

Implications of Telehealth and Digital Care Solutions During COVID-19 Pandemic: A Qualitative Literature Review

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Abstract

The coronavirus disease 2019 (COVID-19) pandemic has brought changes to the way medical care is delivered to keep health workers safe while simultaneously managing available resources. The well-being of patients and healthcare workers is crucial and has become a topic of debate as the world faces adjusts to the COVID-19 pandemic. Therefore, there is need to consider innovative methods of delivering medical care. Telehealth and digital health care which is the provision of medical care via Information Communication Technology (ICT) with highspeed telecommunications systems, has increasingly becoming popular in providing medical care services can be adopted to reduce infections during quarantine and social distancing practices. Specifically, by means of document and literature review this paper discusses the role of telehealth and digital care solutions, types and application of telehealth, and current policies for COVID-19. More importantly, findings from the article present the human, infrastructure, and institutional determinants that influence the adoption of telehealth and digital care solutions during the pandemic. The findings discuss how telehealth and digital care technologies can benefit the society. This study provides implications to informs medical staffs on the potential of digital technologies to provide support during and after the pandemic.

Keywords: Information systems; Telehealth; Digital health care; COVID-19; Coronavirus 2019; Pandemic.

1. Introduction

The emergence of the novel coronavirus disease 2019 (COVID-19) pandemic has caused major impact on global economy, society, including huge challenges for medical care. In an effort to reduce and slow the spread of the virus, social distancing, quarantine¹, and closure of public spaces have been implemented across the world.^{2,3} Specifically, the U.S. Centers for Disease Control and Prevention (CDC) advise to reduce unnecessary medical care visits and use alternatives to face-to-face treatment and visits.¹ Accordingly, self-quarantine which involves peoples having the least in-person contact with other people to prevent spread of virus, proposed by World Health Organization (WHO), has made digital health consultations gain more visibility.⁴ But, presently due to the pandemic there are overcrowded emergency units in hospitals, which struggles to manage constrained capacity and high demand.⁵ Although face-to-face interactions certainly play a vital role in the physician examination of patients, it is not safe in managing pandemics.³

This raises question for healthcare professionals on how to provide medical care without physical interactions with patients.¹ Also, a major issue during this pandemic is to keep medical professionals safely distant while providing patients with efficient and effective care.¹ Furthermore, due to the pandemic, the presence of patients in hospital emergency departments has becomes untenable. As such healthcare professionals are leaning on Information systems

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(IS) solutions as a key enabler to address COVID-19 outbreak.⁶ IS can help facilitate new methods of providing care, aid in tracking, and forecasting.⁶ Deployment of IS such as in telemedicine or telehealth and digital care can be employed to support the mitigation of COVID-19 pandemic,^{6,7,8}. Hence, telehealth and digital care is a suggested as one of the solutions to help resolve this issue.^{1,3,9}

Telehealth and digital health care involve the use of technology in healthcare to support “healing at a distance”.⁷ Typically, it comprises of mainly use of telephone calls, video, and instant messaging, such as email, health system messaging services, and use of mobile applications to track and monitor patient recorded metrics.³ Telehealth utilize audiovisual technologies such as smartphones, mobile applications, computer tablets, and video conferencing to help care for patients allowing physicians to diagnose, evaluate, treat, monitor, and advice patients digitally.¹ Telehealth and digital health care are among the fastest growing trends in healthcare sector. Much of this growth is attributed to its benefits which includes reduction of travel, fewer missed appointments, and shorter wait times.¹ It allows to manage cost, convenience, and readily accessibility of medical information. Findings from prior studies^{8,9,10} suggests that telehealth reduces cost and improves access to care of patients.

Furthermore, providing health care remotely can help decrease the risk of medical professionals’ exposure to infections, as the well-being of the medical care workforce is the keystone of a functioning health system.¹⁰ Additionally, findings from Rao et al.¹⁰ argued that patients report better access and communication, improved medication adherence, and total high satisfaction with telehealth related services. Therefore, this paper employs document and literature review to discuss the strategic role of telehealth and digital care in managing the COVID-19 pandemic among medical-care systems globally. Specifically, this paper discusses the role of telehealth and digital care technologies, types and application of telehealth, current policies initiated to manage covid-19 spread, determinants influencing adoption of telehealth and digital care solutions. The reminder of the paper is structured as section 2 is methodology, section 3 is findings and discussion. Section 4 is recommendations and implications and lastly section 5 is summary and concluding remark.

2. Methodology

This study adopts document and literature review as a research method similar to prior COVID-19 studies Brown and O’Connor¹¹, Bokolo¹² based on guidelines from Farzandipour et al.¹³; Koumpouros and Georgoulas¹⁴ to guide this study as seen in Figure 1.

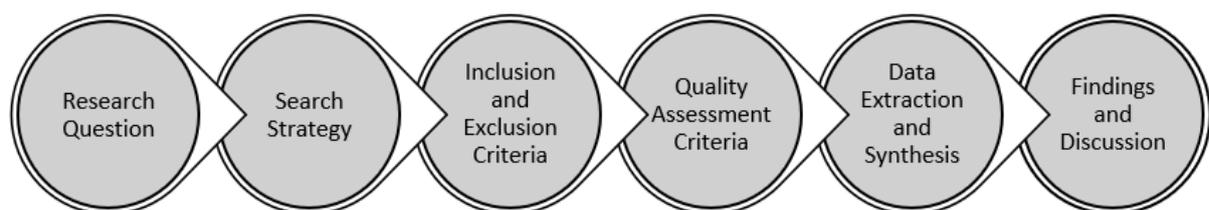


Figure 1. Review protocol employed in this study

Figure 1 depicts the review protocol which comprises of six activities: development of research questions, search strategies, inclusion and exclusion criteria, quality assessment criteria, data extraction and synthesis, and report of findings and discussion. Each of these activities are briefly discussed below.

2.1. Research Questions

Accordingly, this research aims to address the following research questions:

- **RQ1:** Amidst the COVID-19 pandemic what types of telehealth and digital care are being employed?
- **RQ2:** During COVID-19 pandemic how can patients be treating using telehealth and digital care?
- **RQ3:** Amidst the COVID-19 pandemic what policies have been initiated across the world to foster telehealth and digital care?
- **RQ4:** During COVID-19 pandemic what determinants influence adoption of telehealth and digital care solutions?

2.2. Search Strategy

To extensively search for studies related to telehealth and digital care solutions during COVID-19 pandemic, the search strategy was carried out using online databases/libraries. The search was carried out from 2nd May 2020 to 30th May 2020 in Google Scholar, PubMed, Medline, ScienceDirect, ProQuest, Springer, Wiley, IEEE Xplore, ACM, Emerald, Taylor & Francis, ISI Web of Science, Sage, Inderscience, and Scopus. These online libraries were selected as they are considered appropriate search engines for studies in health science, social science and information systems research. Additionally, they provide options of carrying out advanced search filtering by keywords and by publication year, type and research area. Using these online databases, studies related to telehealth and digital care solutions during COVID-19 pandemic were collected from online document reports, journal papers, conference proceedings, and book chapters.

To confirm review quality, search keywords were formulated by using Boolean AND/OR operators to combine the search terms to improve the relevance of the search procedure. The main search terms comprise of “telehealth”, “telemedicine”, “digital care”, “e-health”, “m-health”, “COVID-19”, “coronavirus 2019” and “pandemic”. The search results retrieved 67 articles using the above mentioned keywords. 4 papers were found as duplicates and were removed. Hence, the total number of remaining papers becomes 63. Next, 17 studies were removed after confirming from the title and abstract that the papers were not associated to the research questions being explored (see section 2.1) resulting to 46 papers. The remaining 46 papers were assessed against the inclusion and exclusion criteria (see section 2.3). Therefore, 28 articles were found to meet the inclusion criteria. After which 4 papers were added based on snowballing technique from cross referencing and a total of 32 papers were included in the qualitative review. The refinement in this review study was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). As

employed by prior review study on health informatics.¹¹ Figure 2 depicts the PRISMA flowchart.

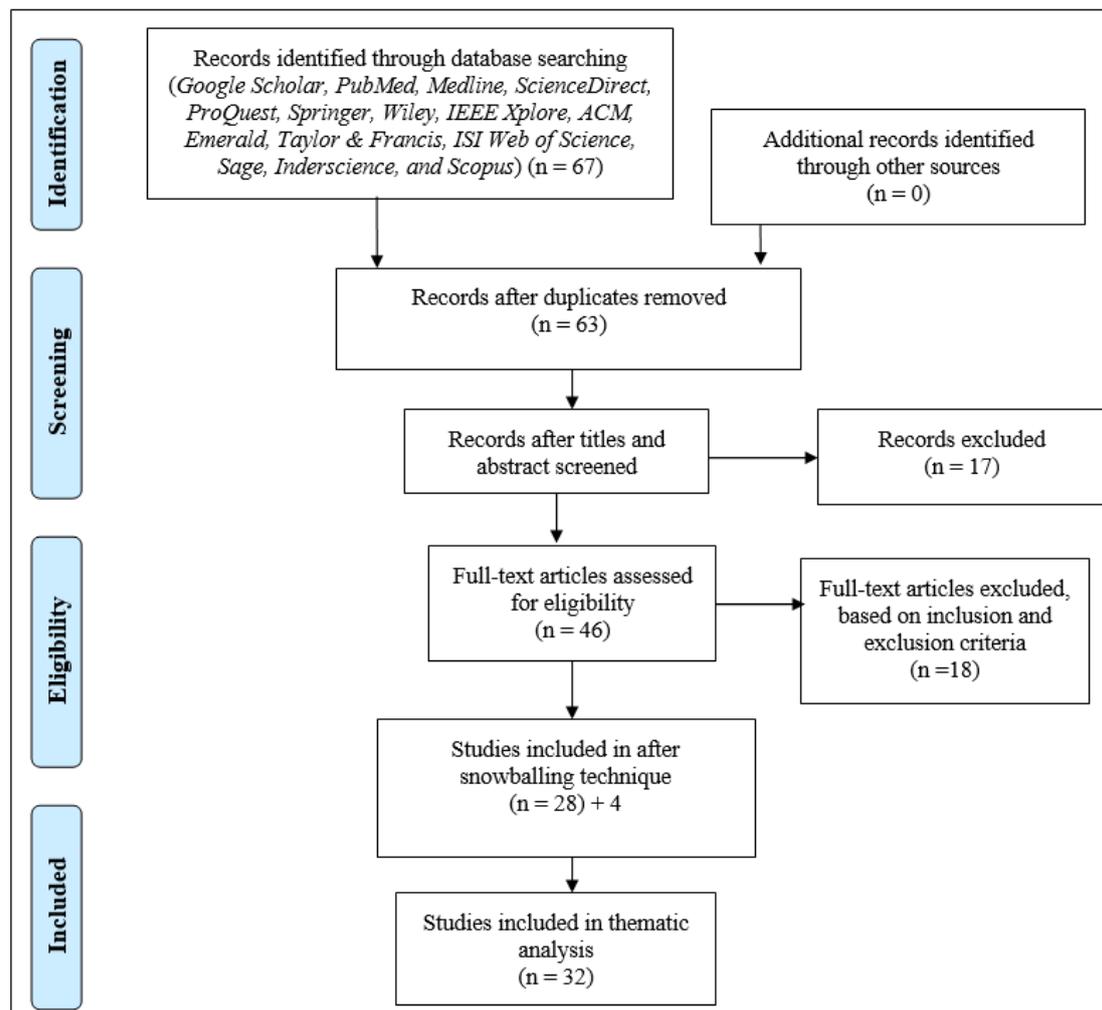


Figure 2. PRISMA flowchart for literature search process

2.3. Inclusion and Exclusion Criteria

Due to the relevance of the selection stage in determining the validity of the literature review, several inclusion and exclusion criteria were employed. Papers were eligible for inclusion if they were focused on the theme of telemedicine, telehealth, and digital care solutions during COVID-19 pandemic. Papers were selected mainly from 2019 onwards, since that is when research in COVID-19 pandemic started. Besides, the review included studies published as academic outlets, such as journal, conference proceedings, and document reports. Dissertations, books, and online sources were excluded from this review, as were papers that were not written in English.

2.4. Quality Assessment Criteria

One of the important criteria that is required to be checked along with the inclusion and exclusion criteria is the quality assessment.¹² A higher level of rigorousness of studies is

employed to check quality of papers. To this end, a quality assessment checklist which evaluates if the selected papers were indexed in ISI Web of Science or Scopus database was employed as a means for evaluating the quality of the studies selected.¹²

2.5.Data Extraction and Synthesizer

This stage of the review aims to synthesize and categorize the selected papers based on their scope as related to telehealth and digital care solutions during COVID-19 pandemic. Thus, the selected studies were reviewed in detail and relevant data were extracted, analyzed, and synthesized to provide answers to the research questions (see section 2.1).

3. Findings and Discussion

3.1.Qualitative Analysis of Selected Studies

With regard to the selected secondary sources included for this COVID-19 pandemic study, the findings for distribution of studies based on year of publication is shown in Figure 3. Findings from Figure 3 indicate that (N=31, 97%) studies are published in 2020 and (N=1, 3%) was published in 2019.

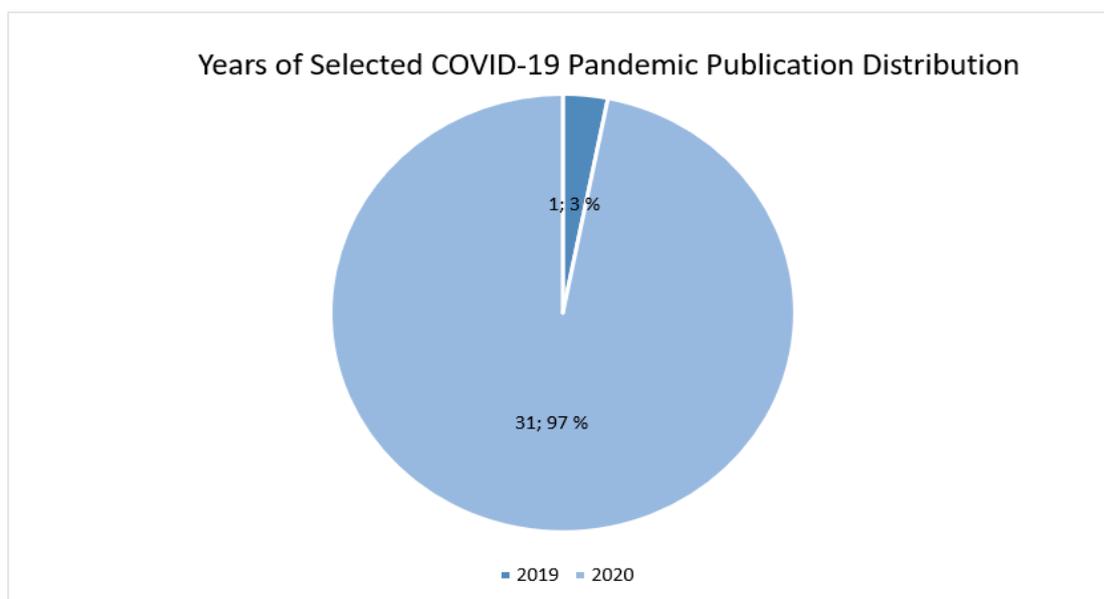


Figure 3 Distribution of selected COVID-19 pandemic studies in terms of years

With regard to the selected studies country distribution, findings from Figure 4 shows that most studies are conducted in United States (N = 16), United Kingdom (N = 4), and Norway (N = 3). Next, research articles related to use of telemedicine or telehealth for treatment during COVID-19 pandemic was carried out in Brazil, Iran, China, and Denmark with (N = 2) respectively. Next (N=1) studies were individually conducted in Australia, Italy, France, Algeria, Nigeria, India, Greece, Spain, and Canada as seen in Figure 4.

Considering the selected COVID-19 Pandemic studies type/approach distribution, findings from Figure 5 indicate that (N =6) studies employed literature review as a research method. Likewise, (N =6) studies are editorial papers and (N = 4) studies were based on a

conceptual method and viewpoint individually. Next, (N =3) are commentary papers and (N =2) are opinion, document review/website report, and perspective papers respectively. Lastly, (N =1) are document case data using exploratory analysis, letter to the editor, and white paper/tele triage scenario individually.

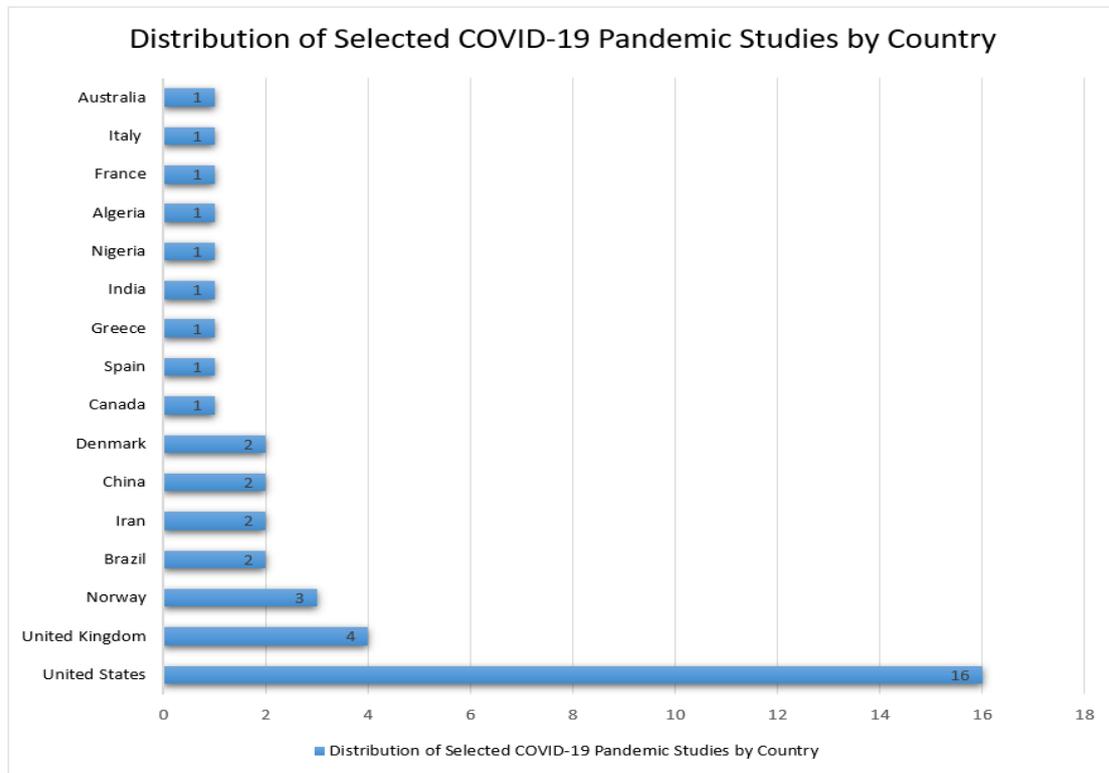


Figure 4 Distribution of selected COVID-19 pandemic studies in terms of countries

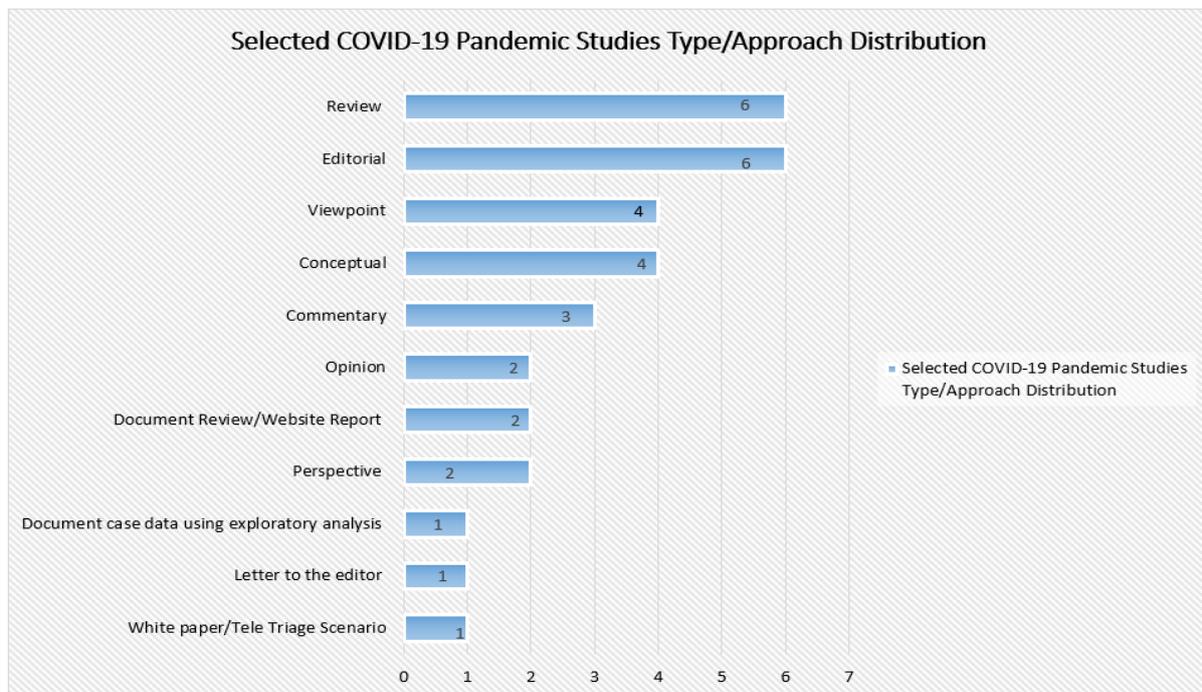


Figure 5 Distribution of selected COVID-19 pandemic studies in terms of type/approach

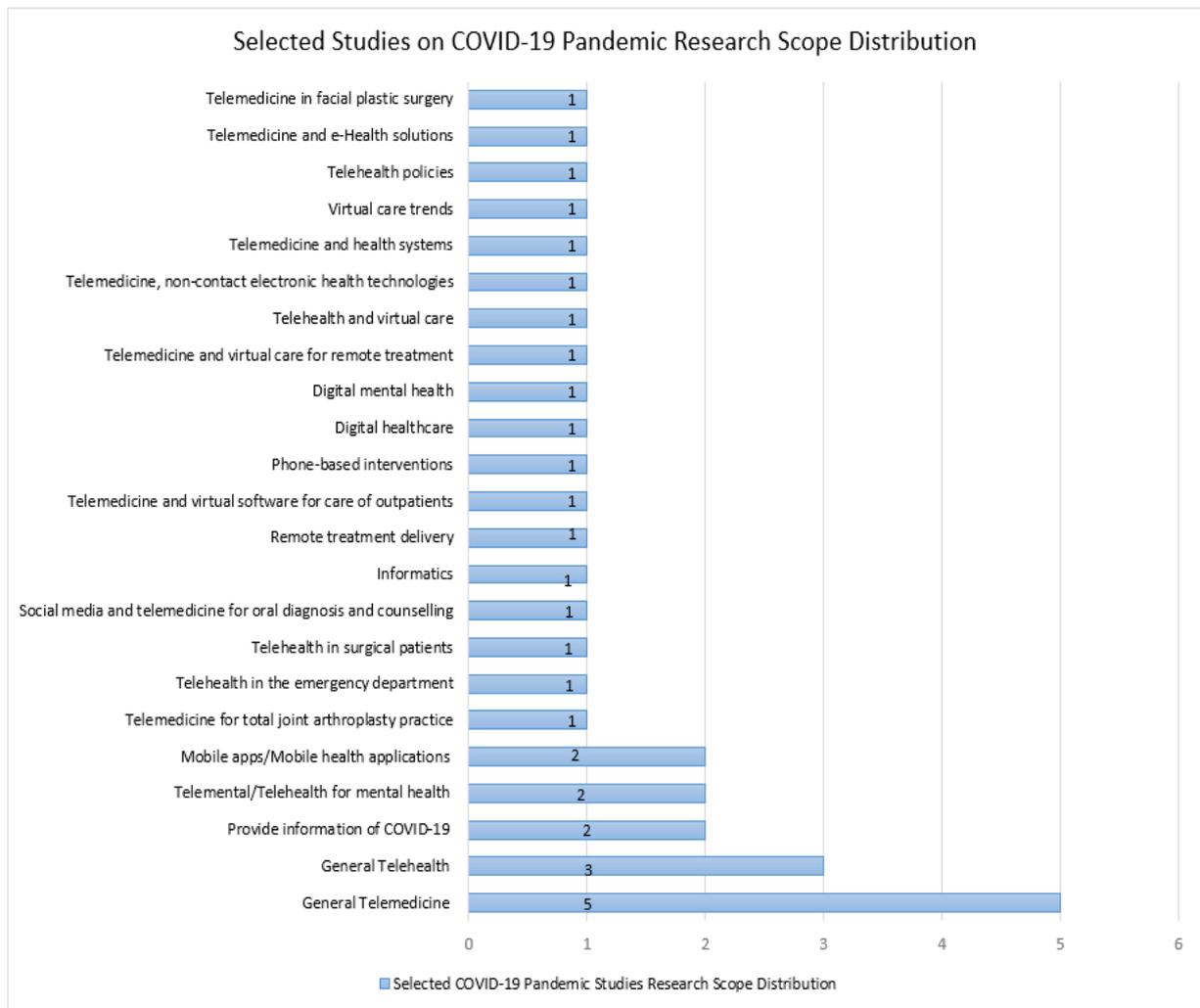


Figure 6 Distribution of COVID-19 pandemic studies research scope

Additionally, findings from Figure 6 show the distribution of the selected COVID-19 pandemic studies research scope or context. The result indicates that (N = 5) studies examined general telemedicine during the pandemic and (N = 3) discussed on general telehealth. Besides, (N = 2) studies discussed telemental/telehealth for mental health and mobile apps/mobile health applications during the COVID-19 pandemic. Lastly, (N = 1) studies exclusively discussed other issues related to COVID-19 pandemic as seen in Figure 6.

3.2.The Role of Telehealth and Digital Care In COVID-19 Pandemic Era

Research and development in telehealth has been in existence since in 1960s.⁵ Digital care provides medical services remotely and telehealth is a practice of medicine which involves using technology to provide care at a distance.⁵ Telehealth and digital care involves the provision of medical-care services via Information Communication Technology (ICT) has demonstrated potential to provide efficient medical services in a cost-effective manner.^{5,15} Given incessant pressure on medical sector to manage costs while providing better care, digital care could be viewed as an important tool which eliminates the need for patients traveling and delivers remote services.⁵ In times of public health crises and national and international

emergencies caused by COVID-19 pandemic, the value of telehealth and digital care cannot be overstated.¹⁵ Medical centers across the world (Australia, United States, Denmark, United Kingdom, etc.), are investing in telehealth and digital care to reduce spread of COVID-19 and decrease physical patients' interaction at emergency departments.⁷

Besides, telehealth technologies such as wearables provide basic vital signs (e.g. blood pulse wave, heart rate, temperature, etc.) that produce data for physicians to monitor patients remotely.^{16,17} Telehealth does not constrain attending physician to refer a quarantined patient to a more appropriate medical-care treatment, if, physical treatment is required for patients to be referred to intensive care.⁵ Therefore, telehealth and digital care may be an ideal solution to lessen the risk of physicians or patients being infected while still providing care.^{15,18}

3.3.Types of Telehealth and Digital Care Employed to Manage COVID-19

The COVID-19 pandemic has altered our society, economy, and medical-care system. While this crisis has presented the medical-care delivery system with unprecedented challenges, it has caused rapid use of telehealth and digital care solutions at a breathtaking pace.¹⁹ Accordingly, telehealth and digital care which comprises of activities employed by physicians to provide medical-care at a distance without direct physical contact with patient.^{19,20} Figure 7 shows the types of telehealth and digital care employed in managing COVID-19.

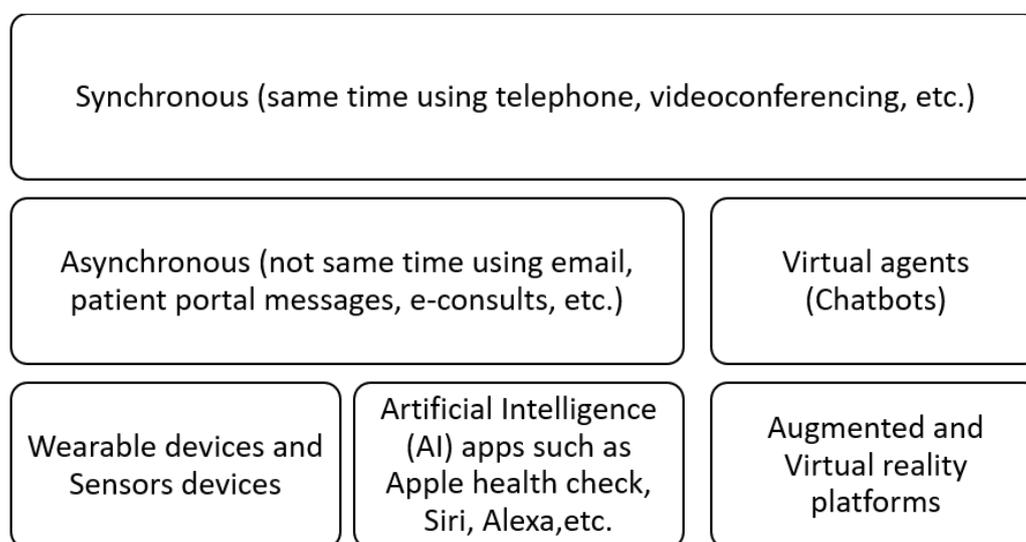


Figure 7. Types of telehealth and digital care to employed in managing COVID-19

Figure 7 depicts that telehealth and digital care can help patients receive care from physicians synchronously (same time using telephone, videoconferencing) or asynchronously (not same time using email, patient portal messages, e-consults) .^{7,19} It can also take place via virtual agents (chatbots), wearable devices, etc..¹⁹ Synchronous involves digital encounters that occur in real time involving one-on-one meetings via webcam-enabled teleconferencing. Alternately, telephone-only checkups can be conducted. Synchronous session is mostly used when discussion is required such as during new patient consultations, counseling, evaluations, and follow-up checks.¹

Asynchronous entails gathering, summarizing, storing, and dissemination of data for a patient to be reviewed at a later time.¹ This usually comprises of email, recorded video messages, and medical record annotation. Findings from Song et al.²⁰ revealed that asynchronous may include platform such as online consulting clinic, where certified medical experts were available 24 hours/day to conduct primary screenings through remote consultation. Moreover, asynchronous telehealth platform includes a COVID-19 informational page, which provides updated latest information in real time such as the Johns Hopkins corona website,²¹ and the VG live corona website update in Norway²² which provides information on the current status of COVID-19. These platforms also provide instructions for quarantine procedures at home, personal protection guide, and when to seek medical attention.²⁰ Respectively, other categories of telehealth and digital care may include;

- Telecare which is similar to synchronous employed via online consultations using videoconference or telephone for patients who ask for advice regarding health or report symptoms.⁸
- Sensors devices such as Global Positioning System (GPS) trackers in remote applications that notifies users to avoid potentially high level COVID-19 locations.^{16,17}
- Virtual agents (Chatbots) for Frequently Asked Questions (FAQs), recommendations, and connecting quarantined patients to available physician.^{6,8} WHO recently deployed a chatbot using the WhatsApp program to provide latest information and recommendations on the current state of COVID-19. Chatbot interacts with users via audio conversation or textual method to provide health information.²³
- New innovations in augmented and virtual reality platforms can be employed but are not easily accessible or scalable.¹⁷

Besides, wearables for telemonitoring/screening using physical devices such as apple wristwatch are adopted to collect, transform and assess patient health data such as respiratory rate, oxygen level, and blood pressure, and sends data to physicians which are used to screen for symptoms based on questions asked to patients.^{16,17} Additionally, physician can use digital care to observe the temperature with a household thermometer used by the patient. Also, observe the general appearance in noticing if the patient appears ill or is exhibiting any symptoms. In conducting patient-directed palpation of posterior and anterior cervical chains to assess for absence or presence of prominent lymphadenopathy. Besides, observe the absence or presence of cough; productive or dry. By checking the oropharynx by assessing the oropharyngeal erythema, exudate for enlarged or absent lesions or tonsils.

The physician can calculate respiratory rate of the patient and observe deep breath and respirations of patients by using accessory such as labored breathing, respiratory muscles, or interrupted speech. Lastly, a bio-peripherals such as pulse oximeter can be included for remote examination. Artificial Intelligence (AI) applications such as Siri, Alexa, etc. can be used during self-quarantine to monitor and transmit data on body temperature, heart rate and oxygen saturation.^{9,16,17} Few recently launched AI apps includes Apple health check application which provides screening and information portal.⁸ Siri give me guidance is a recent update of Siri which offers simple voice based symptom related recommendation on important telehealth

application links for information relating to COVID-19.⁸ Alexa daily check on Alexa mainly focuses on the elderly to be screened digitally for possible COVID-19 symptoms by responds from daily questionnaires.¹⁷

3.4. Application of Telehealth and Digital Care during COVID-19 Pandemic

Governments around the world are working to curtail the increased number of casualties and infections triggered by COVID-19, with the common objective of flattening the infection curve of the virus.^{5,20} Thus, the COVID-19 pandemic has increased awareness about the use of technology and how it can be utilized to flatten the infection curve. Amongst several cutting-edge technologies, telehealth and digital care practices have emerged as a possibility.⁵ Presently, physicians in some countries such as US, UK, Australia, etc. are using telehealth and digital care to rapidly screen potential COVID-19 cases using questionnaires⁷ and if needed the patients are asked to self-quarantine to minimize exposure and avoid in-hospital clustering.¹⁷ This helps many patients to stay at home from the hospitals who may otherwise incur risk of unnecessary exposure.¹⁶

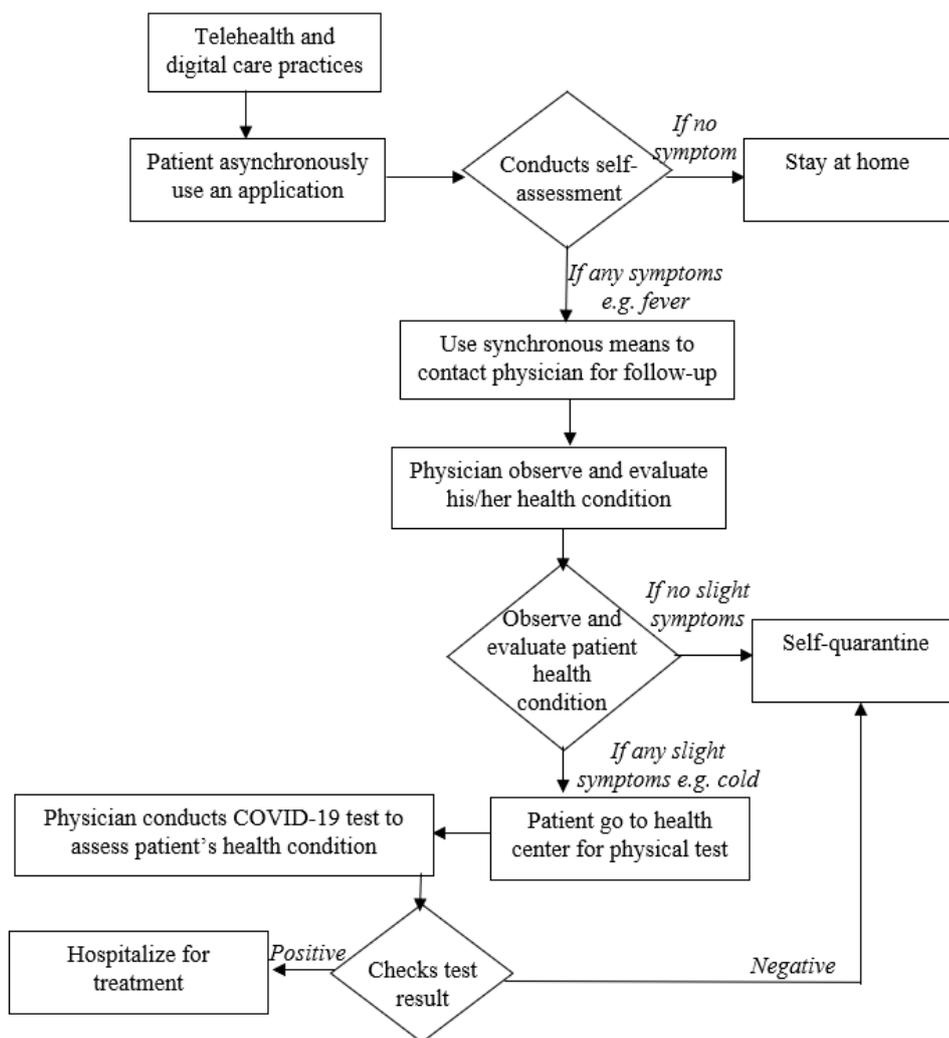


Figure 8. Application of telehealth and digital care during COVID-19

Figure 8 depicts the current application of telehealth and digital care during COVID-19 pandemic based on findings from the literature. As seen in Figure 8 there are at least two main telehealth and digital care practices in action currently adopted to decrease spread of COVID-19. It mainly of asynchronous and synchronous phase. First, patients undergo a self-assessment asynchronously using an application to assess possible symptoms which then directs the patient to the nearest health center. Next, the patients can access synchronous video consultation where a physician can observe and evaluate the patients' health condition, determining if or not the patient needs a test or self-quarantine. Thus, the synchronous approach saves use of available Personal Protective Equipment (PPE) to be used for COVID-19 cases,² and also enables the physician to provide quick specialized care via diagnosis or suggest further physical examination in the medical facility in severe case.⁵ Any medical risk can be assessed by the physician remotely and where appropriate, testing and treatment can be initiated upon arrival to the medical facility. Physicians are remotely situated and can be called to various locations within the medical facility to evaluate patients upon arrival.² Based on the initial screenings of patients' online suggestions are provided and patients are told to stay home if no symptoms.²⁰

3.5.Policies to Promote Telehealth and Digital Care Use During COVID-19 Pandemic

The COVID-19 pandemic has highlighted the role of telehealth and digital innovations such as applications used to provide care.² As such medical professionals are now utilizing digital solutions to provide medical services.¹⁷ In this context, telehealth and digital care particularly synchronous video consultations, has been employed to reduce risk of transmission, especially in the United Kingdom (UK) and the United States (US), China, and Australia as well.²⁴ Presently, the US government has endorsed the use of telehealth and digital care where it can safely be used.² Likewise, state and federal regulations surrounding the use of telehealth have been relaxed so that health workers can provide patient care where it is needed most.²

Among these countries in USA, some federal health rules have been waived to allow physicians to provide health care remotely, i.e. to adopt digital care.^{7,23,25,26} Thus, the temporary waiving of numerous regulations and rules around telehealth by the US government on March 17th, 2020, was made possible because of the usefulness of telehealth.¹⁷ Additionally, the Health Insurance Portability and Accountability Act (HIPAA) Security Requirement of the US Department of Health has stated that it will not impose fines for non-compliance with HIPAA regulations for provision of telehealth during the COVID-19 crises, permitting use of digital tools such as Skype, Google Hangout, Zoom, FaceTime, etc. to connect with patients.^{9,16} Similarly, as mentioned by Torous et al.¹⁷, in Boston, USA medical team are already using telehealth for medical consultations with patients during this COVID-19 crisis.

In other part of the world such as in India as per new guidelines registered medical practitioners are entitled to use telehealth consultation for patients within India while upholding the same ethical and professional norms and standards applicable to physical in person care.⁹ Hence, practitioners are encouraged to be familiar with guidelines related to use of digital care stipulated by the Board of Governors.^{9,16} Similarly, finding from Zhou et al.²⁸ suggests that

China has been actively providing various telehealth health services through online platforms (e.g., Tencent QQ, WeChat, and hotline) during the outbreak of COVID-19. These services are from academic agencies and government and include training, supervision, counseling, and psychoeducation. In Shandong province China, the government and the Shandong Health Committee established an “Anti-epidemic Expert Group” to formulate diagnosis, quarantine, treatment, and reporting protocols for management of COVID-19 patients using telehealth to connect patients, physicians, and information.²⁰ The anti-epidemic expert group found that the use of telehealth and digital platform contributed in controlling the spread of COVID-19 in Shandong province,²⁰ as well as in Zhengzhou both in China.²³

Additionally, in response to COVID-19 the Australian Government has responded with additional funded services via the Medicare benefits schedule to provide different range of telehealth and digital care consultations services with health specialists and practitioners.²⁸ Also, the Australian Department of Health is enabling health staff to provide services via telehealth, encouraging citizens to access medical services remotely to decrease the risk of exposure to COVID-19.⁷ Correspondingly, the UK’s National Health Service (NHS) introduces the use of video consultations in providing online health consultation in designated areas to reduce patient visits to medical practitioners in decreasing the potential for transmission and decreasing the number of patients in hospitals.^{7,23} In France, the Ministry of Health signed a declaration on March 9th, 2020, allowing the reimbursement of tele-expertise and video teleconsultations by the National Health Insurance (NHI), for patients with COVID-19 related symptoms and those confirmed with COVID-19 within the country.²⁴ Also, due to COVID-19 outbreak, temporary funding for follow-up by nurse practitioners via video or phone as well as video teleconsultations by midwives (March 19th, 2020) and speech therapists (March 25th, 2020) was legally allowed.²⁴

These initiatives align with recommendations by governments to implement telehealth and digital care solutions illustrates case examples of how telehealth and digital care solutions might provide safety of patients and physicians, while simultaneously fostering an effective frontline service to the citizenry. Thereby, protecting the society from infection flattening the COVID-19 curve.⁷ However, most countries do lack a regulatory health policy to authorize, integrate, and fund telehealth in their medical-care delivery particularly in relation to pandemic outbreak.²⁴

3.6.Determinants Influencing Adoption of Telehealth and Digital Care Solutions during COVID-19 Pandemic

It is evident that telehealth and digital care has the potential to help reduce the spread of COVID-19. But, as suggested by Pappot et al.²⁹ it is important to explore the institutional, infrastructure, and human determinants impacting both patients and physician’s adoption of telehealth and digital care during this pandemic. Figure 9 shows the institutional, infrastructure, and human determinants that impedes telehealth and digital care solution adoption.

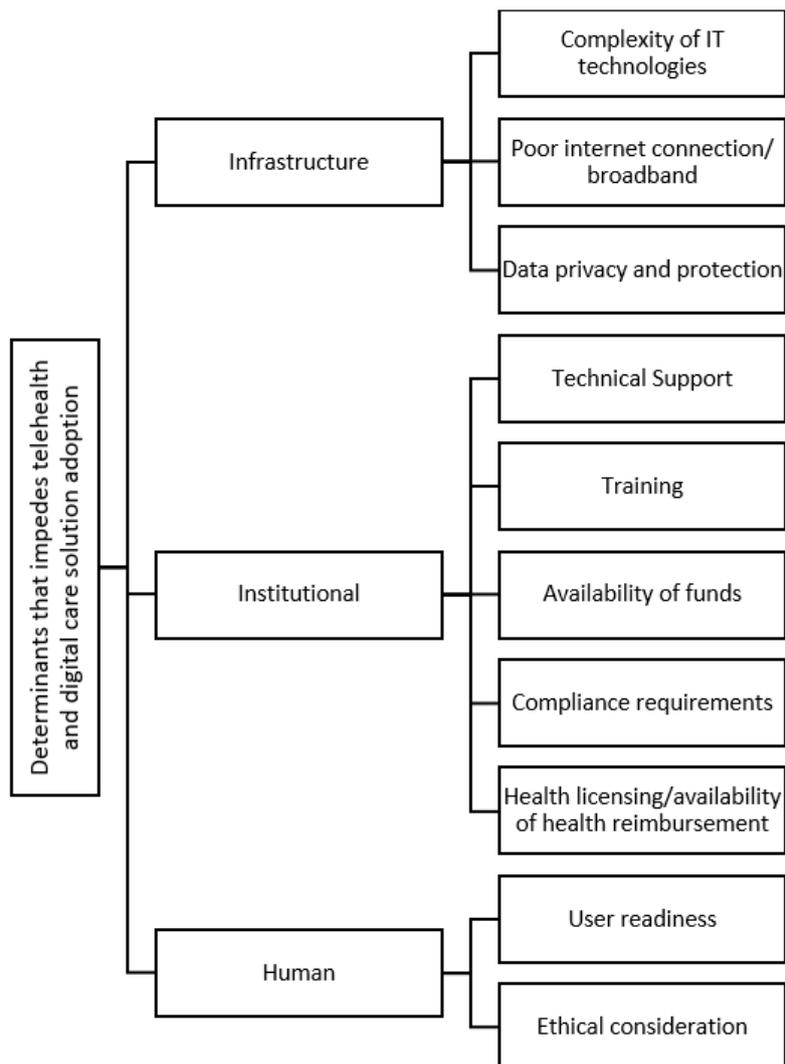


Figure 9. Determinants that impedes telehealth and digital care solution adoption.

Thus, the infrastructure, institutional, and human determinants derived from the literature as seen in Figure 9 are discussed below;

3.6.1. Infrastructure

- a. **Complexity of IT technologies-** an important requirement for using telehealth and digital care solutions is to deploy simple technologies such as standard video conferencing platforms (e.g., Skype, FaceTime, etc.) to provide medical care during the COVID pandemic.^{23,30} Findings from Leite et al.⁵ suggest that health providers and patients cite poor IT platform design and information as barriers to use digital care services in health care. As mentioned by Rao et al.¹ high patient expectations and low levels of IT literacy can lead to patient dissatisfaction with telehealth usage. Hence, when choosing a telehealth platform, it is important to deploy IT applications that are simple to use and easy to implement by end users.
- b. **Poor internet connection/broadband-** A major consideration when adopting telehealth and digital services is access to stable broadband internet connection,³⁰ which is essential for patients when utilizing technologies other than a telephone.^{1,19}

Poor connectivity can be a barrier to delivering care. Also, physician need to communicate with IT support to ensure adequate Internet connection is available.^{15,30}

- c. **Data privacy and protection-** is also a critical issue that influence the success of telehealth and digital care solutions.³¹ The privacy and protection of patient's data must be taken seriously, as this has been raised as an issue by researchers and practitioners in telehealth and digital adoption field.⁷ Thus, adhering to General Data Protection Regulation (GDPR) can help secure data privacy and protection. Key consideration for security is registration of devices used for digital care solutions with the IT departments of the hospital, ensuring data security of these devices guaranteeing that patients' privacy is ensured.¹⁹

3.6.2. Institutional

- a. **Technical Support-** the availability of 24 hours technical support staff can help in providing adequate support in relation to the use telehealth and digital care platform.⁵ IT support staff should be available on demand, if possible.¹ Physician who are familiar with telehealth can provide support to facilitate the adoption of telehealth among their peers.⁹ Although findings from the literature indicate that technical considerations have become less problematic in recent years as medical application such as SimplePractice, Zoom, Doxy.me, Vsee, thera-LINK, Bluejeans, and TheraNest have been implemented with high-quality audio video transmission capabilities.⁹
- b. **Training-** successful telehealth and digital care solution are established with experienced staffs who use these services to deliver care.² Thus, all medical practitioners who interact with patients through the digital care solutions must be.^{30,32} Similarly, use of telehealth and digital care solutions might be challenging for some citizens as they will need training in adopting telehealth.⁷ Findings from Leite et al.⁵ suggested that unfamiliarity with digital technology and insufficient training are key barriers to adoption of telehealth. Given the limited use of telehealth among physicians, it is necessary to provide train on use of telehealth.³² These, training should include technology literacy and digital communication,¹⁹ billing, and regulatory compliance.^{1,7}
- c. **Availability of funds-** it is significant to prioritize the allocation of funds,²⁵ and resources to expand the adoption of telehealth and digital care solutions across medical-care.²³ Investing funds to digital transformation of health sector may contribute to enhanced management and preparedness of current and future similar health crises.¹⁷
- d. **Compliance requirements-** irrespective of the fact that telehealth reduces wait times, eliminates travel, and possibly lessens costs for patients, it has not been universally approved to be adopted as a treatment method.¹ Historically, there has been stringent policies that have been amended to certify the adoption of easily accessible digital technologies like Zoom, FaceTime and Skype, etc. for telehealth from patients' home.³
- e. **Health licensing/availability of health reimbursement:** credentialing and licensing delays telehealth and digital care implementation,³² as such health providers are not given prescribing privileges or license to practice medicine online.³⁰ Furthermore, efforts should be made to expand telehealth coverage for patients by Medicare reimbursement and insurance companies.^{7,15,27} Although, some health fees have been

waived due to the Coronavirus Preparedness and Response Supplemental Appropriations Act of 2020,²⁷ compensation models for telehealth services needs to be revised.¹⁹ Since, existing health insurance policies do not give full support to telehealth and digital health service, thereby making it an undesirable care option except in emergency situations.²³

3.6.3. Human

- a. **User readiness-** It is important to confirm the willingness and readiness of patients and medical practitioners to use telehealth and digital care solution. Because the successful adoption of telehealth depends on the active participation of patients and medical professionals. Specifically, elderly patients may be apprehensive about using computer-based services.²³
- b. **Ethical consideration-** Patients should be explicitly asked if they are willing to receive medical care using telehealth and digital care solution before treatment.³ Hence, a patient's consent to receive care through telehealth must be confirmed.^{1,9} Similarly, confidentiality requirement should not be disregarded.⁹ Risks and benefits and alternatives to receiving care through telehealth should be mentioned if any, as well as the patient's permission to record the conversation and use video.¹

Telehealth provides a new approach for wider digital health care to help reduce spread of COVID-19; however, there are a number of determinants that impede its adoption.⁵ Thus, further action by public health decision-makers and policymakers is needed to re-structure initiatives and supports the adoption of telehealth and digital care solution throughout this COVID-19 crisis and beyond.

4. Recommendations and Implications for Policy and Practice

The COVID-19 pandemic poses huge challenges to the global medical-care community. Telehealth and digital care solutions can help in dissemination of COVID-19 related information.¹⁶ Acknowledging that many patients need recommendations or guidance, on the use of digital technologies in providing guidance services have already been previously deployed in some countries and can be adopted as an alternative to physical visits in hospitals. This article provides implications on the role of telehealth and digital care solutions in contributing in flattening the COVID-19 infection curve. Findings from this review study suggest that adoption of telehealth and digital care solutions provides numerous benefits to the society. As stated by Song et al.²⁰ telehealth can provide prevention and treatment guidance, communication, training, and remote consulting for medical staff and the community residents.

Furthermore, findings from Wosik et al.¹⁹ revealed that a few medical-centers in US are seeing about 600 patients daily via video or telephone visits. As such adoption of telehealth and digital care solutions has increased within a four week period from below 1% to 70% of total visits, reaching over 1000 video daily. Although, this study does not suggest that telehealth and associated digital technologies are the panacea to enhance the entire health sector. However, adoption of telehealth and digital care platforms cause disruption and raises

challenges for conventional medical-care practices. Hence for telehealth and associated technologies to be adopted, organizational, technological, and social determinants needs to be addressed to promote broader adoption of telehealth and digital care solutions.⁵ Nonetheless, adoption of telehealth and digital health care solutions during the COVID-19 pandemic is beneficial to citizens, patients, health practitioners and the entire medical-care. Policy makers are urged to take advantage of the potential of digital capabilities of technology during and after the pandemic.

5. Summary and Concluding Remark

Evidently, information system is important to the successful decline of COVID-19 pandemic, and researchers and practitioners can leverage digital innovation to provide telehealth and digital care solutions to decrease the spread of COVID-19. This study adopted document and literature review to discuss the role of telehealth and digital care solution, types and application of telehealth and digital care solutions, and current policies for COVID-19. Besides, findings from this study present the social, technological, and organizational determinants influencing adoption of telehealth and digital care solutions during self-quarantine in the COVID-19 pandemic. Furthermore, similar to Ohannessian et al.²⁴ this study calls for stakeholders and policy makers in the health sector to address the social, organizational, and technological determinants to promote adoption of telehealth and digital care solutions during this present pandemic and future outbreaks.

For countries without policies to legislate telehealth and digital care in their national medical care system, this is the time to initiate necessary policy changes that supports wide adoption of telehealth and digital care to help reduce the spread of COVID-19. Respectively, findings from this study provided description on how health practitioners, patients, and the entire medical-centers are deploying telehealth and other related digital services. Also, this study recommends further systematic review on the application of IS as telehealth and digital care solutions as a powerful tool to provide seamless medical-care while preserving the safety of self-quarantine patients within the current pandemic. While telehealth or similar digital technologies will definitely not provide solution for all the health challenges, it is well suited for the COVID-19 pandemic.⁴ As stated by Wosik et al.¹⁹ the society is diving into a digital sphere in the middle of the pandemic, as such digital care has come to stay. In conclusion, the author hopes findings from this study motivates future research on adoption of telehealth and digital care solutions in health emergencies.

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