

## Use of telehealth during COVID-19 pandemic in India: literature review

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### ABSTRACT

COVID-19 has provided an unprecedented opportunity to expand access and coverage to the country's healthcare system via telehealth. Because of the growing need for telemedicine by healthcare providers, the Medical Council of India issued Practice Guidelines in March 2020. Medical specialties like ophthalmology, dermatology, and neurology offered telehealth services during pandemics. Low-middle-income countries like India are highly dependent on out-of-pocket expenses for health services. Thus, there is a need to understand telehealth's accessibility, feasibility and affordability. This review aims to understand trends regarding the access and patient response to telehealth in India during the COVID-19 pandemic. We reviewed published papers to understand better accessibility and patient response to the healthcare delivery systems via telehealth in India. The results of this review showed that patients were satisfied with the use of telehealth. Healthcare providers and patients believe telehealth can be suitable for various healthcare services, including follow-up visits in clinical disciplines and minor health problems. In conclusion, for Telehealth to understand further, quality evidence must be available, and its role in developing integrated parts of the healthcare system to be defined.

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## 1. INTRODUCTION

Global data shows that developed countries with large healthcare systems, insurance companies, and federal governments utilize digital healthcare solutions [1]. The usefulness of telehealth services varies between developed and developing countries [2]. However, the use of telehealth is scarce [3]. It is essential to understand the health dynamics of the country for better insights into the utility of telehealth.

India ranked 145<sup>th</sup> among 195 countries on quality and accessibility of health care parameters as per healthcare access and quality (HAQ) index 2016. This rank was even below the poorer countries in Sub-Saharan Africa, like Namibia, Sudan, and Botswana [4]. There is limited funding for healthcare in India, leading to a lack of healthcare infrastructure. World Health Organization (WHO) 2019 data shows that the doctor-population ratio in India is 0.77 doctors per 1,000 population, which is significantly lower than in countries like China (1.49:1000), where the population density is high [5]. As per data 2021, the Indian Government spent 1.8% of gross domestic product (GDP) on healthcare which is much below the global average of 9.20% [6]. Thus, a significant portion of health care expenditure is out of pocket. This scenario in the healthcare sector emerges issues like accessibility, affordability, and financial viability of healthcare services. Healthcare providers and patients are looking for solutions to reach out to quality healthcare

facilities that are not accessible. However, Telehealth stands as a promising solution for improvement in healthcare services. The evolution of telehealth in India, as shown in Figure 1 is explained with each milestone.

In 2000, the Government of India introduced telemedicine in the form of the information technology (IT) act. [7]. The IT act is basically for clarifies privacy, security, and patient confidentiality using telehealth services [8]. The Indian Space Research Organization (ISRO) deployed the first satellite communication (SATCOM) based telemedicine pilot project in 2001 at Andhra Pradesh [9]. In 2005 the Government established a National Telemedicine Task Force [10]. The digitalization of healthcare initiated various programs like Integrated Disease Surveillance Project, the National Cancer Network, and the digital medical library Network [11]. The government of India set up positive steps for international projects such as the South Asian Association for Regional Cooperation (SAARC) and the Pan-African e-network projects based on telemedicine networks [12]. The launch of the "Digital India" campaign (2015) was for a policy action plan for digitizing healthcare initiated by the Ministry of Health and Family Welfare of India (MoHFW) [13]. In 2017, the National Health Policy (NHP) was designed to integrate health information systems for all stakeholders in the health system [14]. This improves the efficiency and transparency of the health system [15]. NHP of India reinforced the National Digital Health Blueprint (NDHB) in the year 2020 [16]. This NDHB aimed to deliver universal healthcare through digital technology [17]. This national health information system includes a teleconsultation Outpatient Department (OPD) named e-Sanjeevani OPD portal [18]. This evolution of telehealth in India enforced established Telemedicine guidelines for public and private healthcare sectors [19]. In 2020 during the COVID-19 pandemic, the Ministry of Health and Family Welfare, Government of India, announced the telemedicine guidelines for medical practice [20]. The guidelines include video, audio, and text messages as modes of communication [21].

The coronavirus pandemic promoted telehealth services in urban settings of the country [22]. However, in rural areas, its requirement is even more, which is currently deficient [23]. Telehealth service helps developing countries like India, as most people live in rural areas [24]. Countries like India and China have highly dense populations, wherein specialists are unavailable as per the population's needs; hence, telehealth is viable.

Telehealth is an umbrella term that constitutes healthcare delivery, education, surveillance, and research [25]. It offers health care services accessible in different geographical areas to those who do not have health care services of that quality in their residential areas [26]. Telehealth services provide various benefits, including increased access to health care, reduced overall healthcare-related costs, real-time referrals to emergency care that avoid complications, declined waiting for time, and provision of high-quality specialist's care [27].

In February 2020, the WHO issued preventive measures against the COVID-19 pandemic, including hygiene habits and social distancing. In response to the pandemic, centre for disease control and prevention (CDC) and other healthcare organizations recommend that healthcare facilities and providers offer all clinical services through virtual mode as telehealth [28]. Telehealth is a convenient and preferred modality for delivering healthcare services in many parts of the world.

With the help of various digital health technologies facilitating telemedicine, India responded like many other countries worldwide. Within a week of the closure of the outpatient department, several health facilities, including large private hospitals and individual professionals, Central government agencies, and state-funded organizations, immediately provided services through electronic means [29]. Immediately after the closure of the hospital units, the Ministry of Health and Family Welfare issued telemedicine policy guidelines (March 25, 2020) [30]. The telemedicine guidelines include all modes of communication between the service provider and user, like text messaging, audio, and video calls. The guideline document also mentioned the scope of telehealth services, inclusion, and exclusion [31]. These guidelines have been prepared in partnership with National Institute for Transforming India (NITI) Aayog and designated only for all registered medical practitioners under the Indian Medical Council Act (IMC) act 1956. These guidelines are used with the other national clinical standards, protocols, policies, and procedures [32]. However, many factors are responsible for the access and patient response to telehealth. In India, like all low and middle-income countries, physical access to healthcare has already been limited [33]. Therefore, the use of telehealth has become a need of the hour.

Even in a global health crisis like COVID-19, the world has seen that telehealth has played a pivotal role in the smooth and efficient delivery of healthcare services. Despite various technical tools like mobile applications, telehealth in India is suboptimal, if not minimal. However, the COVID-19 pandemic compelled the public to use telehealth at the level of public and private healthcare needs. In India, teleconsultation was useful in specialties like ophthalmology, rheumatology, and neurology during the COVID-19 pandemic [34]. Thus, there is a crucial need to know the feasibility, accessibility, and patient response to telehealth services during the COVID-19 pandemic in various healthcare settings. This article reviews available literature on teleconsultation services used during the pandemic in India.

This review article aims to understand trends regarding the access and patient response to Telehealth in India during the COVID-19 pandemic. This review article described the availability of telehealth services in different parts of India during the pandemic of COVID-19 through available literature.

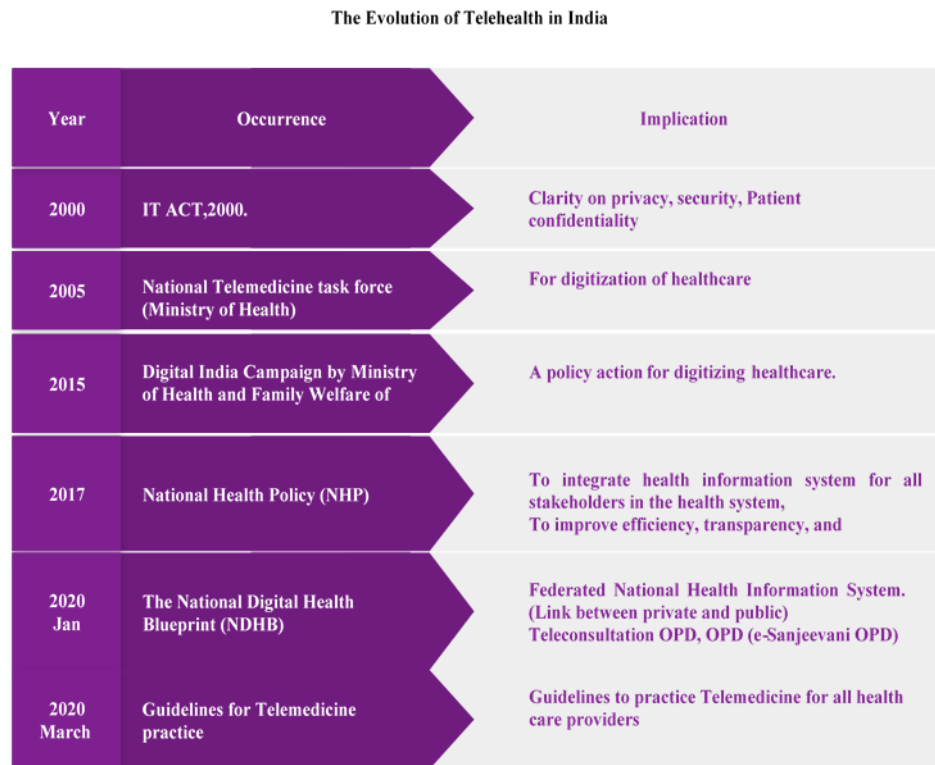


Figure 1. The evolution of Telehealth in India [27], [34]-[36]

## 2. RESEARCH METHOD

We searched the literature for studies relating to teleconsultation during the pandemic in India & articles included in this review were published from Feb 1, 2020 to Nov 30, 2021. The researchers identified the articles from an electronic database PubMed and Google Scholar. Keywords used for search were (("Telemedicine"[Mesh]) AND "COVID-19"[Mesh]) AND "India "[Mesh].

The authors conducted this systematic review based on the 'preferred reporting items for systematic reviews and meta-analysis' (PRISMA) guidelines. In the initial search, 514 articles (PubMed-63 and Google Scholar-491) were studied from the electronic database PubMed and Google Scholar. After eliminating case reports, editorials, and reviews, 48 articles were screened for relevance. Out of 48 pieces, the authors studied 18 articles with eligibility criteria, and after reading entire articles, ten studies were included for the review by the authors. This process is presented in Figure 2.

### 2.1. Inclusion and exclusion criteria

There are several inclusion criteria: i) studies conducted on teleconsultation in India between February 1, 2020, to November 30, 2021; ii) research studies presented findings from primary research; iii) quantitative studies on the use of telehealth during pandemics; iv) review of published articles; v) this study reviewed the web pages of various professional organizations, e.g., Care Quality Commission UK, American Telemedicine Association (ATA), and MoHFW Govt of India. Hence, there are several exclusion criteria: i) all case reports, letters to the editor, editorials, and reviews and ii) duplicates, non-English articles, abstracts.

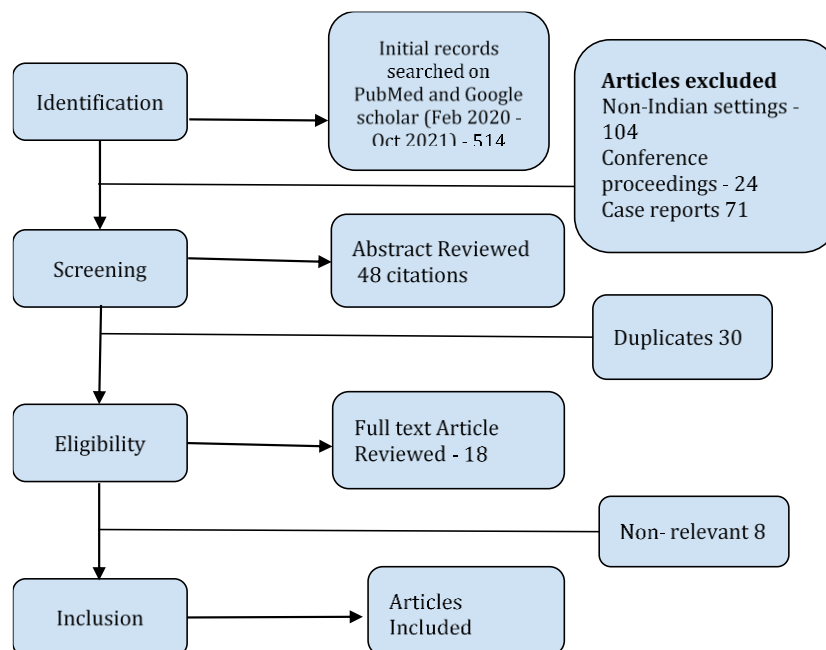


Figure 2. Flowchart-PRISMA flowchart for selection of articles

### 3. RESULTS

#### 3.1. Article/sample characteristics

The authors reviewed all the articles to study teleconsultation in India. Out of these 10 articles, three were cross-sectional studies, four were prospective studies, one was a retrospective analysis, and two were interventional studies. All studies were carried out in Indian settings during COVID-19 pandemic. The researcher carried out the literature review between the periods of March 12, 2020 to October 31, 2020. The duration of each study ranged from a minimum of four days to a maximum of five months. The overall teleconsultations ranged from 100 to 7,008 in all articles. The sample size for each reviewed article ranged from 100 to 6,125 patients and 38 to 40 health providers. The healthcare provider used voice call, SMS, WhatsApp, and Picture msgs are the most commonly used platforms as per location and internet bandwidth.

#### 3.2. Feasibility and satisfaction

Out of 10 studies, eight assessed the feasibility of using telehealth, as shown in Table 1. In a study carried out at All India Institute of Medical Sciences (AIIMS), Mangalagiri reported that 87.03% of patients responded to a call-based mode over App-based telehealth registration [37]. One study showed that teleconsultation was easily accessible in the socially marginalized population. A total of 284 (76.1%) participants revealed that tele-rheumatology service is better than in-person consultation [38]. A study on diabetes education shows that telehealth is feasible for diabetes patients who are on multiple subcutaneous insulin injections [39]. In the studies carried out in the field of teledermatology, in total, 935 (18.18%) were very satisfied, 2,230 (42.65%) were satisfied, 1,749 (33.45%) partially satisfied, and 300 (5.7%) patients were dissatisfied with telehealth consultation [40]. One study on persons with epilepsy in southern India shows that 90% of 95 PWEs either agree or strongly agree with 14 of the 12 telemedicine feasibility questions [41]. Telehealth services are used for follow-up of cases and minor eye problems [42], [43]. The respondents were satisfied with switching to teleconsultation [44], [45]. In one study, the feedback from study participants showed the feasibility and Satisfaction with telehealth was in the 9.5 Inter quartile range (IQR) from 0 to 10 scale [44]. Similarly, telemedicine can be a feasible and effective option in children with epilepsy. The findings show that 96% of the caregivers of children with epilepsy were satisfied with telemedicine [45].

#### 3.3. Mode and type of teleconsultation

This review aimed to explore the patient response to telehealth services under various specialities during the COVID-19 pandemic in India. The use of telehealth improved accessibility to healthcare due to COVID-19. The specialties like ophthalmology, rheumatology, dermatology, and neurology used teleconsultation during COVID-19.

This review revealed that not all patients of various Specialities were eligible for teleconsultation. The common-mode used for teleconsultations were voice calls, text msgs, and WhatsApp calls/msgs. The least use of video consultation in all studies.

The most eligible for teleconsultation is minor and follow-up cases for chronic diseases. In the ophthalmology department, the most common teleconsultations were from previously seen patients. Redness of the eyes, watering, pain and blurring of vision were the most common complaints for which teleconsultation was sought. Other cases were foreign body sensation, refractive error, conjunctivitis, and computer vision syndrome. About 40% of patients were required to visit an ophthalmologist for physical examination [42], [44]. In dermatology, the number of teleconsultations was raised from 23.60% to 77.97% from May 2020 to Oct 2020. In total, 93.45% of all patients were eligible for teledermatology. A total of 34 dermatologists were surveyed for satisfaction and feasibility of Teledermatology. Among them, 88.2% were comfortable with providing telehealth consultation, and 82.4% felt the need to continue teledermatology services in the future [42]. Out of 1,100 records of patients, 336 (30.5%) were eligible for teleconsultation in the neurology department. A total of 95 (28.2%) video consultations and 46 (13.6%) audio consultations were achieved in patients with epilepsy [40].

Table 1. Feasibility and satisfaction

Article	Patients' feasibility and satisfaction	Providers feasibility and satisfaction
[37]	Patients preferred to use call-based registration (0.03%) and counseling than app-based registration (12.7%) and counseling.	
[38]	The author found telecommunication accessibility even in the socially neglected population; in total, 284 (76.1%) Patients perceived tele-rheumatology as better than individual consultation.	
[39]	77.0% of patients followed the insulin instructions properly and were satisfied with this method of consultation.	
[40]	935 (18.18%) were very satisfied, 2,230 (42.65%) were satisfied, 1,749 (33.45%) partially satisfied and 300 (5.7%) patients were dissatisfied with telehealth consultation.	Among 34 dermatologists, 88.2% were comfortable with providing teleconsultation, and 82.4% felt the need to continue teledermatology services.
[41]	A study selected 336 PWEs after screening 1100 records, and they tried video teleconsultation in 141 (41.8%) PWEs & achieved successful video connections in 95 (28.2%) and audio consultations in 46 (13.6%). The study stated that video teleconsultation was more feasible & the mobile video teleconsultation model is an effective and acceptable method to follow up PWEs.	
[42]		During the 50-day lockdown period, 32 doctors had given 4,880 teleconsultations, and patients consulted an average of 3 doctors for telehealth daily—the majority of consultations (approximately 80%) for already registered (older) patients.
[44]	In 7 days, out of 1469 patients, 975 were eligible for telecommunication. In total, 723 (74%) patients opted for telehealth services. The number of patients receiving telecommunications increased over time. Feedback from 100 respondents, the median satisfaction was 9 (Interquartile range (IQR) 8-10), and 9.5(IQR 8-10) recommended for continuation of telehealth services.	
[45]	96% of caregivers of epileptic children were satisfied with teleconsultation. Teleconsultation can be an effective & feasible option in children with epilepsy.	

#### 4. DISCUSSION

The findings of this review showed that patients have a high level of satisfaction with the use of telehealth. Healthcare providers and patients feel telehealth may be feasible for several healthcare services like follow-up visits in clinical specialties and minor health problems. Several studies supported this high level of satisfaction among patients and healthcare providers with telehealth before the pandemic [46]. The pandemic situation accelerates telehealth use because of driven necessity. Telemedicine is a subset of Telehealth that involves clinical service delivery to patients using electronic media communications. Before the COVID-19 pandemic, the use of telehealth in India was prolonged. The evolution of telehealth, as shown in Figure 1 in India, was initiated in 2000 with the IT Act 2000. The Ministry of Health started the National Telemedicine Task Force in 2005. The implication of this task force was to initiate the digitization of healthcare. In Jan 2020, the Ministry of Health and Family Welfare prepared the national digital health blueprint document. This beginning of telehealth in India was practical during the COVID-19 pandemic.

Synchronous and asynchronous platforms are available for telehealth services in India [47]. The synchronous platform includes live video conferencing, while the asynchronous mode includes SMS, Text messages, and remote patient monitoring. The utilization of both telehealth service platforms was high in ophthalmology. This review highlights the feasibility of telehealth amongst healthcare providers in tertiary healthcare facilities. In this review, healthcare providers in teledermatology and ophthalmology were comfortable using telehealth [42], [48]. Most teleconsultations were feasible due to the use of WhatsApp media as a mode of communication.

Patients utilized telehealth services for routine care of patients with chronic diseases. The patients are screened for clinical conditions and enrollment in telehealth services [43], [48]. Patients with chronic disease with stable conditions and minor complaints and those with follow-up visits were keen to avail of telehealth services. It can enhance access to high-quality healthcare for rural communities [49], [50].

This review has implications on healthcare workers, policymakers and researchers as Telehealth is the need of the hour. Health care workers need adaptation to this technology-driven service. The profession of nursing and other paramedical workers will continue to be impacted by Telehealth. The government & policymakers should prepare training modules for healthcare workers to efficiently deliver telehealth services in different healthcare settings. The researcher should partake in evidence-based Telehealth projects to increase healthcare workers' knowledge.

#### 4.1. Limitations

This systematic review considers only Indian studies on teleconsultation. It does not include all relevant studies in different parts of the world. Secondly, we restrict our search to some databases such as PubMed and Google Scholar.

## 5. CONCLUSION

Telehealth significantly improves access to health care while maintaining the quality of care. Patient care delivered remotely can reduce time engagement, physical exposure, and the cost of travel for both patients and service providers. To increase the positive patient response and enhance access to telehealth, appropriate implementation, including training of health care professionals, integration with practice information systems, service evaluation and accessibility of digital technology, is vital for using telehealth on a larger scale. In India, further research is required to determine the use of telehealth in terms of suitability for different patient groups and clinical conditions. Technology is rapidly evolving in the developing world, along with healthcare needs that have changed due to pandemic situations like COVID -19. In view of this, it is required that good quality evidence is made available to understand better the role of telehealth in becoming an integrated part of any health care system.

## REFERENCES





- [1] S. Arshad Ali *et al.*, "Global Interest in Telehealth During COVID-19 Pandemic: An Analysis of Google Trends<sup>TM</sup>," *Cureus*, Sep. 2020, doi: 10.7759/cureus.10487.
- [2] R. Scott and M. Mars, "Telehealth in the developing world: current status and future prospects," *Smart Homecare Technology and TeleHealth*, vol. 2015, no. 3, p. 25–37, Feb. 2015, doi: 10.2147/SHTT.S75184.
- [3] C. Combi, G. Pozzani, and G. Pozzi, "Telemedicine for Developing Countries," *Applied Clinical Informatics*, vol. 7, no. 4, pp. 1025–1050, Oct. 2016, doi: 10.4338/ACI-2016-06-R-0089.
- [4] N. Fullman *et al.*, "Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016," *The Lancet*, vol. 391, no. 10136, pp. 2236–2271, Jun. 2018, doi: 10.1016/S0140-6736(18)30994-2.
- [5] WHO, "WHO Global Report On Traditional and Complementary Medicine 2019," *World Health Organization*, 2019. [Online]. Available: <https://apps.who.int/iris/bitstream/handle/10665/312342/9789241515436-eng.pdf?ua=1> (accessed Jun. 29, 2021).
- [6] M. Bhatia and D. P. Singh, "Health Sector Allocation in India's Budget (2021–2022): A Trick or Treat?," *The International Journal of Community and Social Development*, vol. 3, no. 2, pp. 177–180, Jun. 2021, doi: 10.1177/25166026211017338.
- [7] J. Aneja and S. Arora, "Telemedicine and ethics: opportunities in India," *Indian Journal of Medical Ethics*, vol. VI, no. 4, pp. 314–320, Oct. 2021, doi: 10.20529/IJME.2021.042.
- [8] H. S. Kapare, K. M. Rathi, and S. D. Labhade, "Telemedicine: present, future and applications," in *TELe-Health book series (TEHE)*, Springer, Cham, 2022, pp. 311–320.
- [9] Indian Space Research Organisation, "Telemedicine healing touch through space," *Publications and Public Relations Unit, ISRO*, 2005.
- [10] P. M. Galagali, S. Ghosh, and H. Bhargava, "The role of telemedicine in child and adolescent healthcare in India," *Current Pediatric Reports*, vol. 9, no. 4, pp. 154–161, Dec. 2021, doi: 10.1007/s40124-021-00253-w.
- [11] N. Agarwal, P. Jain, R. Pathak, and R. Gupta, "Telemedicine in India: A tool for transforming health care in the era of COVID-19 pandemic," *Journal of Education and Health Promotion*, vol. 9, no. 1, p. 190, 2020, doi: 10.4103/jehp.jehp\_472\_20.
- [12] S. Sudhamony, K. Nandakumar, P. J. Binu, and S. Issac Niwas, "Telemedicine and tele-health services for cancer-care delivery in India," *IET Communications*, vol. 2, no. 2, p. 231, 2008, doi: 10.1049/iet-com:20060701.
- [13] D. Kaur, Chitsimran, R. Mahajan, and A. S. Sidhu, "Digital India: problems and prospects," in *Rural Diversification in Punjab: Perspectives and Challenges*, National Press Associates, 2022, pp. 192–196.
- [14] M. Bhatia, S. Chaudhary, M. Hooda, and B. Unhelkar, "Telehealth: former, today, and later," in *Big Data Analytics and*

- Intelligence: A Perspective for Health Care*, Emerald Publishing Limited, 2020, pp. 243–262.
- [15] D. Suresh, S. Chaudhari, A. Saxena, and P. K. Gupta, “Telemedicine and Telehealth: The Current Update,” in *Health Information Science*, Springer International Publishing, 2021, pp. 67–82.
  - [16] S. Bhattacharya, S. Saleem, and M. Hossain, “Implementing National Digital Health Blueprint in India-The future opportunities and challenges,” *International Journal of Preventive Medicine*, vol. 13, no. 1, p. 99, 2022, doi: 10.4103/ijpvm.ijpvm\_418\_20.
  - [17] Ministry of Health And Family Welfare, “Final Report on National Digital Health Blueprint (Ndhb),” 2019. [Online]. Available: <http://www.indiaenvironmentportal.org.in/content/466125/final-report-on-national-digital-health-blueprint-ndhb/>. (accessed Jun. 19, 2021).
  - [18] S. N. Sarbadhikari, “The role of standards for digital health and health information management,” *Journal of Basic and Clinical research (JBCR)*, vol. 6, no. 1, 2019.
  - [19] N. Bajpai and M. Wadhwa, “National Teleconsultation Service in India: eSanjeevani OPD,” New York, 2021. [Online]. Available: <https://www.econstor.eu/handle/10419/249842>. (accessed Jun 19, 2021).
  - [20] D. Dinakaran, C. Basavarajappa, N. Manjunatha, C. N. Kumar, and S. B. Math, “Telemedicine Practice Guidelines and Telepsychiatry Operational Guidelines, India—A Commentary,” *Indian Journal of Psychological Medicine*, vol. 42, no. 5\_suppl, pp. 1S-3S, Oct. 2020, doi: 10.1177/0253717620958382.
  - [21] S. Dash, R. Aarthy, and V. Mohan, “Telemedicine during COVID-19 in India—a new policy and its challenges,” *Journal of Public Health Policy*, vol. 42, no. 3, pp. 501–509, Sep. 2021, doi: 10.1057/s41271-021-00287-w.
  - [22] G. Sageena, M. Sharma, and A. Kapur, “Evolution of Smart Healthcare: Telemedicine During COVID-19 Pandemic,” *Journal of The Institution of Engineers (India): Series B*, vol. 102, no. 6, pp. 1319–1324, Dec. 2021, doi: 10.1007/s40031-021-00568-8.
  - [23] J. Campbell, D. Theodoros, N. Hartley, T. Russell, and N. Gillespie, “Implementation factors are neglected in research investigating telehealth delivery of allied health services to rural children: A scoping review,” *Journal of Telemedicine and Telecare*, vol. 26, no. 10, pp. 590–606, Dec. 2020, doi: 10.1177/1357633X19856472.
  - [24] K. Donelan *et al.*, “Patient and clinician experiences with telehealth for patient follow-up care,” *American Journal of Managed Care*, vol. 25, no. 1, pp. 40–44, 2019.
  - [25] L. S. Wilson and A. J. Maeder, “Recent directions in telemedicine: review of trends in research and practice,” *Healthcare Informatics Research*, vol. 21, no. 4, p. 213, 2015, doi: 10.4258/hir.2015.21.4.213.
  - [26] H. Ayatollahi, F. Z. P. Sarabi, and M. Langarizadeh, “Clinicians’ knowledge and perception of telemedicine technology,” *Perspectives in Health Information Management*, vol. 12, no. 12, 2015.
  - [27] I. Chakraborty, P. V. Ilavarasan, and S. Edirippulige, “COVID-19 as a catalyst for telehealth growth in India: some insights,” *Journal of the International Society for Telemedicine and eHealth*, vol. 9, no. e3, pp. 1–4, Jan. 2021, doi: 10.29086/JISfTeH.9.e3.
  - [28] S. S. Rao, A. E. Loeb, R. M. Amin, G. J. Golladay, A. S. Levin, and S. C. Thakkar, “Establishing telemedicine in an academic total joint arthroplasty practice: needs and opportunities highlighted by the COVID-19 pandemic,” *Arthroplasty Today*, vol. 6, no. 3, pp. 617–622, Sep. 2020, doi: 10.1016/j.artd.2020.04.014.
  - [29] S. Sahoo *et al.*, “Knowledge overload versus actual practices: Knowledge and awareness about COVID-19 infection among patients attending the emergency services of a tertiary care hospital during the COVID ‘lockdown’ period,” *Journal of Mental Health and Human Behaviour*, vol. 25, no. 1, p. 14, 2020, doi: 10.4103/jmhbb.jmhbb\_57\_20.
  - [30] B. Ghai, N. Malhotra, and S. S. Bajwa, “Telemedicine for chronic pain management during COVID-19 pandemic,” *Indian Journal of Anaesthesia*, vol. 64, no. 6, p. 456, 2020, doi: 10.4103/ija.IJA\_652\_20.
  - [31] D. Damodharan, M. Narayana, N. Channaveerachari, and S. Math, “Telemedicine practice guidelines of India, 2020: Implications and challenges,” *Indian Journal of Psychiatry*, vol. 63, no. 1, p. 97, 2021, doi: 10.4103/psychiatry.IndianJPsychiatry\_476\_20.
  - [32] R. Bilimappa, S. Prabaharan, and P. Ramalingam, “Dawn of telemedicine,” *Journal of Cancer Research and Therapeutics*, vol. 16, no. 3, p. 697, 2020, doi: 10.4103/jcrt.JCRT\_578\_20.
  - [33] A. Kasthuri, “Challenges to healthcare in India - The five A’s,” *Indian Journal of Community Medicine*, vol. 43, no. 3, pp. 141–143, 2018, doi: 10.4103/ijcm.IJCM\_194\_18.
  - [34] H. Eguia, F. Vinciarelli, R. L. Villoslada Muñiz, and F. J. Sanz García, “Consulta no presencial en tiempos de coronavirus: información para médicos de Atención Primaria,” *Medicina de Familia. SEMERGEN*, vol. 46, no. 8, pp. 560–565, Nov. 2020, doi: 10.1016/j.semerg.2020.08.005.
  - [35] S. Bhaskar *et al.*, “Telemedicine across the globe-position paper from the COVID-19 pandemic health system resilience PROGRAM (REPROGRAM) International Consortium (Part 1),” *Frontiers in Public Health*, vol. 8, Oct. 2020, doi: 10.3389/fpubh.2020.556720.
  - [36] S. Ranganathan, *Towards a Holistic Digital Health Ecosystem in India*. Observer Research Foundation, 2020.
  - [37] M. Tripathi, P. Lingaiah, and R. Kakkar, “Electronic consultation in COVID-19 scare: A comparison of patient response toward Mobile App vs Call-based Registration,” *Journal of Postgraduate Medicine, Education and Research*, vol. 54, no. 3, pp. 163–168, Jan. 2021, doi: 10.5005/jp-journals-10028-1392.
  - [38] C. Kavachanda *et al.*, “Tele-rheumatology for overcoming socioeconomic barriers to healthcare in resource constrained settings: lessons from COVID-19 pandemic,” *Rheumatology*, vol. 60, no. 7, pp. 3369–3379, Jul. 2021, doi: 10.1093/rheumatology/keaa791.
  - [39] M. Mishra *et al.*, “Effectiveness of diabetes education including insulin injection technique and dose adjustment through telemedicine in hospitalized patients with COVID-19,” *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, vol. 15, no. 4, p. 102174, Jul. 2021, doi: 10.1016/j.dsx.2021.06.011.
  - [40] S. Handa *et al.*, “Teledermatology during the COVID-19 pandemic: Experience at a tertiary care centre in North India,” *Dermatologic Therapy*, vol. 34, no. 4, Jul. 2021, doi: 10.1111/dth.15022.
  - [41] P. P. Nair, R. Aghoram, B. Thomas, B. Bharadwaj, and P. Chinnakali, “Video teleconsultation services for persons with epilepsy during COVID-19 pandemic: An exploratory study from public tertiary care hospital in Southern India on feasibility, satisfaction, and effectiveness,” *Epilepsy & Behavior*, vol. 117, p. 107863, Apr. 2021, doi: 10.1016/j.yebeh.2021.107863.
  - [42] N. Pandey, R. Srivastava, G. Kumar, V. Katiyar, and S. Agrawal, “Teleconsultation at a tertiary care government medical university during COVID-19 Lockdown in India – A pilot study,” *Indian Journal of Ophthalmology*, vol. 68, no. 7, p. 1381, 2020, doi: 10.4103/ijo.IJO\_1658\_20.
  - [43] A. Das, P. Rani, and P. Vaddavalli, “Tele-consultations and electronic medical records driven remote patient care: Responding to the COVID-19 lockdown in India,” *Indian Journal of Ophthalmology*, vol. 68, no. 6, p. 1007, 2020, doi: 10.4103/ijo.IJO\_1089\_20.
  - [44] P. Shenoy, S. Ahmed, A. Paul, T. G. Skaria, J. Joby, and B. Alias, “Switching to teleconsultation for rheumatology in the wake of the COVID-19 pandemic: feasibility and patient response in India,” *Clinical Rheumatology*, vol. 39, no. 9, pp. 2757–2762, Sep. 2020, doi: 10.1007/s10067-020-05200-6.





- [45] P. K. Panda, L. Dawman, P. Panda, and I. K. Sharawat, "Feasibility and effectiveness of teleconsultation in children with epilepsy amidst the ongoing COVID-19 pandemic in a resource-limited country," *Seizure*, vol. 81, pp. 29–35, Oct. 2020, doi: 10.1016/j.seizure.2020.07.013.
- [46] C. S. Kruse, N. Krowski, B. Rodriguez, L. Tran, J. Vela, and M. Brooks, "Telehealth and patient satisfaction: a systematic review and narrative analysis," *BMJ Open*, vol. 7, no. 8, p. e016242, Aug. 2017, doi: 10.1136/bmjopen-2017-016242.
- [47] M. Shanbehzadeh, H. Kazemi-Arpanahi, S. G. Kalkhajeh, and G. Basati, "Systematic review on telemedicine platforms in lockdown periods: Lessons learned from the COVID-19 pandemic," *Journal of Education and Health Promotion*, vol. 10, no. 1, 2021, doi: 10.4103/jehp.jehp\_1419\_20.
- [48] A. E. Ibrahim, M. Magdy, E. M. Khalaf, A. Mostafa, and A. Arafa, "Teledermatology in the time of COVID-19," *International Journal of Clinical Practice*, vol. 75, no. 12, Dec. 2021, doi: 10.1111/ijcp.15000.
- [49] S.Ramanadhan, K. Ganapathy, L. Nukala, S. Rajagopalan, and J. C. Camillus, "A model for sustainable, partnership-based telehealth services in rural India: An early process evaluation from Tuver village, Gujarat," *PLoS One*, vol. 17, no. 1, p. e0261907, 2022.
- [50] T. M. Rasekaba, P. Pereira, V. Rani G, R. Johnson, R. McKechnie, and I. Blackberry, "Exploring telehealth readiness in a resource limited setting: Digital and health literacy among older people in rural India (DAHLIA)," *Geriatrics (Basel)*, vol. 7, no. 2, p. 28, 2022.

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