2581-4575
International Journal For Recent Developments in Science & Technology
Crossref
A Peer Reviewed Research Journal

TELEMEDICINE PLATFORM WITH CLOUD VIDEO CONFERENCING

Madhavi Thakare[1], Devendra Dhote[2], Shrihari Rathod [3], Rushika Mokalkar[4]
Student (UG) Department of Computer Engineering Jagdambha College of Engg. & Tech. Yavatmal
madhavithakare270@gmail.com, devendradhote32@gmail.com,
itzshreerathod2748@gmail.com, rushikamokalkar@gmail.com

Abstract:
This paper presents a cloud-based telemedicine platform integrating real-time video conferencing for remote consultations between patients and healthcare providers. Utilizing WebRTC and AWS Chime SDK, the platform ensures secure, encrypted, and low-latency video communication. Patients can schedule appointments, access medical records, and consult healthcare professionals via a user-friendly interface. Healthcare providers benefit from a centralized dashboard for managing patient data and conducting consultations.
The platform leverages cloud infrastructure for scalable data storage and video call management, ensuring reliability during peak demand. Key challenges, including HIPAA compliance, robust security, and intuitive user experience, are addressed through encryption, secure authentication, and thoughtful design. The solution improves healthcare accessibility, especially for rural and underserved populations, by reducing in-person visits and delivering high-quality care. This research demonstrates how advanced cloud computing and communication technologies bridge gaps in healthcare access and enhance overall delivery standards.

Keywords: - Cloud-Based Platform, Real-Time Video Conferencing, AWS Chime SDK, WebRTC, Patient Management, Medical Records Access, Medical Records Access.

History :
This paper presents the design and implementation of a cloud-based telemedicine platform that integrates real-time video conferencing to facilitate remote consultations between patients and healthcare providers. Utilizing technologies such as WebRTC and AWS Chime SDK, the platform ensures secure, encrypted video communication, enabling direct, low-latency interactions. Patients can seamlessly schedule appointments, access medical records, and consult with healthcare professionals through a user-friendly interface, while providers benefit from a centralized dashboard for managing patient data and conducting consultations. The system leverages cloud infrastructure to offer scalable storage and video call management, ensuring reliability even during peak demand periods.
Key challenges, including ensuring HIPAA compliance, maintaining robust security protocols, and providing an intuitive user experience, are addressed through advanced encryption techniques, secure authentication mechanisms, and thoughtful interface design. This platform aims to improve healthcare accessibility, particularly for rural and underserved populations, by minimizing the need for in-person visits and delivering high standards of care through cutting-edge cloud computing and communication technologies. The proposed solution demonstrates significant potential to enhance healthcare delivery and bridge geographical and socioeconomic gaps in medical access

International Journal For Recent Developments in Science & Technology
2581-4575
Crossref
A Peer Reviewed Research Journal

1. Introduction:

The increasing demand for accessible and efficient healthcare services has driven the adoption of telemedicine, allowing patients and providers to interact remotely through digital platforms. Telemedicine offers significant advantages, such as improving access to care in remote and underserved areas, reducing the costs and time associated with in-person consultations, and maintaining care continuity during public health crises like the COVID-19 pandemic. However, these benefits depend on secure, reliable, and scalable platforms that address the diverse needs of patients and healthcare professionals.

Cloud-based telemedicine platforms have emerged as a promising solution to meet these challenges. Leveraging technologies like WebRTC and AWS Chime SDK, these systems enable secure, real-time video consultations, replicating the dynamics of in-person visits. Additionally, cloud infrastructure provides the scalability and reliability required to handle high traffic and peak demand periods effectively.

Despite these advancements, telemedicine platforms face critical challenges that must be addressed to achieve widespread adoption. Security and privacy are paramount, particularly compliance with healthcare regulations such as HIPAA. Moreover, user experience needs to be intuitive and accessible to accommodate individuals with varying levels of technical proficiency. Integration of features like appointment scheduling, medical record access, and consultation management is also vital for streamlining workflows for patients and providers.

This paper presents the design and implementation of a cloud-based telemedicine platform aimed at addressing these challenges. Combining advanced communication technologies with scalable cloud architecture, the platform enhances healthcare accessibility and quality of care. By prioritizing security, compliance, and usability, the proposed solution is particularly impactful for rural and underserved populations, contributing to the advancement of telemedicine as a vital healthcare innovation

2. Purpose:

purpose of this project is to design and implement a cloud-based telemedicine platform that facilitates secure, real-time video consultations between patients and healthcare providers, with the goal of improving healthcare accessibility and delivery. The platform aims to address the increasing demand for remote healthcare services, particularly in rural and underserved areas, by providing a scalable, reliable, and user-friendly solution. By leveraging advanced communication technologies such as WebRTC and AWS Chime SDK, the platform ensures secure, encrypted video calls that enable effective, direct communication between patients and providers.

Additionally, this project seeks to tackle critical challenges in telemedicine, including ensuring HIPAA compliance, maintaining robust security protocols, and offering an intuitive user experience for both patients and healthcare professionals. The platform's integration with cloud infrastructure provides scalable data storage, efficient management of video consultations, and reliable service during periods of high demand. Ultimately, this project strives to enhance the quality and accessibility of healthcare, reduce the need for in-person visits, and support the delivery of high standards of care, particularly in regions with limited access to healthcare facilities. Through this research, the project contributes to the ongoing development of telemedicine solutions and their potential to transform healthcare delivery

International Journal For Recent Developments in Science & Technology
2581-4575
Crossref
A Peer Reviewed Research Journal

3.Capabilities and features of telemedicine when used in healthcare management system

The concept of telemedicine and associated services have now been well established and proven for societal help. Fig. 1 reflects the various features and facilities offered by the telemedicine concept, specifically for the healthcare domain. It provides chronic health management, prescription compliance, remote services, care-for-all under critical and severe cases, etc., which ultimately enable this methodology to support the healthcare and medical care sphere. In addition, a series of tele wearables heals up the patients and keeps them updating about their health status in a unique way [20,21].

Telemedicine is an innovative technology, and many call it disruptive innovation. Thus, to cater to a distant patient, telemedicine employs a range of electronic communications media, ranging from teleconfer encing to image-sharing to remote patient surveillance. Doctors may also use automation to offer quality treatment to their patients. They need to develop better IT support systems and learn a new way of file manage ment. For example, a virtual appointment encourages primary care physicians to receive advice from experts when they have concerns about the illness or treatment. Exam reports, history, medical findings, X-rays, or other images are sent to the expert for examination to the doctor. The specialist can answer electronically, set up a virtual meeting with the doctor. These virtual consultations can eliminate the need for unnec essary in-person referrals to specialists, reduce wait times for specialist feedback, and eliminate the need for unnecessary travel. Telemedicine strategies are more useful where a doctor can see the patient, identify a disease, and chart the experience [22–25]. An electronic personal health record system uses health records that can monitor and preserve. We can use a web-enabled device, such as a desktop or smartphone, at any time. A personal health report will quickly provide essential details to emergency responders in an emergency, such as diagnoses, prescriptions, substance preferences, and the doctor's contact information. The applications of this technology have been developed to assist customers with properly organising their medical records in one safe location. Recovery programmes must establish targets for effectively improving patient behaviour, which is getting more 2 A. Haleem et al. Sensors International 2 (2021) 10011

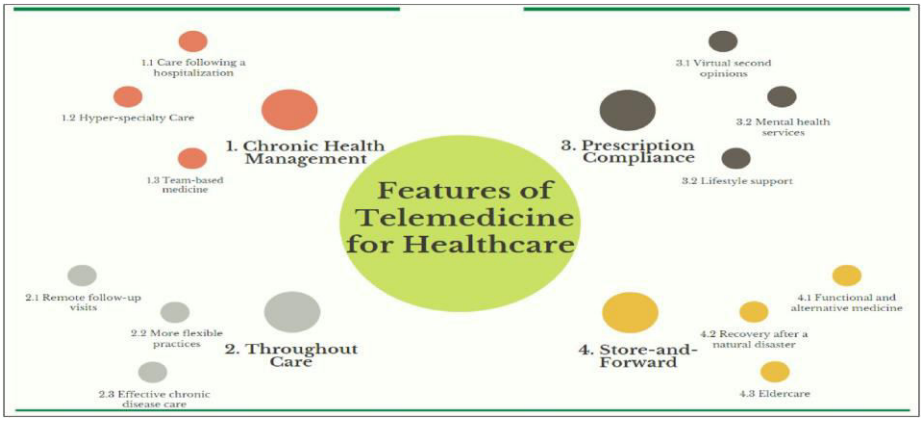


Fig. 1. Various capabilities & features of telemedicine for healthcare domain.

4. Methods:

The proposed literature review aims to present a systematic information extraction from the application of mobile health applications regarding the current pandemic public challenge of COVID-19. This systematic review has been conducted on 15/5/2020, and the papers have been selected by common agreement of all authors. Taking into account the proliferation of a high number of publications regarding this topic as preprints or in non-indexed journals and conferences, this paper reviews the documents published in peer-reviewed journals indexed in the journal citation reports (JCR). This indexation is considered as the most relevant index available. Moreover, the Web of Science database includes the most relevant

journals of the most reputable publishers. Furthermore, the authors aim to find the common objectives, outcomes and limitations of the applications of mobile health to face the current pandemic scenario. A biometric analysis is conducted to make a summary about the countries, regions, domains and authors who are employing mobile health solutions to promote health and well-being and combat the critical new virus. The methods used in this literature review includes multiple steps that start with the defnition of the keywords used to search the relevant papers. Second, the research objectives have been formulated. Consequently, the extracted documents from the Web of Science selection have been selected based on the title and abstract. The relevant studies have been selected for full review, and several have been excluded since do not meet the inclusion criteria. The fnal selection of papers that met the selection criteria have been analysed for data extraction.

4.1 Search strategy, inclusion criteria and study selection

The ongoing COVID-19 pandemic has highlighted the critical significance of interdisciplinary research and the implementation of mobile health solutions. This situation has brought together experts from various fields to collectively address the challenges posed by the virus. Mobile health, a convergence of computer science and medicine, has emerged as a vital area of study. However, the rapid surge in non-peer-reviewed publications related to the pandemic has raised concerns about the dissemination of unverified findings, which may lead to misinformation and hinder future research efforts.

To address these concerns, this systematic literature review focuses solely on articles published in reputable journals indexed in the Journal Citation Reports (JCR). Non-article document types, such as editorials and letters, as well as review papers, were excluded from this analysis. The study aims to evaluate mobile health initiatives during the pandemic by applying stringent selection criteria. Search queries were constructed with terms including “coronavirus,” “COVID-19,” “SARS-CoV-2,” “telemedicine,” “eHealth,” “telehealth,” and “mobile health.” The search string used was:
((coronavirus OR COVID-19 OR SARS-CoV-2) AND (telemedicine OR eHealth OR telehealth OR mHealth OR mobile health)).
This query was applied to the Web of Science database by Clarivate Analytics on May 15, 2020.

Inclusion Criteria

The authors defined five inclusion criteria for the study:

1. Papers must be published after 2020.
2. Only peer-reviewed articles were considered.
3. Papers must address the application of mobile health in the context of the pandemic.
4. Papers must be indexed in JCR-recognized journals.
5. Studies that merely recommend mobile health technologies without practical application were excluded.

Results of the Review Process

The initial search yielded 85 publications. After applying the inclusion criteria:

- Criterion 1 reduced the number to 74 publications.
- Criterion 2 limited the selection to 48, excluding 15 editorials, 8 letters, and 3 reviews.
- Criterion 4 further excluded 5 papers, leaving 43 articles.
- A subsequent review of abstracts and titles resulted in the removal of 20 additional papers.
- Finally, after a detailed review, 4 papers were excluded based on Criterion 5.

This rigorous selection process resulted in a final dataset of 19 articles. The PRISMA flow diagram summarizing this process is shown in Figure 2.

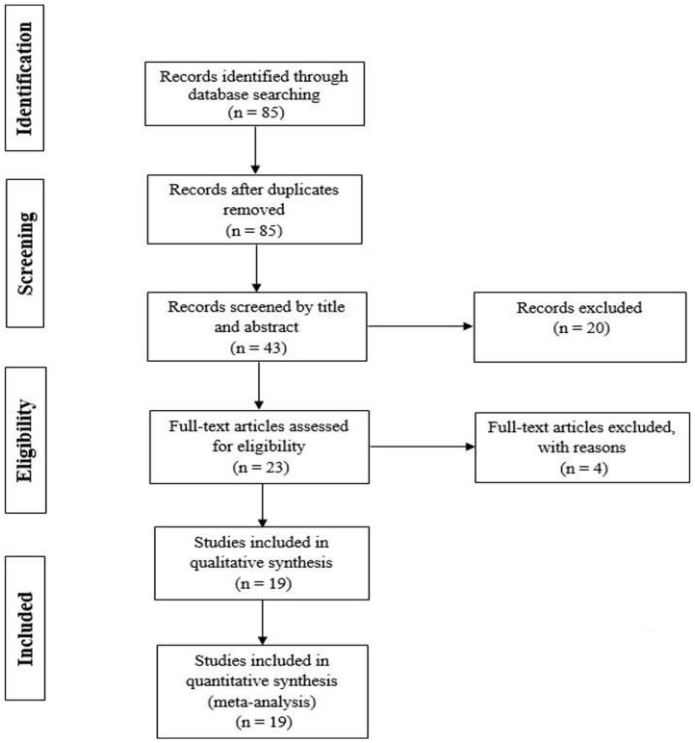


Fig 2 . PRISMA diagram for proposed literature review

International Journal For Recent Developments in Science & Technology
2581-4575
Crossref
A Peer Reviewed Research Journal

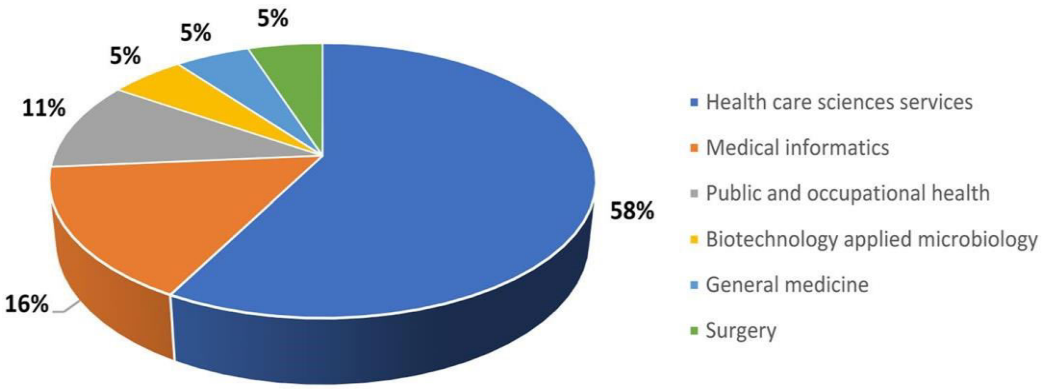


Fig. 3 Percentage category of the research domain

5.The treatment work flow process as being used in telemedicine care

Fig 4 is showing a line-way representation of the workflow for attempting telemedicine culture-based treatment in healthcare services. It provides an ultra-edge type facility and attention at every step during its implementation. It all starts with the patient's entry or detailed in formation, further followed by the telehealth supportive care unit. This step is further associated with the setting up of the doctoral assistant to the patient and then after the diagnosis and appropriate treatment offered to the person under utmost care [36,37]. Telemedicine and other technology improve clinical and adminis trative operations by telecommunication. It is a multifaceted technique that provides emergency care in both critical and non-critical situations. In general, it is used to treat patients who are suffering from chronic diseases. On the other hand, a hospital with an appropriate ambulance crew or other personnel can compensate for telemedicine. Furthermore, additional functions such as the patient's treatment history, diagrams of treatment dynamics, and e-prescriptions can be added to the telemedi cine solution. Furthermore, doctors can easily continue to call patients for follow ups or findings following an appointment. Therefore, text messages are essential because they enable the doctor to speak directly and quickly without another appointment. In addition, data and medications can be exchanged between offices by physicians [38–40]. In the current situation, healthcare surveillance is vital to maintain the quality of Healthcare. With the implementation of digital health tracking technologies and services, there are smart connectivity systems. This technology opens the doorfordirect patient control to providemuch greater insight into patients with simple video conferencing. The doctor's catalogue saves both patient's and healthcare provider's time. It improves the precision of the doctor-patient treatment procedure. The appoint ment scheduling function keeps doctors informed of the status of their appointments. Until communicating with a patient, doctors may review scheduling requests and patient profiles. This shows the patient queue and allows to filter of patient profiling. The doctor can now easily post pone appointments at any time in case of an emergency. Data protection is often ensured by cloud-based medical record-keeping of telemedicine data with patient information and captured video consultation [41–43]. There is an easy sharing of medical records with any clinician spe cialising in treating a specific patient's disease, even a patient's

caregiver who needs the information for insurance purposes. Patients can ask questions about their symptoms by communicating with their doctors via teleconference. Photographs and video consultations are replacing In person evaluations. Telemedicine application software companies use app connectivity and cloud technologies to allow real-time collaboration and remote patient diagnosis. It saves time for both patients and physi cians by monitoring health progress and inspecting when necessary. The telehealth app ensures seamless patient record collection and consoli dation in a single location. It helps pharmacies,

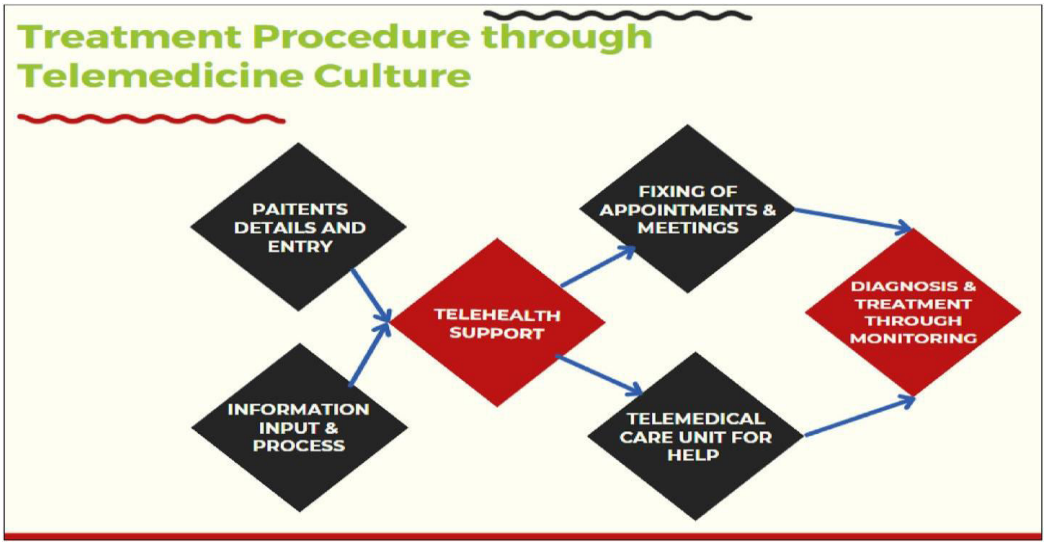


Fig. 4. Work flow treatment process through telemedicine support

customers, and pre scribing physicians by delivering healthcare services more quickly. With an e-prescription feature, doctors can create and deliver prescriptions with lesser errors. It would help to save time while also improving con nectivity and customer satisfaction [44–47].

Telemedicine solutions for Healthcare improve the quality of treat ment for both patients and doctors. Today, telemedicine app growth is increasing as the demandformobiletelemedicine applications grows and will continue to expand. It also enables doctors to view documents on the prescription insurance form and provide all information in electronically connected pharmacies. The ability to pay medical bills from mobile should be a must of every telemedicine app. The ability for patients to rate and compare their doctors is an essential feature of any telemedicine app. Patient feedback is regarded as an essential part of quality man agement and professional development. Furthermore, it will assist many newpatients in locating the specialist doctor that is ideally suited to their needs [48,49].

Telemedicine applications have the potential to speed up the treat ment of a variety of medical conditions. It is more successful when a person gets medication from a professional doctor who provides detailed knowledge about their symptoms. Telemedicine is a method of main taining continuous contact with patients and healthcare providers. It has expanded access to healthcare facilities through the use of advanced technologies and services. Telemedicine provides any hospital or treat ment centre with immediate access to medical professionals, consultants, and additional education and statistics. It is the fastest way to exchange all services with any

hospital or clinic in the country. Telemedicine application specifications may be as simple and few simple requirements and some decisions [50,51]

6.Barriers for the adoption of telemedicine practices in making healthcare services effective

Fig.5 exemplifies the several fences that came across the successful implementation of telemedicine care to support the healthcare units and patients for their utmost care. There are very typical and usual barriers needed to be taken care of while looking to apply telehealth-related practices for Healthcare and its allied domains. The things must be very free from any kind of privacy loss, confidentiality revealing, fraud & abuse, inaccurate solutions, etc. as any of these issues may become a reason for anyone's discouragement, or the case may become complex as far as health sediments are concerned [57–59].

Telemedicine and other telehealth monitoring methods may assist patients and physicians in managing severe health problems such as diabetes and asthma. Providers will also track patients at home after being discharged from the hospital or recovering from an accident. Pa tients' mismanagement is a significant source of anxiety for physicians Although advancements in medicine have made it easier to use tech nology, device outages occur from time to time. Healthcare systems that are considering adopting telemedicine technologies meet with industry experts. They have a host of realistic options for practitioners interested in incorporating telemedicine into their clinics, making the integration smoother [60,61].

Fig 5. Frequent barriers in supporting healthcare through telemedicine

Telemedicine and other telehealth monitoring methods may assist patients and physicians in managing severe health problems such as diabetes and asthma. Providers will also track patients at home after being discharged from the hospital or recovering from an accident. Patients' mismanagement is a significant source of anxiety for physicians.

This telemedicine method helps physicians exchange patient details with another doctor who is located in another country. A primary care practitioner will now exchange patient history and medical details with a doctor without being in the same room. Systemscan relay dataover large

distances between systems, allowing one practitioner to know what another has already done. As a result, there is less duplication in moni toring and fewer cases of inadequate drug management. A physician can collect and exchange information with their patient using patient portals. Medical devices can transmit vital signs and other data to physicians, allowing them to make treatment changes. Patients can now send bio metric data to their clinicians through wearables or remote monitoring devices such as pulsometers or blood pressure cuffs. It can access patient information from a dashboard or clinical decision support system, compile data, and display patient status in near-real-time [62–64].

Telemedicine helps patients to exchange information over long dis tances and become a game-changer. Healthcare records such as imaging photographs, blood analysis, and other data may be exchanged in real time for proper patient evaluation. Overcrowding in emergency de partments can be eliminated using telemedicine by making patients first consult with a remote physician via video chat. Healthcare networks that have implemented telemedicine technologies will testify that it takes a significant amount of time and resources. Practice administrators, clini cians, doctors, and others must understand how to use the device to achieve benefits. and fewer employees. Using this technology, physicians can evaluate a patient's medical background, administer clinical examinations, and more [65–67].

There are now telemedicine options available that enable patients from the convenience of their own homes. It is beneficial for those who use the services of a physician but do not have the means to travel thousands of miles or wait a long time. High-risk children will be seen by a doctor at another hospital in seconds by merely sharing the footage. This also reduces the need for babies to be moved to a different hospital,

Telemedicine technology allows for continuous patient care. This will promote proper self-care and help diagnoses. AI-enabled telemedicine services will automatically interpret patient data and assist physicians in responding rapidly to new technologies. Providers will be able to treat more patients by the use of telemedicine technologies. Visits can be reduced in length, and hospitals can be reduced in size.

It enables experts to collaborate on cases in rural hospitals. These ex changes live streams with remote specialists who can have on-screen consultation. Telemedicine is the remote transmission of medical infor mation from one location to another. This is done in order to improve a person's fitness. Getting an appointment with a primary care doctor or a specialist can be challenging. This remote network is actively gathering and transmitting data to other healthcare organisations for analysis. This technology allows mental health practises to see more patients while maintaining a high degree of medical care. This results in greater prof itability and better time control. Parents will now stop taking their sick child out of the house to visit a doctor [73–75].

7. Limitations of telemedicine in healthcare

Telemedicine, when compared to conventional treatment ap proaches, has lots of possible drawbacks to using telemedicine. It is no substitute for the conventional healthcare system; it compliments the healthcare system for minimal functions. There is a serious issue of hacking patient's medical data, especially if the patient connects to telemedicine from a public network or an unencrypted channel. When a person requires emergency care, this technology can cause the medica tion to be delayed, mainly because a doctor cannot deliver life-saving care or laboratory tests remotely. State rules differ, and physicians will be unable to practise medicine across state boundaries based on the state in which they are licenced and the state in which the patient resides. Clinicians must also ensure that the telemedicine service they use is safe and severe and compliant with privacy laws.

During telemedicine sessions, providers must focus on patient self reports and necessitate physicians asking further questions to get a complete patient history. If a patient fails to report an important symp tom that should have been detected during in-person care, medication could be jeopardised. One of the most significant drawbacks being a lack of availability and affordability. It can be costly for the supplier to set up and manage. Though a valuable and worthwhile facility, telemedicine can be prohibitively expensive for smaller healthcare facilities. Poor communication will also make it impossible to provide reliable care

8. Future of telemedicine in the healthcare sector

In the future, patients will book an appointment with the doctor of their choice after completing a quick and straightforward registration process. Instead of typing, patients will upload medical history, verifi cation documents, medical reports and past prescriptions. The patient interface is a proper function that allows the doctor to create an urgent care plan. It displays an outline of the patient's physical and personal records, assisting the doctor in deciding. Local healthcare resources can be quickly mobilised to offer both emergent and non-emergent services. This will allow clinicians to concentrate on high-demand, complicated cases in person rather than low-level cases that could be handled remotely. In the future, emergency departments to use video consulta tions to triage their patients, non-emergency situations are discharged earlier. As a result, there is less emergency diversion and improved pa tient conditions. Several healthcare organisations are adopting tele medicine application software to prepare for the future. It connected cardiologists with patients who came to the rural facility for care. They will also shorten the time required for follow-up appointments and complement the regular system. Remote patient management has arisen as the next major cause for virtual Healthcare, and this challenge is generating significant opportunities for many businesses

9. Conclusion:

Telemedicine is a valuable technology in linking clinicians with pa tients to ensure they make long-term lifestyle changes. It has significant benefits for medical office staff. This many times eliminates the burdenof patient check-in and concentrates on higher-value tasks. With online visit capability, clinicians may care for their patients while still potentially assisting other affected practices. This also reduces distance limitations by exchanging information about a

diagnosis, care, and disease preven tion between the doctor and the patient through electronic means. The mostextensive telemedicine application can get health coverage closer to people who live in rural areas where quality treatment is otherwise impossible to access. In recent years, this technology has been shown to increase the quality of healthcare facilities by allowing the exchange of information across many distant areas. It expands access to underserved areas, making it easier for them to schedule and hold appointments. People with reduced mobility get doctors' opinions and prescriptions whichthey need morequickly.Medicine andtesting andprocedures they have to manage at their place. Telemedicine minimises the doctors' & patient travel around the globe and changes each sick person's life, ensuring that each sick person receives the appropriate health treatment

10. References:

[1] L.S. Wilson, A.J. Maeder, Recent directions in telemedicine: review of trends in research and practice, Healthcare informatics research 21 (4) (2015 Oct) 213.

[2] S. Hajesmaeel-Gohari, K. Bahaadinbeigy, The most used questionnaires for evaluating telemedicine services, BMC Med. Inf. Decis. Making 21 (1) (2021 Dec), 1-1.

[3] D. Lupton, S. Maslen, Telemedicine and the senses: a review, Sociol. Health Illness 39 (8) (2017 Nov) 1557–1571.

[4] F. Sarhan, Telemedicine in healthcare. 1: exploring its uses, benefits and disadvantages, Nurs. Times 105 (42) (2009 Oct 1) 10–13.

[5] A. Moghadas, M. Jamshidi, M. Shaderam, Telemedicine in healthcare system, 2008, in: World Automation Congress, IEEE, 2008 Sep, pp. 1–6. 9 A. Haleem et al. Sensors International 2 (2021) 100117

[6] R. Chunara, Y. Zhao, J. Chen, K. Lawrence, P.A. Testa, O. Nov, D.M. Mann, Telemedicine and healthcare disparities: a cohort study in a large healthcare system in New York City during COVID-19, J. Am. Med. Inf. Assoc. 28 (1) (2021 Jan) 33–41.

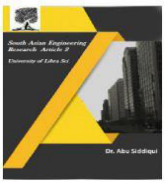
[7] C.D. Flumignan, A.P. Rocha, A.C. Pinto, K.M. Milby, M.R. Batista, A.N. Atallah, H. Saconato, What do Cochrane systematic reviews say about telemedicine for healthcare? Sao Paulo Med. J. 137 (2) (2019 Apr) 184–192.

[8] B.J. Kaspar, Legislating for a new age in medicine: defining the telemedicine standard of care to improve healthcare in Iowa, Iowa Law Rev. 99 (2013) 839.

[9] K.L. Rockwell, A.S. Gilroy, Incorporating telemedicine as part of COVID-19 outbreak response systems, Am. J. Manag. Care 26 (4) (2020 Apr 1) 147–148.

[10] R. Bashshur, G. Shannon, E. Krupinski, J. Grigsby, The taxonomy of telemedicine, Telemedicine and e-Health 17 (6) (2011 Jul 1) 484–494.

[11] K.F. Funderskov, D. Boe Danbjørg, M. Jess, L. Munk, A.D. Olsen Zwisler, K.B. Dieperink, Telemedicine in specialised palliative care: healthcare professionals and their perspectives on video consultations—a qualitative study, J. Clin. Nurs. 28 (21–22) (2019 Nov) 3966–3976.



[12] J. Lokkerbol, D. Adema, P. Cuijpers, C.F. Reynolds III, R. Schulz, R. Weehuizen, F. Smit, Improving the cost-effectiveness of a healthcare system for depressive disorders by implementing telemedicine: a health economic modeling study, Am. J. Geriatr. Psychiatr. 22 (3) (2014 Mar 1) 253–262.

[13] B.L. Charles, Telemedicine can lower costs and improve access, Healthc. Financ. Manag. 54 (4) (2000 Apr 1) 66.

[14] R.S. Weinstein, A.M. Lopez, B.A. Joseph, K.A. Erps, M. Holcomb, G.P. Barker, E.A. Krupinski, Telemedicine, telehealth, and mobile health applications that work: opportunities and barriers, Am. J. Med. 127 (3) (2014 Mar 1) 183–187.

[15] E. Parimbelli, B. Bottalico, E. Losiouk, M. Tomasi, A. Santosuosso, G. Lanzola, S. Quaglini, R. Bellazzi, Trusting telemedicine: a discussion on risks, safety, legal implications and liability of involved stakeholders, Int. J. Med. Inf. 112 (2018 Apr 1) 90–98.

[16] X. Wang, Z. Zhang, J. Zhao, Y. Shi, Impact of telemedicine on healthcare service system considering patients' choice, Discrete Dynam Nat. Soc. (2019 Jan 1), 2019.

[17] A.S. Albahri, J.K. Alwan, Z.K. Taha, S.F. Ismail, R.A. Hamid, A.A. Zaidan, O.S. Albahri, B.B. Zaidan, A.H. Alamoodi, M.A. Alsalem, IoT-based telemedicine for disease prevention and health promotion: state-of-the-Art, J. Netw. Comput. Appl. 173 (2021 Jan 1), 102873.

[18] R.L. Bashshur, G.W. Shannon, E.A. Krupinski, J. Grigsby, J.C. Kvedar, R.S. Weinstein, J.H. Sanders, K.S. Rheuban, T.S. Nesbitt, D.C. Alverson, R.C. Merrell, National telemedicine initiatives: essential to healthcare reform, Telemedicine and e-Health 15 (6) (2009 Jul 1) 600–610.

[19] S. Manchanda, Telemedicine–getting care to patients closer to home, Am. J. Respir. Crit. Care Med. 201 (12) (2020 Jun 15) P26–P27.