Medical Science

Review

Telehealth during COVID-19 pandemic era: a systematic review

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Abstract: Background: Across the globe, the coronavirus (COVID-19) pandemic has altered the delivery of healthcare services as patients must maintain their distance from caregivers, and still receive medical treatment. This has triggered a necessity for exploring means which minimizes the physical gap between patients and healthcare givers while offering health care and ensuring high medical protection at a reduced risk of exposure. Even though telehealth services are no replacement for conventional healthcare, its' usefulness in the coronavirus (COVID-19) pandemic is immense. **Objective:** This research reviews the ardent utilization, barriers and recommendations with telehealth services for healthcare delivery during the COVID-19 pandemic. **Methods:** An assessment of literature in five large digital databases; PubMed, Science Direct, Sage Pub, ProQuest, and Google Scholar was conducted. Inclusion criteria included studies defining telehealth/telemedicine, utilization, barriers and recommendations during the COVID-19 pandemic from January 2020 to July 2021, written in English and published in peer-reviewed journals. Two reviewers independently assessed search results, extracted data, and assessed the quality of the included studies. Narrative synthesis was undertaken to summarize and report the findings. **Results:** Overall, the study discoveries which are most commonly stated as impediments for telehealth services' full utilization between patients and physicians beyond the scope of typical medical confinement are: infrastructure and internet access (20.00%), data privacy and security (13.33%), digital literacy (13.33%), reimbursement and liability (10.00%), and clinician and patient's unwillingness (6.67%). **Conclusions:** The intrusion of coronavirus has accelerated the transition to telehealth services in healthcare delivery, but it has also provided a unique chance to demonstrate the critical role that telehealth can play in ensuring that people of all races, ethnicities, and communities receive high-

quality treatment (justice). Healthcare professionals should emphasize the effectiveness of telehealth services as an alternate healthcare delivery method in promoting healthcare to all populace.

1. Introduction

The COVID-19 pandemic is unlike any past pandemic. The ease of virus transmission and the variability of symptoms resulted in an unparalleled rate of spread, hence the need for physical distance [1]. The rapid rise in COVID-19 infection rates disrupted traditional treatment approaches, which relied solely on in-person visits. Restrictive measures imposed by state and municipal governments, such as stay-at-home orders, necessitated the development of a replacement platform to meet the demands of sick populations. There was only one solution in these situations that would satisfy both demands, minimizing the physical gap between patient and physician while offering health care and ensuring high medical protection [2]. The rapid utilization of telehealth services was an initiative introduced by Healthcare Authorities worldwide in response to the COVID-19 pandemic. Barriers to telehealth services during the COVID-19 pandemic were strongly tied to existing issues in the health sector that hampered telehealth prior to the outbreak. The high cost of telehealth services involving live-video communication, which was due to the lack of high-speed internet connection and infrastructure, was among several problems. Reimbursement for telehealth services was also a challenge. On the part of healthcare personnel, challenges include a reluctance to use telehealth platforms in healthcare due to inadequate use of Information Communication and Technology (ICT) in critical aspects of healthcare such as health information management, concerns about medical liability, fears of patient privacy breaches, and cybersecurity on the use of digital channels [1,3].

The adoption of telehealth had been quite slow before COVID-19 however, the advent of the pandemic has seen an increase in its use in the forefront of treatment. It can reduce contact between patients and doctors and increase surveillance of the population. Some African countries such as Mali, Uganda, Senegal, Botswana, South Africa, and Ghana advised patients to seek medical care online instead of participating in physical consultations. Weak internet access, insufficient education, lack of basic infrastructure with a particular focus on electricity supply in Africa precede the challenges faced by African countries in building a strong telemedical network [4]. The COVID-19 pandemic has brought in the widespread and rapid adoption of digital health, but these benefits must be balanced against the loss of human interaction in health care, and equally given by swift federal, state, and healthcare organization legislation. Although the pandemic has drawn attention to socioeconomic and systemic health inequities, it is critical to guarantee that the needs of the most vulnerable patients are also met in digital care [5]. Even though telehealth services are becoming a common place in responding to public health emergencies, its roadblocks and health inequities must not be neglected. Given the rising need for health care, it's vital to raise awareness of these telehealth problems to guide the growth of telehealth services delivery in crisis situations by identifying its usage and bottlenecks in patients care service delivery [5,6].

2. Materials and methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were followed in this review. The PRISMA flow diagram was used on the basis that it would help streamline the available literature (see Figure 1).
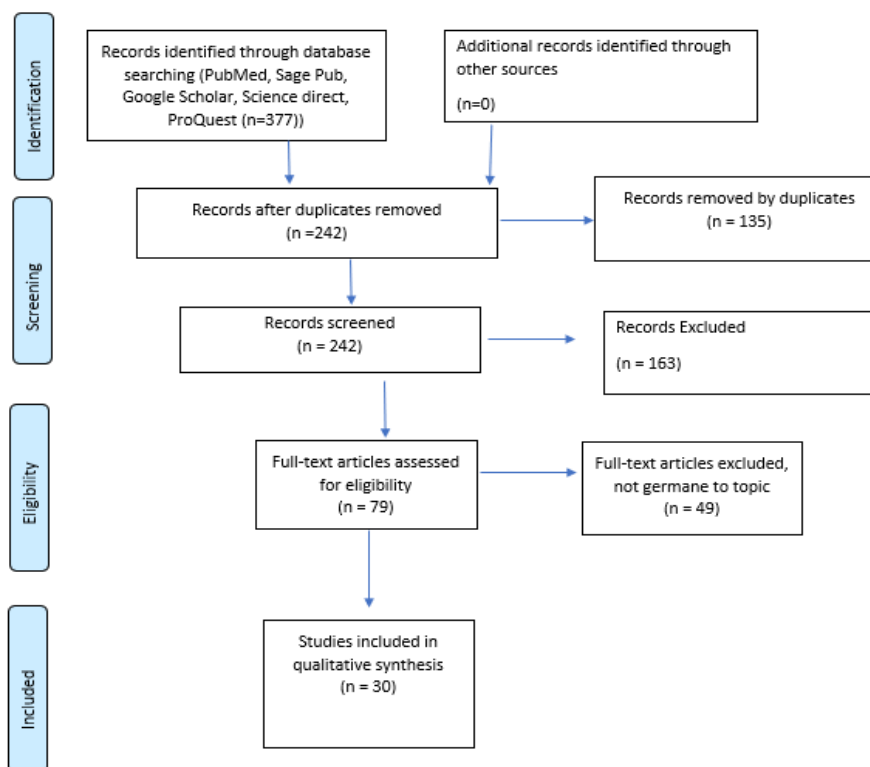

Figure 1. PRISMA Flow for summarizing the process of article selections.

2.1. Identification: search strategy and data sources

To conduct a thorough review of studies related to telehealth/telemedicine, its utilization, and barriers during the COVID-19 pandemic, the search strategy was carried out using five large digital databases; PubMed, Science Direct, Sage Pub, ProQuest, and Google Scholar. These search engines were chosen because they were suitable for medical/health science, social science, and information systems research. They also allow conducting advanced searches based on keywords, publication year, type, and research area. The search was conducted using the title and research questions. All titles and abstracts that were close to or relevant to the search keywords were screened and held for further consideration.

An elementary search on February 10, 2021, found a variety of available data on telemedicine services use and barriers during the COVID-19 outbreak. A new search was performed to update the results. Both the terms "telemedicine" and "telehealth" were included in the keywords because they are frequently used interchangeably. The following keywords and Medical Subject Headings (MeSH) were used in the search: COVID19, COVID-19, Coronavirus, Telemedicine, Telehealth, Barriers,

Challenges, Utilization, Uses, and Solutions. Search keywords were created to ensure the quality of the reviews by combining search terms with Boolean AND/OR operators to increase relevant results. With constraints on the search, the keywords were tested on PubMed, Science Direct, Sage Pub, ProQuest, and Google Scholar databases to check their validity. The search was limited to: (1) journal papers, (2) English-language publications, and (3) articles published between January 2020 and July 2021 (during this period was the apex of the COVID-19 pandemic in most countries).

2.2. Screening: review of abstract and title and removing duplicate references

After collecting 377 papers using search keywords, 135 duplicates were excluded, leaving 242 for screening. 163 articles were excluded after a screening analysis of each article's title and abstract, as the papers were not aligned to the research questions being investigated. A total of 79 papers were reviewed for eligibility, with 49 being rejected because they did not address the research questions. As a result, 30 publications were found to meet the requirements for inclusion. The inclusion and exclusion criteria for the screening of the articles are stipulated in Table 1. These criteria aided in excluding of unnecessary and/or needless knowledge from the selection, allowing for the most productive discovery of studies to address the research question.

Table 1. Inclusion and exclusion criteria employed.

Criteria	Decision
The paper should be written in the English Language	Inclusion
The paper provides possible answers to research questions	Inclusion
The paper should be related to telehealth/telemedicine and COVID-19	Inclusion
The paper is a journal article	Inclusion
Papers duplicated within searched documents	Exclusion
Papers published before January 2020	Exclusion
Papers that are not accessible and not in full text	Exclusion

3. Results

The review looked at literature about telehealth's utilization and barriers during the COVID-19 pandemic. The barriers to telemedicine usage were then broken down into common themes and exhibited to determine their frequency of recurrence in the literature. Frequency draws attention to key topics in the literature. The literature search for telehealth's use and barriers during the COVID-19 pandemic resulted in a total of 377 studies from five databases (see Table 2). Further screening revealed (n = 135) duplicates and were exempted. Titles and abstracts were further checked with the criteria for inclusion and the search excluded (n = 163) at this point. Further examination for full text and abstracts of these studies was conducted and (n = 49) were excluded. Studies included in the qualitative synthesis that met all the researcher's set criteria were (n = 30) and were included in the study analysis. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow in Figure 1 shows the process of selecting articles from the chosen databases. Table 2 shows the databases and the number of articles found in each database whiles Table 3 shows the summary of articles with citations, year of publication, title, study locations, utilizations, barriers, recommendations and key findings from each reviewed article. Table 4 describes the statistics of

reviewed articles comprising of continents (Figure 2), percentages, country of origin, number of articles, probability of occurrence and references. The study statistics consisted of 46.66% articles from North America being the continent with the highest frequency, Europe with a frequency of 23.33%, Asia (16.66%), Africa (10%) and the least articles from Australia with (3.33%). This shows that most telehealth studies were conducted in the North American continents within the period of the literature search. This is depicted in Table 4. In Figure 3, a search in some literatures portrays that several barriers have direct or indirect relationship with the use of telehealth. This consisted of infrastructure and internet being the highest with 6 (20.00%) studies, data privacy and security 4 (13.33%), and digital literacy 4 (13.33%) studies. The search continued to reveal' reimbursement and liability 3 (10.00%) as a barrier and finally clinician and patients' unwillingness as the least barrier with 2 (6.67%). This implies that several barriers were attributed to the use of telehealth during the COVID 19 pandemic era and the study period.

Table 2. Databases and the number of articles used in literature.

Databases	Number of articles used in literature
PubMed	9
Science Direct	9
ProQuest	2
Sage Pub	2
Google Scholar	8
Total	30

Figure 2. The distribution of articles based on continents.

Table 3. Summary characteristics of studies included.

Citation	Year of Publication	Title	Study Location	Utilization and Barriers	Recommendation	Key Findings
Blandford A, et al. [1]	2020	Opportunities and challenges for telehealth within, and beyond, a pandemic	UCL Institute of Healthcare Engineering and UCL Interaction Centre, University College London	Infections are less likely to spread if they are contained. Physical separation is made easier, and symptoms and breakouts are monitored.	Telehealth systems must be simple to use and maintain to maximize digital inclusion.	Individuals and healthcare programs have been forced to reconsider what is feasible and acceptable, as well as to adapt care models to the rapidly changing circumstance. To reap the long-term advantages of telemedicine, organizations must work together to discover where, why, how what telemedicine systems work best.
Hoffman DA [2]	2020	Increasing access to care: telehealth during COVID-19	Duke University, Stanford School of Public Policy	Reimbursement and Liability barrier	Expansion of state parity laws and regulations on telehealth usage.	More legal and regulatory steps are needed to fully realize telehealth's potential.
Abdel-Wahab M, et al. [3]	2020	Opportunities in telemedicine, lessons learned after COVID-19 and the way into the future	Vienna, Austria	Prevent cross-infection of patients with COVID-19	The optimal techniques for using telemedicine resources in health care should be determined through research.	The optimal strategies for utilizing telemedicine resources in healthcare will need to be determined soon.
Barney A, et al. [4]	2020	The COVID-19 pandemic and rapid implementation of adolescent and young adult telemedicine: challenges and opportunities for innovation	Division of Adolescent and Young Adult Medicine, University of California, San Francisco	Digital literacy	Technical assistance through online tutorials.	Telemedicine is inaccessible to people who do not have access to the internet or appropriate technology, or who do not have a private area to conduct a visit.
Gajarawala SN & Pelkowski JN [5]	2020	Telehealth benefits and barriers	United States of America	Data privacy and cybersecurity; Reimbursement and Liability barrier	Providers must observe telehealth etiquette. Providers must be responsible for maintaining regulatory enforcement. Insurance companies should consider covering alternative healthcare programs.	Telehealth programs allow patients with smartphones, tablets, laptop computers, and desktop computers to interact with health care specialists who can diagnose, track, and manage a variety of acute and chronic diseases.

Citation	Year of Publication	Title	Study Location	Utilization and Barriers	Recommendation	Key Findings
Zhai Y [6]	2020	A call for addressing barriers to telemedicine: health disparities during the COVID-19 pandemic	Pennsylvania State University's Department of Educational Psychology, Counselling, and Special Education	Infrastructure and internet access	Funding telemedicine infrastructure; Providing technical assistance to support telemedicine adoption.	This study revealed that treatment delivery through telehealth technology can be hampered by hearing and vision impairment. Another important factor in the inequity around telemedicine is age.
Al-Samarraie H, et al. [7]	2020	Telemedicine in Middle Eastern countries: progress, barriers and policy recommendations	Coventry University's School of Media and Performing Arts, Coventry, United Kingdom	Infrastructure and internet access; Clinician and patient's unwillingness barrier	Policymakers should incorporate new ICT facilities. Standard training programs for physicians and healthcare professionals. Raise public consciousness about the value of technology. Train and educate key users.	Five cultural and social obstacles were established in this study as having the potential to affect the use of telemedicine. Healthcare employees must adopt uniform training protocols. The study findings will benefit organizations, legislatures, and health policymakers as they implement plans and policies to improve telemedicine services.
Bakshi S & Tandon U [8]	2021	Understanding barriers of telemedicine adoption: a study in North India	Patiala, Punjab, India: Chitkara Business School, Chitkara University	Infrastructure and internet access; Data privacy and cybersecurity	File compression for still image transmission. Usage of a Local Area Network. Training programs on information security.	The study proposes a theoretical structure that illustrates various aspects of risk perception and their relationship to behavioural purpose. It takes well-defined rules and regulations for every system to operate smoothly and provide solutions.
Jalali MS, et al. [9]	2021	Telemedicine, privacy and information security in the age of COVID-19	Harvard Medical School, Boston, USA	Data privacy and cybersecurity	Education, and employee training. Best-practice security behaviours must be adopted.	Healthcare firms must strengthen their cybersecurity infrastructure by implementing more effective prevention and detection procedures.
Chowdhury SR, et al. [10]	2021	Telemedicine is an important aspect of healthcare services amid the COVID-19 outbreak: its barriers in Bangladesh and strategies to overcome	Department of Public Health, North South University, Dhaka, Bangladesh	Data privacy and cybersecurity	Establish a legal structure that protects both the patient's and caregiver's rights.	Every hospital's e-health program should be held accountable and be transparent.
Triana AJ, et al. [11]	2020	Technology literacy as a barrier to telehealth during COVID-19	Vanderbilt University School of Medicine, USA	Digital literacy	Education and self-efficacy	Transition to telehealth necessitates time, patience, and money.

Citation	Year of Publication	Title	Study Location	Utilization and Barriers	Recommendation	Key Findings
Smith AC, et al. [12]	2020	Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19)	The University of Queensland, Princess Alexandra Hospital, Australia	Clinician and patient's unwillingness; Reimbursement and Liability	Regular telehealth practice. Training and education. Funding by government.	All healthcare providers should incorporate telehealth into their regular service delivery as the most reliable strategy to ensure that it can be used in an emergency.
Dubin JM, et al. [13]	2020	Telemedicine usage among urologists during the COVID-19 pandemic: cross-sectional study	Department of Urology, University of Miami Miller School of Medicine, Miami, FL, United States	Clinician and patient's unwillingness	Doctors, administrators, and patients should accept changes to maximize efficiency.	If telemedicine becomes more prevalent in medical practices, health care facilities and practitioners can devote more time and resources to educating patients about it and improving access to it.
Ahmed S, et al. [14]	2020	Telemedicine takes center stage during the COVID-19 pandemic	Department of General Surgery, Tan Tock Seng Hospital, Singapore	Reimbursement and Liability barrier	Medical licensing authorities must cooperate and establish standards that promote innovation.	In certain nations, reimbursement and payment systems are not favourable for telemedicine consultations. Supporting healthcare transition by telemedicine needs a favourable regulatory framework.
Monaghesh E & Hajizadeh A [15]	2020	The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence	Tabriz Health Services Management Research Center, School of Management and Medical Informatics, Tabriz, Iran	Enhance epidemiological studies, disease prevention, and clinical case management	Clinicians and patients are highly advised to use telehealth tools as an effective way to prevent and treat COVID-19 infection.	This study aimed to figure out what role telehealth played during the COVID-19 outbreak. Telehealth is a form of telemedicine that has the opportunity to fix several major issues during the outbreak of the COVID-19 pandemic in providing health services.
Okereafor K, et al. [16]	2020	Exploring the potentials of telemedicine and other non-contact electronic health technologies in controlling the spread of the novel coronavirus (COVID-19)	Department of Information and Communications Technology, National Health Insurance Scheme (NHIS) Abuja, Nigeria	Infrastructure and internet access	Using COVID-19 emergency bailout money to deploy telemedicine implementations.	Telecare services are limited due to lack of resources. Telemedicine implementation could be hampered by the organizational structure of health systems in some countries.
Bokolo AJ [17]	2021	Exploring the adoption of telemedicine and virtual software for the care of outpatients during and after COVID-19 pandemic	Norwegian University of Science and Technology's Department of Computer Science	Infrastructure and internet access; Clinician and patient's unwillingness barrier	Provision of sufficient bandwidth. Provide telemedicine training to stakeholders.	This study's findings show telemedicine's disruptive effect on healthcare delivery, as well as the rapid adoption of interactive computing systems by outpatients and medical practitioners.

Citation	Year of Publication	Title	Study Location	Utilization and Barriers	Recommendation	Key Findings
Burroughs M, et al. [18]	2020	Benefits and shortcomings of utilizing telemedicine during the COVID-19 pandemic	Baylor University Medical Center in Houston, Texas, United States of America	Lessen the need of personal protective equipment (PPE), enhance access to care, relieve burden on healthcare systems, and reduce the risk of transmission.	When the normal patient-physician interaction is broken, highlight the inherent inadequacies in evaluating and treating patients.	Telemedicine has been extremely helpful in increasing access to care while reducing disease transmission.
Nouri S, et al. [19]	2020	Addressing equity in telemedicine for chronic disease management during the COVID-19 pandemic	NEJM Catalyst Innovation, Massachusetts	Technological literacy	Partnership with societal organizations like libraries to provide digital literacy training.	The majority of healthcare programs do not offer training or instruction about how to use healthcare technologies to the general public.
Ortega G, et al. [20]	2020	Telemedicine, COVID-19 and disparities: policy implications	Harvard Medical school, Boston	Infrastructure and internet access; Data privacy and cybersecurity	Advocate for policies that encourage broadband expansion. Establish policies compliant with HIPAA regulations.	This report lays out key guidelines for policymakers and healthcare systems to expand telemedicine access and tailor the use of these technologies to address the needs of underserved patients.
Vidal-Alaball J, et al. [21]	2020	Telemedicine in the face of COVID-19 pandemic	Gerència, Spain: Health Promotion in Rural Areas Research Group	Data privacy and cybersecurity	Establishment of regulations and procedures and Authentications.	According to the study, detecting privacy and security concerns during the processing of sensitive data or transmission to the provider's system is critical.
Oyediran KA, et al. [22]	2020	The role of telemedicine in addressing access to sexual and reproductive health services in sub-Saharan Africa during the COVID-19 pandemic	Nigeria's United Nations Population Fund (UNFPA)	Increasing access to those that may lose physical access to service.	Collaboration between African healthcare providers and those in other nations where telemedicine is widely used.	The dangers of nosocomial infection of COVID-19 in health facilities will affect future clients' health-seeking actions as well as how health professionals handle cases in the hospital.
Wosik J, et al. [23]	2020	Telehealth transformation: COVID-19 and the rise of virtual care	Duke University, Durham, North Carolina	Preserving personal protective equipment	Health institutions should build a long-term telemedicine infrastructure to make better use of hospital space.	Physical interaction with COVID-19-infected patients raises the risk of illness transmission substantially.

Citation	Year of Publication	Title	Study Location	Utilization and Barriers	Recommendation	Key Findings
Ohannessian R, et al. [24]	2020	Global telemedicine implementation and integration within health systems to fight the COVID-19 pandemics: a call to action	Paris, France	Decrease visits to physicians' offices. Allow patients to have an electronic prescription.	Stakeholders are urged to work together to solve the issues and promote safe and evidence-based telemedicine use.	Most countries lack a regulatory framework for regulating, integrating, and reimbursing telemedicine systems, which is especially terrifying during emergencies and outbreaks.
Nittas V & Von Wyl V [25]	2020	COVID-19 and telehealth: a window of opportunity and its challenges	University of Zurich	Digital literacy	Access to free training, listening to challenges of existing users.	Healthcare systems are complicated and dynamic, requiring patience and drive to make changes.
Gifford AH, et al. [26]	2020	Evaluating barriers to and promoters of telehealth during the COVID-19 pandemic at U.S. cystic fibrosis programs	Cleveland, OH, USA	Increased accessibility and the prevention of infection spread were two proponents of telehealth.	Understanding factors that promote or impede telehealth will inform planning for future telehealth-enabled care models.	Targeting specific barriers and promoters will improve the use and quality of telehealth throughout care centres. Lack of internet access ranked as the highest impediment to patient engagement of telehealth.
Garfan S, et al. [27]	2021	Telehealth utilization during the COVID-19 pandemic: a systematic review	Perak, Malaysia	The use of telemedicine and its implementation in various circumstances during the COVID-19 pandemic.	To overcome patient flow and reduce physician workload, telehealth adoption is advocated.	This research looks on the various roles played by telemedicine during the COVID-19 pandemic. When patients and healthcare professionals accepted telehealth, it effectively altered healthcare delivery.
Akintunde TY, et al. [28]	2021	Expanding telemedicine to reduce burden on the healthcare systems and poverty in Africa and post-corona virus disease 2019 (COVID-19) pandemic reformation	Nigeria	Telemedicine applications in various African countries to investigate popular applications and telemedicine obstacles in order to address public health issues such as limited healthcare facilities, health professional overload, information sharing, testing, and results delivery.	Governments can address delicate topics such as stigmatization, sexual abuse, and rights, as well as injustices, through legislation and public awareness that keeps them going.	The study looked into the many geographies where telemedicine was introduced, the modalities used, and the fields or diseases where these health innovations were applied in order to determine Africa's readiness to fully embrace telemedicine amid public health emergencies like COVID-19.

Citation	Year of Publication	Title	Study Location	Utilization and Barriers	Recommendation	Key Findings
Rozga M, et al. [29]	2021	Telehealth during the COVID-19 pandemic: a cross-sectional survey of registered dietitian nutritionists	United States of America	Lack of client interest, Internet connection, and the inability to conduct or evaluate standard nutrition assessments were the most often stated hurdles to providing nutrition care via telehealth.	Further recommendations on optimal practices for doing nutrition assessments via telehealth may be required.	Telehealth can be a good option to deliver nutrition care to people who can't or don't want to see a doctor in person.
Cunningham NR, et al. [30]	2021	Addressing paediatric mental health using telehealth during corona virus disease-2019 and beyond: a narrative review	Michigan state university, USA	The utilization of telemedicine in paediatric mental health care, as well as evidence-based methods that clinicians can utilize to improve telehealth practice during the COVID-19 epidemic.	It is suggested that the effects of telehealth in treating certain mental health issues be investigated.	Primary care practitioners can benefit from the usage of telehealth in a range of patient demographics. Telehealth integration made mental health care more accessible to the general public.

Table 4. Study locations, percentage, probability of occurrence and references of included studies.

| Continent	Percentage (%)	Country of Origin	Number of Articles	Occurrence = (30) Probability of occurrence (%)	References
Australia	3.33%	Australia	1	3.33%	Smith et al. [12]
Europe	23.33%	Austria	1	3.33%	Abdel-Wahab et al. [3]
		United Kingdom	2	6.66%	Blandford et al. [1]; Al-Samarraie et al. [7]
		Norway	1	3.33%	Bokolo [17]
		France	1	3.33%	Ohannessian et al. [24]
		Switzerland	1	3.33%	Nittas & Von Wyl [25]
		Spain	1	3.33%	Vidal-Alaball et al. [21]
Asia	16.66%	India	1	3.33%	Bakshi & Tandon [8]
		Bangladesh	1	3.33%	Chowdhury & Ahmed [10]
		Iran	1	3.33%	Monaghesh & Hajizadeh [15]
		Singapore	1	3.33%	Ahmed et al. [14]
		Malaysia	1	3.33%	Garfan et al. [27]
Africa	10.00%	Nigeria	3	10.00%	Okereafor et al. [16]; Oyediran et al. [22]; Akintunde et al. [28]
North America	46.66%	United States of America	14	46.66%	Hoffman [2]; Barney et al. [4]; Gajarawala & Pelkowski [5]; Jalali et al. [9]; Triana et al. [11]; Dubin et al. [13]; Nouri et al. [19]; Ortega et al. [20]; Wosik et al. [23]; Gifford et al. [26]; Rozga et al. [29]; Cunningham et al. [30]
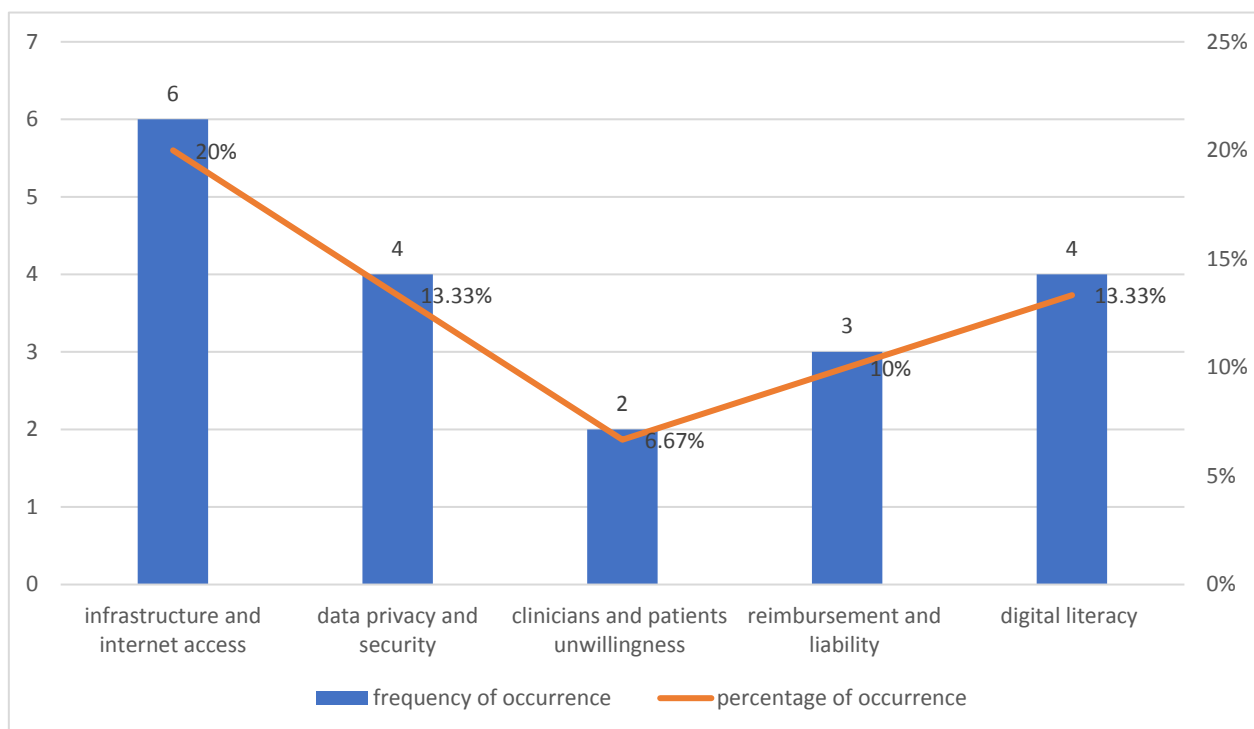
Figure 3. Telehealth barriers and their occurrences in some selected literatures.

4. Discussion

The study examines telehealth as a tool for healthcare delivery, barriers to its utilization, and provides policy recommendations for its use.

4.1. Telemedicine as a tool for healthcare delivery

Studies reviewed depict telemedicine as a branch of health information technology that entails using technology to offer clinical care through secure video and audio connections. The review postulates that healthcare givers and patients can connect via audio and video conferencing. During the COVID-19 era, its patronization has increased in popularity, and new uses are being developed to enhance health outcomes, decrease costs, and ensure that each patient receives the high-quality treatment deserved [7]. The works of Bakshi [8], and Jalali [9] envisage that by incorporating telemedicine into standard operational mode, it can become an integral element of the healthcare delivery system [8,9]. To increase telemedicine services adoption and utilization, healthcare practitioners should make sure that the services they provide are as near to local service providers as feasible and consider the community's social culture [7]. The pandemic not only established the value of telemedicine but also demonstrated its capacity to prevent broader meltdowns in hospital systems and among medical personnel, including those whose work had been halted owing to social distance. Following the extremely infectious COVID-19, telemedicine has gone from being an optional service to a necessary one.

4.2. Barriers to telemedicine services utilization

The works of several authors [9–11] reviewed show that when telemedicine services are compared to traditional treatment methods, telemedicine offers several potential disadvantages. It is not a replacement for the traditional healthcare system; rather, it complements it for the most basic purposes. Hacking a patient's medical data is a serious issue, particularly if the patient connects to telemedicine system through a public network or an unencrypted connection. Because a caregiver cannot offer life-saving care or laboratory tests remotely, this technology might cause the medication to be delayed when a person needs emergency treatment. Clinicians must also ensure that the telemedicine service use is safe and compliant with privacy laws. Furthermore, if a patient fails to reveal an important symptom that should have been noted during in-person care, therapy may be compromised. As postulated in Figure 3, the lack of availability and cost are some of the most critical disadvantages [7–15].

Telemedicine is unlikely to be able to take the role of in-person healthcare. The COVID-19 pandemic has presented a wealth of chances to embrace digital health, but these opportunities must compensate for the loss of interpersonal therapeutic communications in healthcare and be equally provided by swift state and healthcare organization measures [10–12]. Balancing the inherent privacy and information security concerns with the huge potential benefits of virtual care will remain a vital component of our ever-evolving approach to COVID-19 during this pandemic [9]. Scores of authors [11–18] argue that transitioning to telehealth takes time, patience, and resources, but it is a necessary investment for patients who are in danger of falling behind. While we may not forecast the exact date of viral pandemics, we can be certain that they will occur again. It is critical that healthcare givers training emphasizes the limitations (see Figure 3) of telehealth and informs care givers about alternate data collection strategies that might be employed in these situations [13]. Even though care givers have demonstrated their capacity to integrate and adapt telemedicine into their practices during and after the pandemic, technological barriers are stopping many from doing so [14–18]. During the COVID-19 pandemic, telemedicine services have reached a tipping point, with a boom in use that will likely persist even after the crisis is over [15–19]. Finally, other obstacles remain, and they will have an impact on the long-term viability of telemedicine. The economic and care feasibility of telemedicine practice is one key issue that has yet to be solved [18–21]. All barriers identified in this research are considerable threats to sustaining telemedicine projects but are believed to be manageable by policymakers, stakeholders, and implementers. Although telemedicine acceptance and use cannot address all COVID-19's difficulties, it can help flatten the virus's infection trajectory [19]. The bar chart in Figure 3 depicts the barriers to telemedicine services utilization as envisaged from some literatures screened.

5. Conclusions

This systematic review used current research to determine telehealth utilization, barriers to implementation, and interventions to address barriers in the COVID-19 pandemic. The COVID-19 has accelerated our transition to telehealth, but it has also provided us with a unique chance to demonstrate the critical role that telehealth can play in ensuring that people of all races, ethnicities, and communities receive high-quality treatment. Due to stringent social distancing mechanisms during the COVID-19 pandemic, telemedicine services have proven to be the safest interactive mode

between patients, both infected and uninfected, and healthcare givers. Telemedicine services minimize the number of in-person visits for patients and their families while saving money by avoiding long-distance travel with associated mileage and time away from work for both patients and family members [23,24].

Studies reviewed show that the present COVID-19 pandemic provides a chance to avoid the normal reluctance and sluggishness in implementing new healthcare policies. Telemedicine is a disruptive technology that can substantially influence public health if it is widely adopted and expanded. When the COVID-19 emergency lessens or fades, investments in public health management must provide long-term and strategic solutions so that the healthcare infrastructures left behind may easily be transformed to deliver high-quality treatment. Thus, the spread of telemedicine will help not only to improve COVID-19 patient treatment but also to the worldwide strengthening of healthcare systems. Scores of researchers show that with any new technology, it is critical to consider how healthcare access issues may impact telehealth's growing popularity. As a result of telehealth deployment, healthcare institutions must be careful not to limit access to care along socioeconomic or cultural lines. More upfront investment and regulation are required at the institutional and governmental levels to enable equal access to care to all populace [24,25–28].

Research work done so far shows that it is difficult to predict how the world will respond to the COVID-19 pandemic, current circumstances and legislative changes have encouraged and will likely continue to push more healthcare givers to include telehealth into their practices [25,26–30]. Now that the new infrastructure is in place, policymakers and providers should work together to keep the positive developments and paradigm shift in healthcare delivery. When possible, health systems and policymakers should work to reduce obstacles to telemedicine services (see Figure 3) through initiatives such as digital literacy outreach and equitable telemedicine infrastructure distribution. In terms of additional barriers, it may be necessary to create corroborating networks between companies and medical sectors in both the domestic and international sectors. This will result in a large number of healthcare professionals engaging in advancing the telemedicine services industry.

6. Policy recommendations

The findings of the study are extremely useful to healthcare policymakers and managers alike. It will also assist in appreciating the benefits that telehealth may provide in the present and future and the acceptance and application of technology in health. The constraints identified as prominent in this study are important not only for developed countries, but also for other rising economies. In order to enable the use of telemedicine services, hospitals must continue to educate physicians, nurses, and other health personnel's [8,15,20]. Additionally, telehealth providers must be responsible for regulatory compliance, patient confidentiality, and system security at all times when operating in the telehealth paradigm [21–25,27–30]. In addition to understanding the legal issues of telehealth, providers should be aware of and follow telehealth etiquette. When caregivers work remotely at home or do telehealth visits at their practice site, specific etiquette rules should be followed [5–16]. Healthcare Providers should invest significantly in resources that improves telemedicine capabilities, while healthcare delivery organizations must also ensure that these new capabilities are safe, secure, and protects patient privacy.

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Authors' contributions

Conceptualization: JK; formal analysis, investigation, and data curation: JK, DKKQ, JAN and YAG; formal data analysis and results interpretation: JK and YAG; writing, original draft preparation: JK; writing, review and editing: JAN and ABD.

Conflict of interest

The authors declare no conflict of interest.

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