Integrating Telemedicine to Support Digital Health Care for the Management of COVID-19 Pandemic

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Abstract
The current health care crisis and need for social distancing to protect medical practitioners and patients has necessitated the need to adopt new initiatives for treatment of patients. One of such initiatives is the adoption of telemedicine which involves diagnosis or medical service provided by a consulting physician to patients digitally. Telemedicine is implemented using telecommunication technology either asynchronously or synchronously via audio and video systems. Therefore, this study adopts an integrative literature review to provide evidence on the role of telemedicine to support digital health care for management of Coronavirus disease 2019 (COVID-19) pandemic. Findings from this study presents the benefits of integrating telemedicine for digital health care management. Additionally, findings discuss how telemedicine can be integrated for remote management of health care. Besides, recent polices and trends in telemedicine are discussed. Implications from this study discuss the challenges and recommendations on how telemedicine can be integrated for digital health care management during the COVID-19 pandemic. This study provides a timely guide on the potential of telemedicine to support digital health care as a response to COVID-19 crises now and into the future.

1. Introduction

The current COVID-19 pandemic has resulted to lockdown across the world which in turn has caused a paradigm shift on how medical practitioners communicate and consult with their patients [1]. Due to lockdowns and restrictions within countries medical practitioners are now adopting virtual consultation via telecommunication technologies for treatment of patients [2, 3]. Therefore, existing Information Communication Technology (ICT) tools has been vital in keeping frontline medical practitioners informed regarding up-to-date health management and recommendations [4, 5]. Apparently, medical practitioners are now leveraging the capabilities of ICT to deploy innovative tools to support provision of health care to patients (Kaminski, 2020).

Evidence from the literature [6, 7, 8] suggest that there is increasing interest in the adoption of telemedicine to provide health care especially due to the pandemic. Telemedicine which was introduced since the early twentieth century involves the use of telecommunication and online technologies including mobile devices and computers for delivery of health care or services [9]. It can be employed remotely over the phone or via real-time video consultations using an interactive two-way telecommunications system [1, 2, 10]. Historically, telemedicine has been previously used to provide health care in rural areas remotely [11] But, the widespread use of telemedicine is associated with the current COVID-19 pandemic [8].

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Furthermore, as hospitals and medical centers throughout the world begins to fill with patients during this COVID-19 pandemic, the need to preserve Personal Protective Equipment (PPE) and decrease the risk of COVID-19 transmission to attending medical practitioner and patients is critical [12, 13, 14]. Telemedicine has the potential to reduce the exposure of patients and medical practitioners, help limit usage of PPE, and decrease the backlog of delayed patient care due to the COVID-19 situation [2, 15]. Moreover, due to the current state of COVID-19 most patients prefer telemedicine as a means of treatment mostly due to fear of exposure in hospitals and medical centers [2, 16].

Telemedicine can deliver appropriate access to routine care without exposing prone patients (e.g. older adults with pre-existing health conditions) in congested hospital waiting rooms [15, 17]. Furthermore, telemedicine can support physician to conduct remote physical examination maneuvers using audio and image capturing devices to assess the pulmonary, cardiac, and dermatologic systems [12, 14]. Finding from the literature suggest that 95 % of patients who were treated via telemedicine rated it to be useful than conventional office visit [18]. Likewise, findings from Basil et al. [19] reveal there was 70 % increment in telemedicine consultation as compared to physical visits from March 25th, 2020 until April 17th, 2020. Evidently, telemedicine can be leveraged and adopted to improve the safety, experience, and capability of physicians to provide quality health care delivery during the COVID-19 pandemic [18, 20].

Besides, telemedicine is ideal for the management of infectious diseases as it helps to adhere to social distancing thus reducing person-to-person contact [21]. For patients affected with self-quarantine, telemedicine can aid with remote assessment (triage) and the provision of medical care [11, 19]. Accordingly, the following research questions are to be explored in this study;

- **RQ1**: What are the benefits of integrating telemedicine for digital health care management during the COVID-19 pandemic?
- **RQ2**: What are the recent policies and trends initiated promoting telemedicine during COVID-19 pandemic?
- **RQ3**: How to integrate telemedicine for management of remote health care during the COVID-19 pandemic?

Therefore, to address the research questions this study adds to the body of knowledge by carrying out an integrative review on prior studies to describe the implementation of telemedicine for managing the COVID-19 pandemic. Findings from this study offers practical guide to medical practitioners on how ICT can be leveraged to help manage the current COVID-19 crisis and beyond. The reminder of the article is structured as follows: section 2 is literature review and section 3 is the methodology. Section 4 is findings. Section 5 is discussion and implications and lastly section 6 is conclusion, limitations, and future works.

2. Literature Review

Presently, medical centers and hospitals are expeditiously implementing or switched their health delivery system to include both face-to-face and telemedicine in order to sustain or continue the provision of care to patients during the pandemic. Therefore, this section reviews a few studies that implemented telemedicine during the COVID-19 pandemic as presented in Table 1.

Table 1 Related works of telemedicine linked to COVID-19 pandemic

Authors and Contribution	Context	Methodology	Country	Article Type
Andrews et al. [9] researched on satisfaction with the adoption of telehealth during COVID-19	Patient satisfaction	Literature review	United States (US)	Research paper
Bokolo [15] examined the use of telemedicine for care of outpatients during and after the pandemic	General Telemedicine and virtual software	Literature review	Norway	Review
Fix and Serper [2] investigated telehepatology and telemedicine amidst the COVID-19 pandemic	Telehepatology	Literature review	United States	Research paper
Gillman-Wells et al. [1] explored telemedicine to reduce the risks of COVID-19 for surgical consultations and communications	Plastic surgery	Literature review	United Kingdom	Research paper
Jnr [11] examined the use of telemedicine and virtual care for remote treatment in response to COVID-19 pandemic	General Telemedicine and remote treatment	Literature review	Norway	Research paper
Jnr et al. [3] examined applications of software-defined networking to aid telemedicine during the pandemic	Quality of service for health consultation	Literature review	Norway	Research paper
Gadzinski et al. [13] researched e-consults and telemedicine for hospitalized patients amidst COVID-19	Urology during COVID-19	Literature review	United States	Editorial
Grimes et al. [22] researched on recommendation for urogynecologic patient care using telemedicine amidst COVID-19	Urogynecologic patient care	Literature review	United States	Original article
Haleem et al. [5] researched on areas of academic studies in relation to the impact of COVID-19	Research areas related to COVID-19	Theoretical	India	Correspondence
Haxhihamza et al. [6] explored patient satisfaction with adoption of telemedicine in university clinic psychiatry	Patient satisfaction	Survey	Macedonia	Research paper
Hong et al. [23] presented experiences gained from western	Telemedicine general	Literature review	China	Viewpoint

china telemedicine use during the pandemic				
Khan [21] explored deployment of telemedicine system to improve COVID-19 screening and evaluation	Screening and evaluation	Action research methodology	Pakistan	Research paper
Kojima and Klausner [18] discussed telemedicine health care delivery model with strategies for COVID-19	Virtual house calls	Literature review	United States	Concise research report
Leite et al. [24] researched on the development of telemedicine and COVID-19	Telemedicine general	Literature review	United Kingdom	New development
Nouri et al. [25] explored equity in telemedicine for chronic disease management during the COVID-19	Chronic disease management	Literature review	United States	Article
Omboni [26] researched telemedicine amidst the COVID-19 in Italy	Telemedicine general	Literature review	Italy and Russia	Opinion paper
Rajasekaran [27] explored telemedicine access during the pandemic	Telemedicine general	Literature review	United States	Commentary
Ramaswamy et al. [8] examined patient satisfaction with implementing telemedicine within the pandemic	Patient satisfaction	Observational cohort study	United States	Original paper
Rao et al. [28] establishing telemedicine in an academic total joint arthroplasty practice during the pandemic	Arthroplasty practice	Literature review	United States	White paper
Saleem et al. [29] examined virtual ophthalmology for telemedicine during pandemic	Virtual ophthalmology	Literature review	United States	Perspective
Smith et al. [20] provided recommendations for integration of outpatient telemedicine program during the pandemic	Outpatient telemedicine program	Toolkit based on 8 essential components	United States	Original scientific article
Sullivan et al. [30] investigated mental health viewpoint and response using telemedicine	Mental health	Literature review	United States	Special interest COVID-19

Table 1 presents related works of telemedicine linked to COVID-19 pandemic in different health sectors. However, there are fewer studies that have explored the integration of telemedicine to support digital health care for management of COVID-19 pandemic. Thus, this current study adds to the body of knowledge by addressing the research gap grounded on an integrative review of the literature.

3. Methodology

An integrative literature review methodology was employed to present evidence similar to prior COVID-19 study [9]. Integrative literature review aims to expediently assess prior studies that are appropriate to the specific research topic in order to present a fair assessment of an investigated topic using a rigorous and trustworthy approach [31, 32, 33]. The method employed for this study are discussed in the subsequent sub-sections.

3.1. Research Design

The integrative literature review employed in this study comprise identification of the research area, specifying research questions, stating of search strategies, specifying the inclusion and exclusion criteria, conducting quality assessments of selected studies, data extraction and synthesizes of findings from the secondary sources.

3.2. Search Strategy

The studies involved in this review were retrieved through an inclusive search of literature on online databases (PubMed, Google Scholar, Wiley, Taylor & Francis, ScienceDirect, Sage, Emerald, IEEE, Inderscience, and Springer). The search was carried out in April 2020 and then in November 2020. The search keywords comprise (("COVID-19" OR "corona virus 2019" OR "telemedicine" OR "telehealth" OR "pandemic") AND ("implementation "OR "integration" "deployment" OR "adoption" OR "polices" OR "management" OR "process" OR "digital care")) AND ("telehealth" OR "remote care")).
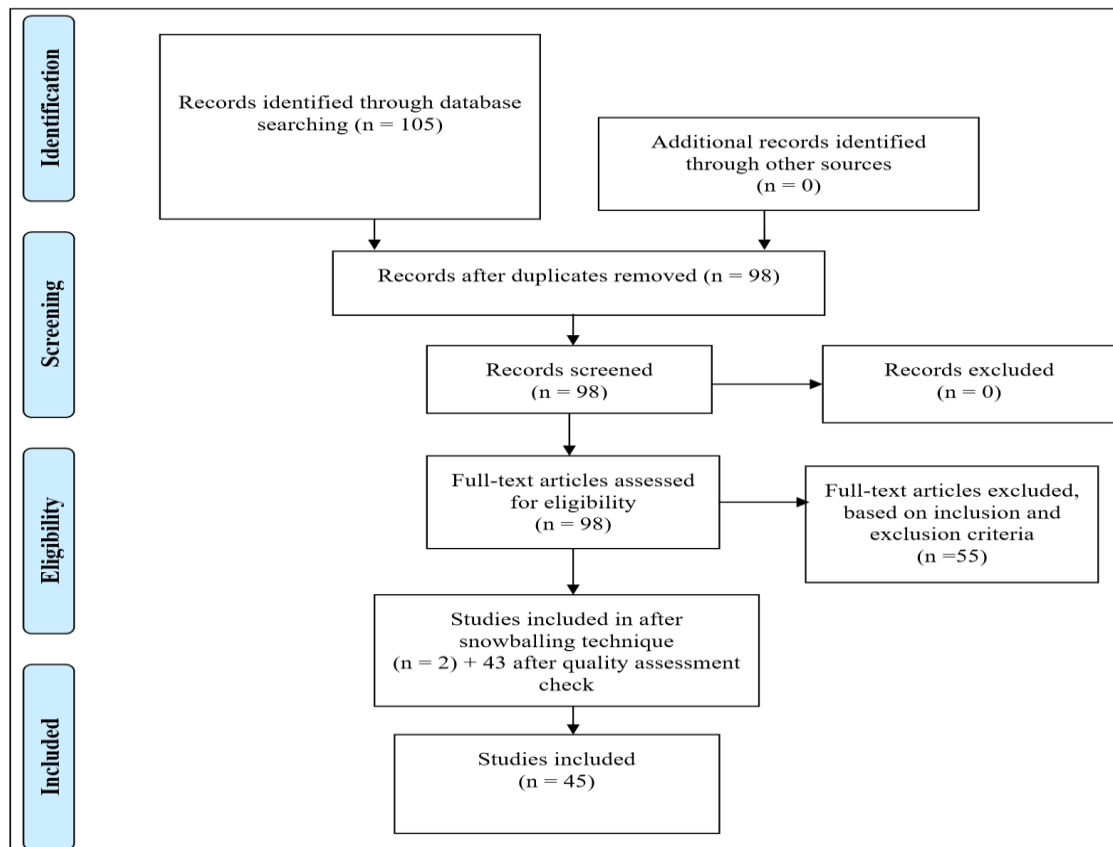

Figure 1 PRISMA flowchart for literature selection

Figure 1 depicts the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flowchart which was used for searching and refining of the articles as previously utilized by Anthony et al. [31]; Anthony Jnr. [32]. After the search a total of 105 articles using the above stated keywords were retrieved. 7 studies were duplicates and were removed resulting to 98 articles. The author checked the articles against the inclusion and exclusion criteria and removed 55 sources. Next only 43 studies remained. Then, 2 studies were added based on snowballing from existing sources resulting to 45 sources. Therefore, 45 sources meet the inclusion criteria and were included in the study.

3.3. Inclusion and Exclusion Criteria

The inclusion and exclusion and quality assessment are adopted as the sampling methods employed to select studies to be included in this study. The inclusion criteria include studies that examined telemedicine or telehealth implementation or adoption during the COVID-19 pandemic in different health sectors. The study should be written in English language and published between 2019 and 2020. The exclusion criteria mainly include studies that are not directly related to telemedicine or telehealth implementation as regards to the current pandemic and not written in English.

3.4. Quality Assessment

The selected sources were appraised by checking if the selected articles published were indexed in ISI web of science and/or Scopus database. Hence, the author independently assessed each study. The quality assessment revealed that more than half of the studies are indexed in Scopus and/or ISI web of science.

3.5. Data Extraction and Synthesis

Each of the included study was critically reviewed by the author to retrieve evidence as regards to the integration of telemedicine to support digital health care for management of COVID-19 pandemic. Moreover, descriptive and narrative analysis was employed to present findings from the selected sources in providing answers to the research questions being explored in the study.

4. Findings

4.1. Benefits of Integrating Telemedicine During COVID-19 Pandemic and Beyond

Presently ICT is being adopted to provide digital infrastructures for physicians to be in touch with their patients. Respectively, telemedicine is thriving and emerging as an indispensable resource to improve health care provided to patients [26], ensure care of vulnerable patients with chronic conditions, and monitoring of patients during the current pandemic [17, 22]. Besides, the benefits of ICT have prompted medical centers to deploy telemedicine as an alternative means in ensuring ongoing care of outpatients [19]. Telemedicine enables mildly ill patients to get the supportive care they require while lessening their exposure to other acutely ill patients [12, 14, 34]. Accordingly, in adopting telemedicine the attending physician use their judgment to assess the state of health of patients remotely. Subsequently, patients can be

directed to the appropriate health centers for further testing if the patient is seriously ill and an emergency protocol is placed to call emergency helplines such as 911 in the United States with transfer to the nearest emergency center [34].

Telemedicine can provide an effective and safe alternative for outpatient care ([34]). Telemedicine is suitable during pandemic because it can be asynchronous (using email, patient portal messages, health apps, e-consults, etc.) [14, 28, 35, 36] or synchronous (real-time using telephone, videoconferencing, etc.) [24, 37, 38] to enable scalability. Besides, telemedicine can be integrated to regularly disseminate health educational videos, report patient health examination and patients can use it to report medical data such as body temperature or blood pressure [36]. Some telemedicine systems such as health information systems and electronic health records provides a health chart services, monitoring service that is managed in real time to provide information on COVID-19 symptom. Lastly, telemedicine provides patients with the option to call for help or request for call back during medical emergencies [14, 39].

4.2. Recent Policies and Trends for Telemedicine Integration During COVID-19 Pandemic

Evidence from the literature suggest that the current COVID-19 pandemic is not the first time that government organizations and medical-care providers have adopted telemedicine to manage disaster situations. One of such organizations is The North Atlantic Treaty Alliance (NATO) which is an intergovernmental military coalition between 30 members comprising of European countries and North American [17]. NATO implemented a multinational telemedicine system in 2000 that has been adopted during various crises by NATO military forces. The telemedicine system implemented by NATO provides technology solutions and support as guidelines to individual interconnected telemedicine applications used by member states during disasters [17].

Following suit, other countries have begun to integrated telemedicine to support in managing the current COVID-19 crises. In March 2020, an emergency supplementary funding legislation for COVID-19 was passed in the US that allows the federal government to adopt telemedicine for patients in municipal areas and also allows medical practitioners to provide medical-care to patients in their homes [2, 17]. Similarly, in response to the COVID-19 situation, the Centers for Medicare and Medicaid Services (CMS) in US have waived co-pays for telemedicine consultations as a means to encourage adoption [18, 20, 25, 29, 30, 34]. CMS now allow for remote broader access for recipients to telemedicine services [25, 29, 40]. Explicitly, telemedicine consultation is now paid at the same rate as in-person physical encounters. Payees may be situated in their home during the consultation and audits will not be carried out as previously carried out to ensure prior physician patient relationship existed (i.e. not restricted to prior established patient visits) [13, 41].

Likewise, the Health Insurance Portability and Accountability Act (HIPAA) regulations has eased their regulation and are now permitting physicians to use digital devices to consult with patients [12, 20, 30]. Additionally, in an effort to fast track COVID-19 tests, the US Food and Drug Administration has waived the standard regulations to accelerate and permit test

makers to commercialize scientifically valid products in US [34]. Also, medical-care systems in Houston, Texas developed a remote communication channels between emergency responders and physicians to help with triaging [6, 9]. Virtual home treatment for high risk individuals and remote/digital Intensive Care Unit (ICU) monitoring is also being used to decrease hospital staff contact with patients with confirmed or suspected cases of COVID-19 [8, 42]. In Taiwan, a national medical insurance database was integrated with customs and immigration data to generate real-time alerts during hospital visits to help with infection case identification. Online questionnaires were used to collect information from high risk travelers. With this measure low risk residents were automatically sent a medical announcement border pass while high-risk people were asked to self-quarantine at home and are remotely monitored for any symptoms using mobile device applications [1, 20, 42].

Chinese hospitals are offering virtual consultations and online-based drug prescription and delivery service for patients with chronic and common diseases since February 1st, 2020. The online-based services are accessible through WeChat accounts, hospitals' websites, and other widely used mobile applications in China. As at March 23rd, 2020, a total of 31,905 patients had received medicines or prescriptions via the telemedicine service. The deployed telemedicine solution decreases the number of patients visits, lessens overcrowding in outpatient medical centers, and creates calm among patients with chronic illness [23]. In Wuhan, China an application is developed and adopted for identifying early symptom and triaging of COVID-19 as a mitigation initiative for potential management tool. By using this application 89 % of patients were not hospitalized until at least 5 days into their illness. Electronic Health Records (EHR) platforms with tools for screening and triaging symptoms were also adopted as it has the potential to earlier identify symptomatic patients and reduce physical burden on existing medical-care systems [42]. Similarly, Hong *et al*. [23] reported the adoption of a multimodal telemedicine system network in Sichuan Province in Western China during the COVID-19 pandemic. The system network synergizes a smartphone application (app), a newly deployed 5G service, and an existing telemedicine application. By using the telemedicine system more than 800,000 training has been provided to support the implementation of control and prevention measures against infections.

The telemedicine network system in Sichuan Province was fully deployed online immediately after the first COVID-19 outbreak in January 2020. In Jan 17th, 2020, the telemedicine system was adopted for providing tele-education about COVID-19 infection, prevention, and treatment of medical practitioners at local hospitals through smartphone apps, web portals, and remote consultation networks. Furthermore, a real-time video telemedicine system was used to provide consultations for medical practitioners via telephone, new web-based and internet by a multidisciplinary team to manage the COVID-19 cases as at Jan 26th, 2020. Based on the telemedicine system, in Feb 1st, 2020, an internet-based drug prescription and delivery was integrated in the system to provide medication to patients with chronic diseases at home [23]. As at March 23rd, 2020, a total of 9085 patients had used the telemedicine system for online interventions or consultations through the app, whereas 1094 patients had received physical interventions or consultations from 137 physicians by telephone [23]. In other countries like Singapore telemedicine is being implemented to provide remote triaging

of care in delivering rapidly accessible information digitally via chatbots during COVID-19 pandemic [17]. This is due to opportunities to be derived from adopting telemedicine to provide emergency response during infectious disease outbreaks.

After Italy released a statement of specific telemedicine guidelines in 2012, the Ministry for technological innovation and digitalization and the Ministry of Health launched a 3 day open call for telemedicine stakeholders/providers to collect information about current digital solutions (such as applications and chatbots) available to be adopted for appropriate tracking of patients with COVID-19 [26]. Although, researchers such as Omboni [26] argued that at the moment, the only result of this call is the declared deployment of a smartphone application to be utilized for contact tracing without much outcome in managing the current pandemic [26]. In other counties such as Australia, there have been similar calls to relax restrictions on medical practitioners' adoption of telemedicine consultations for treatment of patients. Whilst, the potential opportunities to be derived from telemedicine are clear, the adoption of telemedicine in disaster or emergency situations has been quite limited. As stated by Smith *et al*. [17] in Australia, funding is mostly focused on medical consultations provided by videoconference for patients in remote and rural locations Hence, to encourage telemedicine adoption funding is being provided by the Australian government to facilitate the delivery of online or videoconference health services to individuals affected in the bushfire crisis [17], but it seems to have had less impact.

4.3. Implementation of Telemedicine for Treatment During COVID-19 Pandemic

The implementation of telemedicine in the current pandemic for consultation may be new for medical practitioners as well as for patients [12, 20]. Although, video consultations have been adopted over the years to diagnose and assess patients' symptoms in facilitating rapid decisions on treatments to be administered [12, 13, 14]. Patients are now looking for digital based care, evidenced by recent increase reported by telemedicine providers [29]. Before social distancing practice 74 % of patients were unaware of telemedicine as an option to get medical care from their physician. But, due to the COVID-19 pandemic telemedicine platforms have now reported that virtual patient consultants have increased from about 25% to 70% [29]. Thus, telemedicine adoption enables reduce physical congregation in medical facilities promoting social distancing thus limiting risk of exposure [21, 40]. Accordingly, Figure 2 depicts a flow diagram for telemedicine adoption during COVID-19 pandemic.
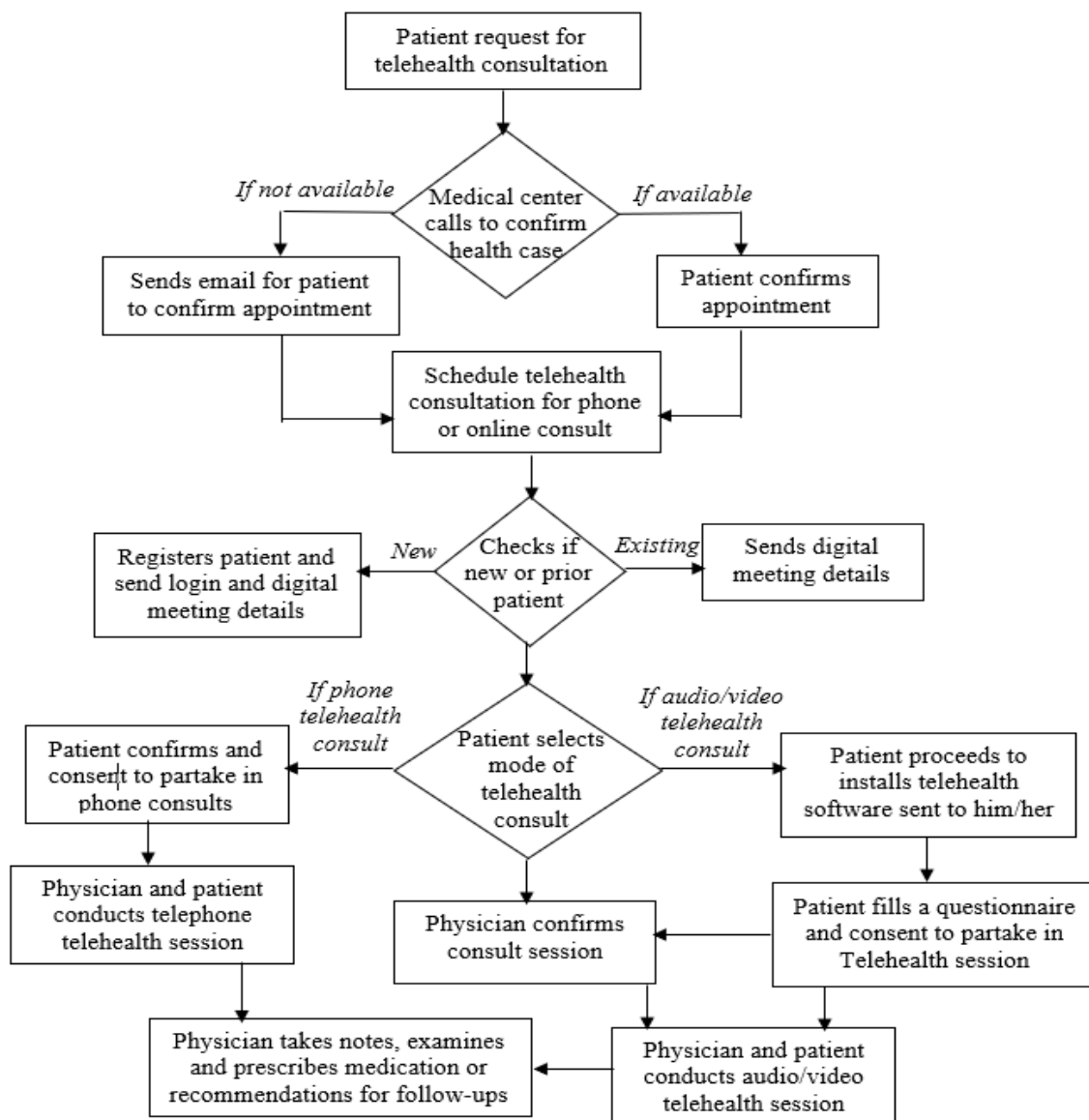
Figure 2. A flow diagram for telemedicine adoption during COVID-19 pandemic

Figure 2 shows the flow diagram for telemedicine adoption activities for patient, physician, and medical health center. In adopting telemedicine for hospital-at-home treatment during the COVID-19 pandemic and beyond, a few opinions need to be considered such as documentation of care should be carried out by the attending physicians [13], consent of the patient agreeing for video consultation should be collected [20, 29]. Also, patient and physician location at time of the consultation should be noted [13], the time spent for the consultation should be documented [12]. In a typical telemedicine treatment as seen in Figure 2 patients are contacted by a medical coordinator and explained the need for transitioning to digital mode of consultation [13]. The medical practitioner can be a Physician Assistant (PA) who attends to intense medical case (the PA must have obtained a 3-year graduate-level education where many of the same courses taken by medical practitioner or physician must have been taken. Likewise, the flow diagram for telemedicine adoption as seen in Figure 2 can be employed by a Nurse Practitioners (NP) who is a registered nurse that attended graduate-level as well as advanced clinical training after their initial registered nurse qualification.

In receiving treatment via telemedicine patients are asked if they have an internet-enabled device (e.g. smart phone, computer, etc.) that is equipped with a webcam and microphone [12, 14]. After which instructions are provided by a medical practitioner on how the patients can download the preferred telemedicine application and set-up guide is provided to the patients. The patient is then given an appointment time to access the telemedicine consultation [41]. A HIPAA-compliant platform such as Zoom, FaceTime, Google Duo, Skype, and Microsoft Teams, etc. can be used by the physician with an internet connection using a video and microphone equipped device [12, 20, 30]. During the synchronous consultation session, the physician can perform a complete visual examination which should be documented. Also, inspection of vital signs such as respiratory rate and heart rate can be checked by the physician and a note is then entered in the electronic health records [41].

5. Discussion and Implications

5.1. Discussion

This study employs an integrative review to provide evidence on how telemedicine can be integrated to support digital health care for management of COVID-19 pandemic. Findings from this study present how to implement telemedicine during the COVID-19 pandemic and current trends and policies initiated across some part of the world to improve formal integration of telemedicine strategy. These findings can be employed as a guide to assist with co-ordination and deployment, and delivery of telemedicine services during the current pandemic. The findings also discuss how to integrate telemedicine for management of remote health care during the COVID-19 pandemic.

Findings from this study highlights that telemedicine is importance and can be adopted to support treatment of patients during and after the pandemic. This finding is similar with results from Gillman-Wells et al. [1] which indicate that telemedicine inherently saves time and reduces cost-saving and is proven to be beneficial to both patients and medical practitioners. In addition, findings from the literature [29] reveal that patients are currently looking for digital care, this is based on evidence from recent surges reported by telemedicine providers. The findings from Saleem et al. [29] also revealed that prior to quarantine and social distancing practice, 74% of patients were unaware of telemedicine as treatment option. Accordingly, the COVID-19 pandemic has transformed and caused disruption in healthcare as such some leading telemedicine service providers now reported that digital patient visits have increased from 25% to 70% [29].

Similarly, findings from Nouri *et al.* [25] suggest that within a 2-week period before telemedicine adoption (17th February to 28th February) to a 2-week period after telemedicine adoption. Video consultation increased from 3% (from a total weekly average of about 1,000 virtual consultation) to 80% (of a weekly average of about 550 virtual consultation). Similarly, telephone consultation increased from 0% to 16% indicating an increase in adoption of telemedicine services during the COVID-19 pandemic in US [25]. While telemedicine clearly provides a potential benefit, it also has a few disadvantages. As stated by Hong *et al.* [23] the

main setbacks of telemedicine include interruption in the relationship between medical practitioners and their patients, a halt in the relationship between medical practitioners, problems concerning the quality of medical information, and bureaucratic and organizational difficulties.

5.2. Implications for Practice

The COVID-19 pandemic has changed the way of living as well as medical practitioners provides health care. As the number of COVID-19 infection continues to rise, outpatients with chronic and acute conditions need to be cared for in the safest means possible [9]. Telemedicine has existed for decades, but the COVID-19 pandemic has made it more accessible and applicable. Findings from Andrews et al. [9]; Gillman-Wells et al. [1]; Haxhihamza et al. [6] suggest that telemedicine adoption improves patient quality of care. The findings in this review discuss the adaptability of medical centers and hospitals in adopting telemedicine an alternative way of delivering care to patients during the pandemic. As we look to a future after the COVID-19 pandemic, it is envisioned that telemedicine can be fully integrated in the daily routine of health delivery for patients as telemedicine can improve health care delivery [2]. Telemedicine need not only be implemented as a temporary alternative during a crisis but can be used even after the pandemic.

With the rapid digitalization telemedicine has transitioned to a paradigm that offers convenience and greater possibilities. Although adoption of telemedicine will not address all COVID-19 challenges. It provides medical care to patients remotely as well as rapid access to medical practitioners to provide medical treatment [23]. Moreover, some consultations require physical face-to-face examinations that may be difficult to perform virtually such as auscultation and imaging, cultures diagnostics which cannot be done digitally [7]. Furthermore, to improve the adoption of telemedicine it is important that physicians training highlights the limitations of integrating telemedicine and suggest alternative approaches of information gathering that can be employed when such case arises [17].

5.3. Implications for Policy

The COVID-19 crises have changed health care provision throughout the world [6]. The pandemics pose great challenges to medical-care delivery [43]. Telemedicine which employs ICT to manage health information for assessment, education, diagnosis, therapy, monitoring and follow-up can be adopted during pandemic. Telemedicine enables rapid deployment of large numbers of physicians, supports triage so that front-line medical staffs are not burned out with increased heath demand and reduce the risk of person-to-person disease transmission [17]. The current COVID-19 crisis which necessitate for quarantine, isolation, and social distancing to protect medical practitioners, patients and the entire society requires the need to consider new approaches for managing of infections [14, 44]. Telemedicine adoption may provide solutions [29], as such the CDC has recommended adoption of telemedicine in place of live hospital visits in keenness to promote social distancing [27, 45].

6. Conclusion, Limitations, and Future works

Telemedicine and other associated digital technologies are vital and requisite platforms in supporting outbreak management and should be leveraged to their full potential [27]. Telemedicine offers a medium to provide medical-care treatment for outpatient, while ensuring the safety of patients, attending physicians, and the general public by reducing personal interactions [41]. By integrating telemedicine into conventional medical practices, patients can receive proper care and follow-up especially during the pandemic. The implementation of telemedicine provides access to and continuity of patient care while reducing exposure [20].

This article provide recommendation to assist policy makers and regional medical systems in implementing telemedicine to manage the COVID-19 outbreak. Findings from the study discuss the benefits of integrating telemedicine for digital health care management during the COVID-19 pandemic. The findings also present recent policies and trends initiated to promote telemedicine implementation during the COVID-19 pandemic. Lastly, the findings discuss how medical centers and hospitals can integrate telemedicine for management of remote health care during the COVID-19 pandemic.

In conclusion, telemedicine must no longer be an add-on or possible option to react to a disaster or pandemic. Rather it should be a proactive method to deploy continuous care to patients [26, 29]. Finally, every research has limitations and so is this study. First, this study employed an expected review conducted within a short timeframe, and literature related to COVID-19 is evolving daily. Secondly, only secondary data from existing review was employed in this study, no primary data was collected to validate the findings related to the how telemedicine is integrated. In future, there is need to collect primary data from interview and/or survey to further investigate the integration of telemedicine during pandemic and beyond.

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