan to their destination Introducing a map of incorrect information about Corona around the globe on Twitter Applying GIS technology in data sharing and providing timely information in critical situations Placing the informative dashboard about the spread of the disease in the center Monitoring the entire disease process by GIS
Long [42]	A narrative review in form of a letter to the editor	virtual Intelligence	The role of enhanced intelligence in diagnosing and preventing the spread of Corona	Rapid detection of epidemiological risks which allows the prediction, prevention and recognition of future global health risks
Allam [41]	A narrative review in form of a prespective	Artificial intelligence	Proposing a smart urban network by creating standardized protocols to increase data sharing in the event of a disease outbreak or natural calamity to monitor and manage urban health	Preventing economic recession Increasing urban safety Standardizing data sharing Increasing cooperation in times of crisis
Hollander [38]	Narrative review in form of a prespective	Tele-medicine	Using tele-medicine as an effective method for treating Corona patients	Using web conferencing between physicians and patients in emergencies Using tablets by quarantined patients to control infection Using Electronic intensive care unit (e-ICU) monitoring programs by physicians Using mobile-based healthcare programs
South Korean Epidemiology and case management team [39]	Breif report	Global tracking system	A general review of Corona patients and clarifying the different ways that they had become in contact with the disease	Providing accurate information about the location and time of individual's exposure to the disease, and details about their current condition
Li [43]	Case report	Deep learning	Investigating laboratory results of Real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) based on deep learning of two Corona patients	Demonstrating a classification of the damages done to the lungs and calculating the abnormalities by percentage Determining the ratio of minor abnormalities found in the lung to the entire lung, right upper lobe, right middle lobe, right lower lobe, left upper lobe and left lower lobe

Letters to editors, prospects, or reports were also found in addition to the abovementioned articles, which had mentioned the effectivity and contribution of technology in diagnosing and reducing the spread of the Corona disease (Table 3). Rao [36] emphasized the use of mobile programs that are based on machine learning algorithms in detecting patients with Corona disease.

Tárnok [37] has mentioned the use of teleconferencing technology and its benefits in dealing with Corona disease. Hollander et al. [38] described telemedicine as an excellent way to diagnose and treat Corona patients. In a report presented by the South Korean Epidemiology and Case Management team [39] and Boulos [40] Global Tracking System and GIS have been recognized to be effective in tracking Corona patients.

In fact, Boulos mentioned the use of various geographical trackers in monitoring the Corona disease and finally introduces GIS as the most efficient tool in dealing with pandemic diseases. Allam et al. [41] elaborated on the necessity to design intelligence city networks by use of artificial intelligence, during a pandemy or natural calamity, to better monitor and manage the health of the city and increase the accessibility to data. In another report presented by Long et al. [42] it was stated that virtual intelligence can be used to diagnose and prevent the spread of the Corona disease, contributing to a rapid recognition of the global pandemic health risks in the future and defeat the disease. In a case report carried out on laboratory results by Li et al. [43], the significance of using deep learning algorithms in reading the CT scans of Corona patients was emphasized as such that by use of these algorithms it was possible to demonstrate, in percentages, the damages caused by Corona disease and the amount of harm caused to the lungs.

DISCUSSION

Pandemic diseases like SARS, MERS, and H1N1, should be prioritized over non-contagious disease. Each of these diseases has left drastic social and economic effects on different countries of the globe, as such that America tolerated 30 billion dollars economic loss in year 2003 due to SARS [44]. Additionally, there were many mortalities and the normal living conditions were disrupted in infected countries [1, 2]. Having insufficient information about epidemic diseases and their way of transmission in the past has led to countless deaths including the Black Death pandemic from the plague pneumonia (caused 30-60% deaths in Europe) in the fourteenth century [45], the Influenza pandemic in the early twentieth century which caused about 50 million deaths [46, 47], Malaria which killed one person every 60 seconds [48], and AIDS which caused

about 32 million deaths by the end of 2018 [49]. These events show that a new pandemic disease can spread quite rapidly and to overcome them using the help of other disciplines to research and inform the public is essential. In this study, those articles were reviewed which had investigated the effects of using different technologies in the spread of the Corona disease. Although this issue has been the focus of few studies, the results of this review showed that the use of different technologies has been effective during the spread of the Corona disease.

As the results showed, the range of the technological aims investigated in the reviewed articles were diagnosing the Corona disease and reducing its spread. Most studies had stated that machine learning algorithms and artificial intelligence methods could be used to diagnose the disease. These results indicate that scholars are well aware of the potential and usefulness of these algorithms and conducting research on intellectual systems. For example, the results of this review showed that in 2018, machine learning algorithms and artificial intelligence can be promising in helping patients in different areas of healthcare [50], such as the use of machine learning algorithms and artificial intelligence in treating viral epidemic diseases like MERS and Ebola [51-54]. On the other hand, one of the most salient challenges for smart systems is the problem of knowledge acquisition; for instance, in designing a Neural Network the number of samples required to educate the system is one of the main issues. Fong et al. investigated this and succeeded to find a promising method to address this issue [24].

On the other hand, most of the reviewed articles had stated that GIS and global tracking systems were effective tools in discovering infected individuals and their connections with other environmental data. Perhaps nothing is more effective in controlling the prevalence of pandemic diseases than monitoring the geographical distribution of these diseases [55]. In a study conducted by Gleason et al. [56] on the Ebola virus in 2014, it was shown that GIS techniques are effective mechanisms in investigating related temporal and spatial risk factors of pandemic diseases in the future. In 2019, Al-Ahmad et al. [57] conducted a study in Saudi Arabia on the effective use of important temporal and spatial factors that had led to the emergence of MERS in that country, by use of the GIS. Analyzing these connections with the help of such software can help reduce undesirable effects caused by encountering infected patients and also improve the healthcare of others who have been exposed to the virus and have become vulnerable. Yet, since the GIS software is not able to perform statistically complicated calculations, many scholars believe that these software, are not suitable tools for conducting epidemiological studies [58]. Still, however, the potential of GIS in connecting patients to geographical and spatial data is unquestionable,

and it has made invaluable contributions to healthcare systems at the time of the pandemic diseases spread.

Over the last decade, the demand for telemedicine services in developed countries has increased [59, 60]. Zhai et al. [35] was a successful study on the use of telemedicine in defeating the prevalence of Corona disease. It is noteworthy that China has also successfully used telemedicine services in an earthquake that occurred in 2013 [61]. They set up specialized remote medical assisting teams in the hospitals at the site of the earthquake to have remote consult with other specialists at other hospitals. Many patients were treated thanks to this remote system. The results of studies have shown that for many reasons, in many cases, telemedicine has been equivalent to or better than face-to-face methods.

Zhai and Tárnok [37] each have mentioned these causes in their studies, and Hollander has mentioned the different effective remote medical tools used in reducing face-to-face contacts between physicians and patients [38]. Other benefits of telemedicine include day and night accessibility.

The limitations of Wang et al. [29] and Zhai et al. [35] studies were that they had not yet been evaluated by journals and since the number of published articles were limited, these studies were included in this review.

CONCLUSION

The novelty of the Coronavirus prevalence is one of

the main reasons that limited articles were available on the subject. Technology and health information systems are now intertwined and rapidly expanding since it is expected that they play a prominent role during the outbreak of the Corona disease. The results of this study showed that it would be impossible to control Corona disease without the help of technology. Since health system managers need to be aware of the measures taken with the help of technology during the outbreak of this disease in different societies, it is recommended that related institutions develop necessary measures to facilitate the conduct of different research in this area.

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AUTHOR'S CONTRIBUTION

The authors agree on this final form of the manuscript, and attested that all authors contributed in the final draft of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest regarding the publication of this study.

FINANCIAL DISCLOSURE

No financial interests related to the material of this manuscript have been declared.

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