Distance Does Not Matter any Longer - India Emerges as a Leader in Telehealth

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Abstract: Telehealth is the need of the hour for both healthcare providers & patients. This helps to be innovative with the newer concepts that can be fine-tuned with an Indian perspective. Teleconsultation offers a comprehensive system for small, medium, and large-sized hospitals to manage day-to-day activities and implement managerial strategies that can be integrated into multi-speciality telemedicine services, facilitating collaboration with peripheral units. The study undertaken is cross-sectional and descriptive, employing an observational method. Structured data, including both qualitative and quantitative information, was collected during the commissioning of a telehealth project utilising a hub-and-spoke model for a large hospital situated in a suburban rural area of India. These aspects are elaborated upon, providing insight into project commissioning, challenges, and limitations faced during the operations of telehealth centres, as well as the quality, training, and regulatory aspects of telehealth services in India. The elements of Telemedicine/Telehealth, including Affordability, Accessibility, Reliability, and Scope, with relevance to clinical importance and their role in non-communicable diseases, are discussed. Remote patient monitoring (RPM) is also known as the store-and-forward form of teleconsultation, in which patients upload images to facilitate medical diagnoses. The Hub and Scope model and Vendor Analysis model have been depicted. The measurement model will provide the relevance of vendor analysis for commissioning the telemedicine projects. Telehealth technology enables the remote evaluation of patients by a medical specialist, allowing for the consideration of fluctuations and variations in medical conditions. These patients may be situated at home, where their medications can be adjusted accordingly. With the help of telehealth technology, we can digitally connect remote, rural, and urban areas, providing holistic healthcare services to the most vulnerable individuals in a comprehensive manner. The integration of healthcare that results in a continuum of care is vital. Real-time data for the effective management of staff and caregivers is enumerated.

Keywords: Telemedicine, Reliability, Technology advancements, Communication, Privacy, and Security.

I. INTRODUCTION

Using digital tools to reach patients is no longer a question of 'if' – it's a question of 'how,' and it's a matter of now."- Chris Boyer. One of India's emerging fields in the healthcare sector is Telemedicine.

This arises from the effective integration of Information and Communication Technologies (ICT) with medical sciences, which plays a vital role in addressing the challenges of healthcare delivery in remote and rural areas. This has multiple applications in education, training, and development, management in the healthcare sector (Craig and Patterson 2005 [1]). Telemedicine can play its role in several aspects of medical care to improve patient-physician communication and to facilitate the monitoring of chronic conditions and treatment modalities (Ekeland, Bowes, and Flottorp 2010 [2]).

The main challenge, which is the most unique one, is to ensure patient safety and privacy of health information (Halberstadt 2017 [3]). The Telemedicine practice Guidelines, which were issued on March 25, 2020, by the Indian Medical Council, have enabled and permitted registered medical practitioners and other professionals of health care to provide their services through Tele-Technology (Board of Governors - Indian Medical Council 2020 [4]).

The terms and conditions and the policy matters and contract laid down by the Insurance Regulatory and Development Authority of India (IRDAI) have allowed telemedicine consultation to be practised and reimbursements (IRDAI and Reg 2020 [5]).

As there is inquisitiveness and a great deal of anxiety among all the end-users and the service providers, ease of use has been created at the outreach areas in the perspective of technology demands, legal aspects, and issues, challenges that are faced in commissioning (Montgomery et al. 2015 [6]).

Importance of the Telehealth domain: Telemedicine & Telehealth are the need of the hour for both healthcare providers & patients(Ryu 2012 [7]). This will help to be innovative with the newer concepts that can be fine-tuned with the Indian perspective. The application aspects are elaborated, providing insight into project commissioning, challenges, and limitations faced during the operation of telehealth centres.(Rosenberg et al. 2012 [8]).

The basic fundamental terminologies:

Telehealth: In a broad sense, telehealth encompasses all the services related to health information, education, and academics in health care, in health care services provided which are blended as an exclusive entity (Olson and Thomas 2017 [9]) (American Telemedicine Association 2014 [10]).

When we refer to Telecare and telemedicine as a broader scope of services, the term telehealth encompasses services rendered, including health education to patients and their families, remote monitoring of vital signs and symptoms, and data capture of vital signs, such as Blood pressure.

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Pulse rate, ECG monitoring and consultation performed remotely between doctor and patient (telemedicine)(American Hospital Association 2019 [10]). Telehealth technology facilitates the evaluation and remote diagnosis of patients. It also supports the detection of fluctuations in the medical and health conditions of patients so that treatment and specified therapy can be provided respectfully (Dixon, Hook, and McGowan 2008 [11]). Telemedicine allows prescribing medicines i.e. e-prescriptions, which are in vogue as a treatment modality (Tuckson et al. 2017 [12]).

Telecare: The term is utilized to enable patients to be safe and independent at their homes and provided with care through technology (Guise and Wiig 2017 [13]). The technology involves multiple components such as mobile monitoring devices, medical alert systems, and telecommunication technology-enabled devices for output devices like telephones and computers (Coiera 2002 [14]). The monitoring of patients can be performed continuously with telecare to constantly monitor and track the patients for chronic diseases, observe and monitor lifestyle changes, and receive real-time alerts during emergencies (Malasinghe, Ramzan, and Dahal 2019 [15]).
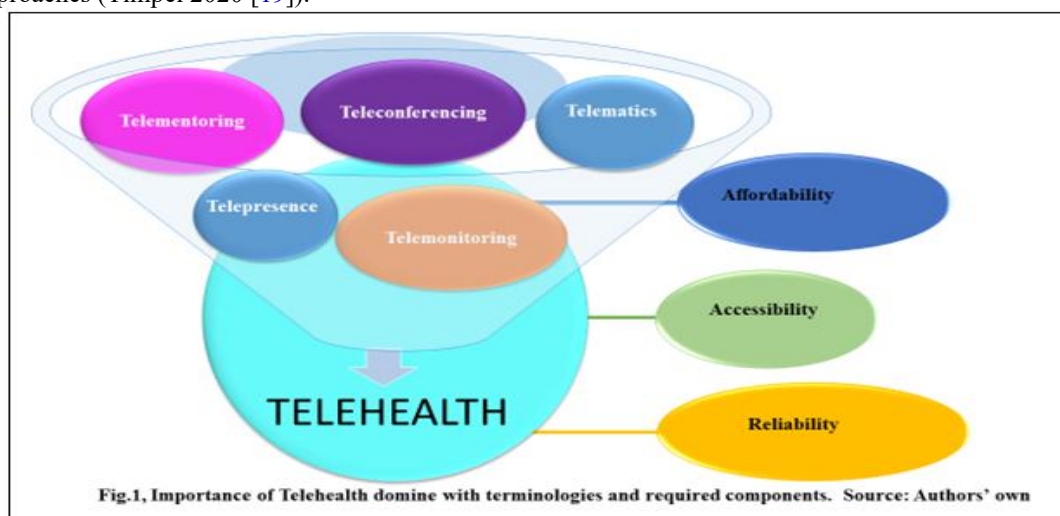
Telemedicine: The scope of telemedicine is narrow when compared to telehealth. More specifically, to provide education at a distance and also provide health care services by utilising telecommunication technology (Internet n.d. [16]).

Telemedicine is mainly utilized to provide clinical care and health care services through electronic communication and information technologies (Khemapech, Sansrimahachai, and Toahchoodee 2019 [17]). The transmission by digital mode for medical radiological imaging, along with consultation and evaluation in the form of video consultations with consultants and specialists, is one such Telemedicine example (Fouad 2014 [18]).

The main objectives of telehealth are:

1. To promote and encourage telemedicine technology with the patient-centric approach in clinical care approaches (Timpel 2020 [19]).

2. To enhance, promote, and incorporate the developments in research and the field of telemedicine and its associated fields (Fouad 2014 [20]).

3. To promote the training of students pursuing Health Sciences programs, healthcare professionals, and research fellows in various aspects of Telemedicine(Papanagnou, Sicks, and Hollander 2015 [21]).

4. To liaise and coordinate with academic institutions and develop a curriculum for the training program in telemedicine, along with the modules prepared specifically for Nursing, Dental, and Allied health care, for incorporating the training programs (Ackerman et al. 2010 [22]).

5. Networking and collaboration, involving professionals and interest groups in imbibing telemedicine technology from different backgrounds such as science, providers in health care, NGOs, Legal, stakeholders, and policymakers to promote telemedicine (Rutledge et al. 2017 [23]).

6. To meet the requirements of regular scientific meetings, symposia, seminars, and workshops on the Education, application, and practice of Telemedicine(Edwards 2018 [24]).

7. To execute and work in close collaboration with scientific organisations and industry development for upstream marketing activities like innovative products, and services concerning Telehealth (PAHO 2016 [25]).

8. **Issues to address in telemedicine**: To improve the healthcare aspects of medical care in terms of communication and coordinate the physician-patient care continuum (Stroetmann et al. 2010 [26])

9. To improve the quality of care and monitor the aspects of chronic conditions, telemedicine is a value proposition(Cruickshank, Beer, and Winpenny 2010 [27]).

Fig.1, Importance of Telehealth domine with terminologies and required components. Source: Authors' own

Telemedicine/Telehealth: To exchange information and utilize telecommunication as a modality, these terminologies are used (IWG-Asia task force on Telemedicine 2014 [28]). In improving the health status and care aspects of the patients, the exchange of information from one place to another is a necessity(Broderick et al. 2017 [29]).

The word telemedicine is used with the involvement of direct patient clinical services, which include patient interactions, diagnosis, and treatment aspects(Bryan 2019 [30]).

Teleconferencing.g: When many users are interacting on electronic communication across various sites, and most of these interactions are conducted live(Panagiotakopoulos et al. 2013 [31]). The usage of Tele-technology is for the diagnosis and long-term monitoring of patients' in-home health care(Hoenig et al. 2006 [32]).

Other terminologies are pretty crucial for understanding the concepts. They are:

Telementoring: This term is used when an individual is offered personalized guidance by using a blend of audio, video, and other modalities of electronic and telecommunication technologies(Singh et al. 2016 [33]). One of the examples is: The new local health service provider is being mentored by a physician who is situated remotely(Ní Cheallaigh et al. 2017 [34]).

Telemonitoring: This term is used when we are using audio, video, electronic, and telecommunication platforms for live information to be transferred between multiple computers(Pandor et al. 2013 [35]). The aim is to monitor the patient's health status and that of individuals situated at a distance. One example: Home-based health care services(Pandor et al. 2013 [36]).

Telematics: By this modality, allowing data transfer between computers by using telecommunication, we can use and integrate the information processing that is based on the computer(Quddus et al. 2003 [37]).

Telepresence: The scope of this term is the usage of technologies, and also the use of robotics, by allowing the medical practitioner and surgical consultants to perform procedures at a specific location by using devices(Bowersox et al. 1996 [38]). Through these devices, a certain amount of sensory information can be achieved(Kristoffersson, Coradeschi, and Loutfi 2013 [39]). The feedback helps contribute to achieving the procedures(Hardavella et al. 2017 [40]). One example is the use of handpieces and lasers to apply pressure, which is similar to the use of physical hands. This helps to provide the perception of presence and also achieve a satisfactory degree of accomplishment. These areas are still in their infancy and require further exploration. This telepresence is an upcoming and evolving field(Ha, Chai, and Nguyen 2020 [41]).

Telemedicine usage has unique features which are also challenges. To ensure patient privacy and safety in information aspects(O'connell 2015 [42]), we need to understand many real situation-based analysis which is contextual(Brauchli 2006 [43]).

Components required for commissioning:

Affordability: A budget-friendly telehealth solution can be offered by the following steps:

- Performing the budget sheet and reviewing the numbers

- Utilizing the use case at the initial stage as a start-up
- Complete and thoroughly evaluate the software solutions that are present in the market
- Cost variables and cost containment are to be considered in all dimensions.
- Training and development without cutting corners in support and execution.
- Build communication strategies to streamline the process aspects.
- Set surprise and virtual visits at the service areas, as cash pay is a set-in process.

Accessibility: The needs of patients must be matched with the technology that is made accessible. The care delivery aspects are relevant during a pandemic and for the future (Rimsza et al. 2015 [44]).

Reliability: The probability that the software will not cause the failure of the system in any specific condition is considered Reliability (Coma-Del-Corral et al. 2013 [45]). Models exist for reliability and for graphical representation to detect the mean reliability index based on the existing reliability model (Wangenheim and Wangenheim 2011 [46]). There has to be a fault-free system, and then it is assumed reliable (Brauchli 2006 [47]). There has to be an emphasis on the functions of the systems, and how exactly they fail is to be found out (Massone et al. 2020 [48]). There are states and health systems that continue to work with people with disabilities. The problem areas are to be identified, and access problems in the implementation of telehealth are addressed (Johnson and Cook 2020 [49]). The goal has to provide telehealth/telemedicine accessible and functional to all and everyone (Rimsza et al. 2015 [50]).

II. MATERIALS AND METHODS

Place of study: The study was conducted at Symbiosis University, the research hospital in Pune, and Symbiosis Medical College Hospital. The study was conducted during working hours, from 8:30 a.m. to 4:00 p.m., over a period of six months. The hospital had the necessary infrastructure and physical facilities, as well as remote rural outreach clinics for patients referred for treatment and care.

Study Procedure: This study employs a cross-sectional, observational, prospective, quantitative, and secondary data analysis approach. The study usually involves collecting data from a review of existing materials (text materials, publications, review articles, project reports), and survey planning tools were also incorporated.

Study variables:

- All parameters from the hospital checklist and internet access.
- Awareness among clinical and non-clinical staff was observed
- Implementation and the working behavioural pattern were monitored
- Maintenance of standards was incorporated
- A regular prospective audit was performed

Outcome variable:

- Improvement of clinical service and productivity
- Patient safety and confidentiality
- Elimination of unwanted patients
- Optimization of resources and a safe environment

Scope with the relevance of clinical importance: There will be a profound increase in access to specialized care services and timely availability of urgent care for needy patients. From the doctor's perspective, enhanced capacity can be perceived in clinical care. In terms of the efficiency of specialists, the benefit is exponential(Ferdous 2017).

In operational aspects, a reduction in waiting time is considerably beneficial for both first-time appointments and follow-up consultations.

Teleconsultation can minimise the need for visits to the emergency department and also reduce the time patients spend in hospitals. The main advantage is that it is beneficial to the family and the patient by minimising the discomfort and associated anxiety of travelling with the patient to receive healthcare services. By and large, it reduces the cost of care and also minimises the carbon emissions associated with patient travel.

III. RESULTS

Role in non-communicable diseases: By reducing risk factors for chronic disease conditions and managing cases through a team approach facilitated by detection, screening, diagnosis, and treatment modalities for early interventions and improved management, telehealth has proven to be a boon. There are a plethora of diseases that can be managed, such as Diabetes, cardiovascular disease like heart attacks, chronic respiratory diseases, and stroke, which can be handled without a hospital visit, but by home monitoring devices, wearable devices, and constant consultation for treatment, therapy and remedial purposes. Screening modalities such as pulse rates, Blood mass index (BMI), and Random blood sugars (RBS) can be performed by wearable devices. For palliative care for cancer patients, mobility and risk of hospital-acquired infection can be reduced by teleconsultation. Advantages include connecting healthcare services to provide greater continuity of care. Conventional care delivery models are integrated to keep patients in their respective homes and the preferred community for a longer duration. For patients with a more extended hospital stay, it also connects remote family members. The most significant advantage is to connect healthcare professionals and the spectrum of service delivery personnel for knowledge sharing.

It also facilitates medication adherence and compliance. The clinical outcomes are better controlled, and dietary modifications can be subsequently customised according to the patient's adherence responses. Different modalities of teleconsultations can be incorporated, such as live videoconferencing (Synchronous) with interactive content, web-based content, applications, text messaging, and chatbots.

Role in Communicable Disease: Telehealth helps minimise the spread of infectious diseases by allowing for minimal contact with the care provider, who is situated remotely. The exposure rate to hospital-acquired infection can be reduced.

Since there is minimal or no physical handling of patients, the spread of contagious diseases is reduced.

Asynchronous mode: There are platforms for d-forward (asynchronous) videoconferencing, which are ideal for specific consultations with digital support systems. The store-and-forward modality of telemedicine enables healthcare providers and hospitals to share patients' medical data with those located in remote areas. A variety of reports can be captured and shared, including lab test results, radiological images, recorded videos for patient education, and records and documentation of diagnostic tests and other procedures, such as ECGs, CT scans, and MRIs. These platforms are among the most sophisticated and secure ways to share and retrieve information, rather than using email.

The advantage of the asynchronous mode of teleconsultation is that patients do not need to wait for consultations to be scheduled. The communication between the primary doctor, the specialist, and the patients need not be at the same time. This is one of the most effective ways for interprofessional medical services to collaborate with outsourced diagnostic service providers. Tele-radiology, as a system, relies on the technology of store-and-forward, which enables radiology technicians and healthcare service providers to share images and radiological data with specialists located at different sites. This has been one of the most cost-effective ways to share specialists among multiple hospitals and healthcare organisations. There is an increase in efficiency because the patient, provider, and specialist do not need to be situated in the same place at the same time. This is a great way to enhance and facilitate a faster diagnosis. Especially in India, underserved areas can be covered by remotely located specialists providing services. This modality helps make healthcare more accessible. This minimises patient waiting time and enhances customer satisfaction, leading to better patient outcomes. The coverage of medical services rendered can be improved, and the specialist's schedule can be optimised. Most commonly, the speciality services that utilise asynchronous telemedicine are teleophthalmology and teledermatology, which immensely benefit patients in remote rural areas.

There is an enormous benefit to patients, with the private network playing a leading role in delivering various commercially viable applications after paying fees.

These are called application service providers (ASPs), which are commercially available as a central server. These help patients as customers rent applications as needed, rather than buying and installing the software. There is no hassle of maintaining the software when it is rented, as the software's upgradation is a possibility, included in the rental price paid. Telemedicine enables the provision of urban amenities and services to rural patients through remote patient monitoring (RPM) at a lower cost.

Remote patient monitoring has enabled healthcare providers to monitor patient data and track vital signs remotely. The warning signs are identified early, and interventions can be quickly implemented for patients who require attention due to health risks. This also includes patients recovering from post-surgical situations and in the postoperative period. This has given way to

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telemonitoring, and as a result of these facilities, home healthcare has become increasingly popular.

The popularity of remote patient monitoring (RPM) is increasing rapidly in the management of chronic diseases. For example, patients with diabetes whose glucose levels must be monitored at regular intervals, and this report must be transmitted to the specialist. Suppose there are any abnormal values or critical alert reports that require immediate intervention. In that case, a lab technologist can flag them, and a diabetologist or physician may intervene at the earliest opportunity.

This remote patient monitoring (RPM) is also known as the store-and-forward form of teleconsultation, in which patients upload images to facilitate medical diagnosis. This has been commonly included in the scope of services of dermatology, wound care, radiology, and radiodiagnostics. This may consist of clinical data transferred in the form of an ECG and the results of blood tests from the patient to the hospital site.

As a tool, remote patient monitoring solutions (RMP) have made communications easier between patients and physicians. Data automation in the medical field has become a possibility with the help of remote patient monitoring solutions, which enable a team of health monitoring professionals to detect early warning signs by flagging them and sending them to treating consultants for further intervention.

Understanding synchronous telemedicine: Real-time telemedicine involves a live, interactive consultation between patients and healthcare providers who professionally utilise audio and video chats. The primary objectives are to see and speak with patients who are located remotely. This is an alternative to in-person doctor consultations.

These modalities of real-time telemedicine integrated solutions are becoming popular. Many companies are providing platforms that enable patients to easily, affordably, and immediately connect from anywhere, thereby satisfying their needs and requirements. Consultant doctors are also obliging patients for their convenience to improve the care, cure, and outcome aspects. This has helped to boost the level of confidence in treatment modality, manage work-life balance, and enhance the benefits.

There are basic requirements for compatible devices, an internet connection, a webcam, and a microphone, which enable patients to receive medical treatments. This is one of the marvellous modalities of real-time telemedicine consultations.

IV. DISCUSSION

A. Operations Aspects:

Telehealth can be simplified and said as two professionals discussing the medical issues and problems of the patients who are seeking specialist advice over the simple telephone or it can be as complex as utilizing transmission of electronic medical records which includes patients' clinical information, test results of the diagnostics such as Blood tests, E.C.G., Radio diagnostic reports, and images, etc. These can be carried out in real-time and in an interactive setting called medical video conferencing. The telehealth consultation also requires the support of IT-based hardware and software.

Video-conferencing requires broadband telecommunication media, which are provided by satellite and terrestrial networks. There are additional units involved, such as teleradiology, which aids in diagnosis by sharing radiological images that facilitate interpretation on the digital platform called DICOM (Digital Imaging and Communications in Medicine).

The telepharmacy concept is gaining popularity for providing medications and drugs to patients in need at their doorstep.

The term teleconsultation should provide a unified system as a medium for larger hospitals to manage day-to-day operations, which can be incorporated into a multi-speciality telemedicine system.

Speciality clinics that provide services such as Telepathology, Tele-Radiology, Tele-Psychiatry, and Tele-Surgery supervision (remote supervision of junior surgeons, where it is telecast live from the operating theatre) can perform. This innovation in teleconsultation, utilising cutting-edge technology, has paved the way for cost-effectiveness and enhanced efficiency. Teleconsulting in these specialities has improved the quality of care. There is an evolving scope for Tele-ICU, which has been expanding in various locations across India.

Hub and Spoke model: This hub-and-spoke model is one of the approaches commonly implemented in remote rural India to provide healthcare services to the needy. The model can be implemented with one well-equipped hospital, which serves as the preferred service provider. The hospital has specialised departments with top-class consultants who serve as experts. The small clinics situated in remote rural areas serve as a point of contact and centres for patients who would otherwise be cut off from medical care. This is a win-win situation that complements each other, the hub and the spoke centres. Unnecessary duplication of resources as a structure can be avoided. The hub can concentrate on the tasks and focus resources. The minimally specialised or less specialised doctors and service providers can perform many diagnoses and provide treatment at the outreach centres, which eases the burden on the hub.
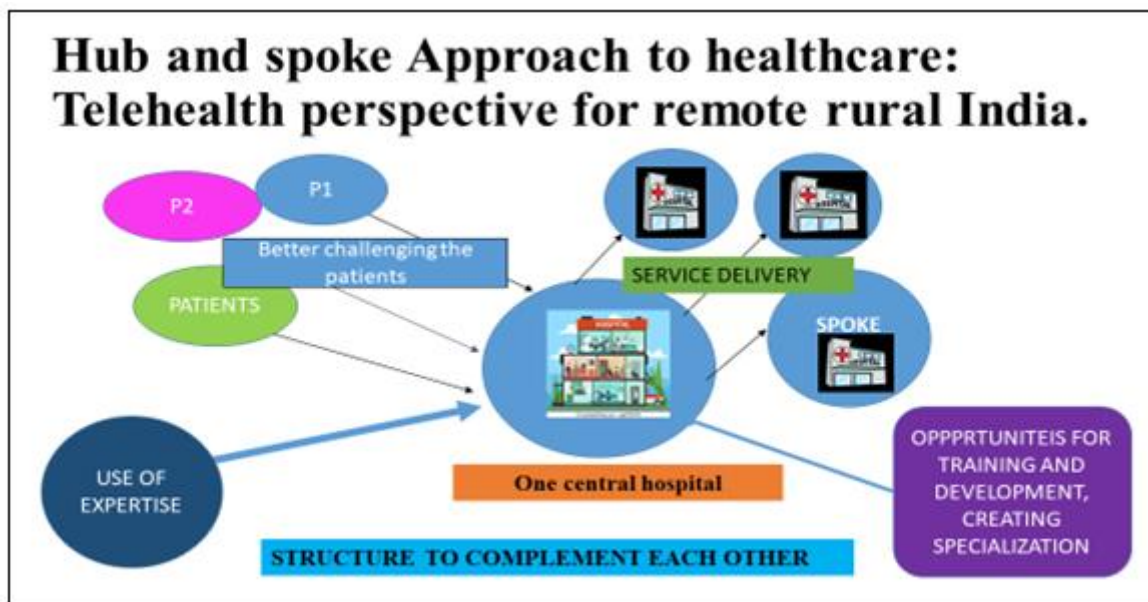
Source: Authors' own.

Fig. 2. Hub and Scope approach to healthcare: Telehealth perspective for remote rural India.

This network enables the treatment of many patients closer to their homes. This prevents unnecessary and excessive journey times, and in turn, lowers costs. Patients who require specialised treatment and a tailored approach can be identified within a large and rural catchment area. This increases the volume of patients in the central facility, which in turn enhances the utilisation of equipment and the resource pool. This hub-and-spoke model helps extend opportunities for training and specialisations. This network enables us to reach a large number of doctors and patients, providing opportunities for training and gaining broad experience. This also presents a chance to diagnose rare diseases. The staff in the remote area will benefit from regular training. The hub and scope model will make it easier to access expert knowledge in remote rural parts of India. Another scenario involves industrialised and advanced countries with experts in telemedicine, particularly in the fields of pathology and radiology, who consult with remote, rural, and needy patients.

Advantages of the Patient Portal: Hospitals and primary care clinics prefer to have an online patient portal. These may act as a single point of contact for communication with the specialist who organised the consultation. There may be alternative portals, such as email, which are often insecure in terms of maintaining information related to medical issues. This online portal provides a secure and safe medium and acts as a tool for the following communication modality:

- Doctor and patient communication
- Prescriptions and requests for refills
- Diagnostic test results that are to be reviewed
- Consolidation and summary of the previous consultations.
- Schedule new consultations and reminders for appointment requests.

Technology utilised: In today's era, mobile health is the leading technology with the highest usage. With the advent of new technologies such as audio and video displays, advanced digital photography has introduced new trends and dimensions to consultations. As the patient is situated in remote rural areas of our country, where proper approaches are often hindered, remote patient monitoring (RPM) has a broad scope. When a consultation is performed online and in real-time, it's dynamic, with synchronised communication established. There are facilities for store-and-forward communication, where reports and documents are shared in an asynchronous mode. There are several advantages to remote patient monitoring (RPM), including the collection and transmission of patient information. Some reports can be generated, and patient data can be analysed and evaluated. Remote patient monitoring helps physicians utilise wearable devices. These devices, which are electronically monitored, are used to collect, collate, and transfer vital sign data that monitors respiratory rate (RR), Blood pressure (BP), Oxygen Saturation (SpO2), and Cardiac status.

As these data can be measured by the patients' wearable devices and sent to consultants for interpretation and recommendations, the added advantages of time, space, and costs incurred can also be quantified.

The technological advancements in telehealth are enabling specialists to conduct video conferences and discuss treatment modalities through virtual barnstorming sessions. Video scopes and the aid of High-resolution digital cameras have replaced the Modality of treatment, raising the bar on the standard of care. This video conferencing technology-driven access has been utilized by Military personnel, inmates, and patients situated in remote rural areas.

Patients should consult a specialist as soon as possible to reap the added benefits. The early detection of diseases, timely interventions, and appropriate management of complications can improve care aspects, rather than relying on in-person appointments for doctor consultations, where resources are often utilised unnecessarily.

There are added advantages to data compression. By this method, the volume of data can be reduced. There is a reduction in space due to the encoding process. To make the system robust, a bandwidth requirement is necessary. Image processing modality has to be ascertained.

Scheduling of transmission time is a requirement. As there are risks of losing clinical data and information, compression techniques, depending on the circumstances, situation analysis, and IT audits, become essential. This has enabled newer technologies, such as compressed videos, which store and transmit information over the phone network. Video images are to be processed to capture all the necessary bandwidth and essential information.

Digital Imaging and Communications in Medicine (DICOM): For medical imaging devices, vendor-independent standard communication protocols are used to identify and format images.

Measurement Model: This model outlines the process for evaluating the array of vendors, taking into account the organisation's needs and requirements. The end-user benefits are multiple and consider a variety of Parameters for enhancing the quality and the delivery of services.

To make systems foolproof and avoid wasted man-hours in redesigning and drafting policy matters, the selection criteria have been listed. Collective ideas and inputs are gathered from academic, Technical, IT personnel, Clinical experts, and top management, who facilitate and are the decision-makers. A conscious decision is made to weigh the consequences and include all necessary parameters that fit the topographical environment. The adaptation of the vendor as a service provider is considered for piloting the telehealth project.

Privacy by design and quality improvement through implementation: Telemedicine remains an innovative approach and is evolving into value-based healthcare (VBHC) from the perspective of customer-centred experiences. By creating awareness in healthcare about preventive aspects, patients greatly benefit. The trends are leading to therapy by choice, where the end-user is the decision-maker of their health and wellness, and also to eliminate disease-triggering factors. The user experience is considered more important in adaptation, while legal advocacy is more of a mandate. Through customer engagement and the adoption of Voice of Customer (VOC) ideations, the privacy-by-design concept is given importance in strategic management from the project's inception. Quality improvement is an ongoing program that streamlines service delivery to achieve better outcomes and ensures systems are efficient and flawless.

The Telemedicine Practice Guidelines specifically exclude the following:

- The building infrastructure and physical facility maintenance issues
- Specification pertained to hardware or the inclusion of software
- Standards and interoperability issues
- Involved in Data management systems
- Utilisation of digital technology for remotely guiding surgical and invasive procedures.
- Evaluation and continuing education for health care service providers
- Research aspects in healthcare
- Does not have a provision for consultation outside the Indian provinces and jurisdiction.

There are policy matters that should be implemented to safeguard the privacy and integrity of care required for patients. The treatment plans and recommendations provided by healthcare workers are to be made available as per feasibility and based on the availability of resources.

The provider of telemedicine platforms for patient use is expected to provide feedback during telemedicine practices, encouraging patients to share their thoughts about their participation.

Policy Matters: The procedures and policies in telemedicine address the following:

- Establishment of the patient-physician relationship
- Licensures and statutory requirements
- Evaluation and treatment modality
- Informed consent as far as execution, continuity of care notes
- Referrals to emergency care services
- Medical records, privacy, and security of patient records
- Online services with the exchange of information, communication links, disclosure, and functionality
- Prescription of medications and drugs
- No separate required licenses by RMP for telemedicine practices.

Table 1. Template of Telemedicine Vendor Assessment Parameters for commissioning: End-to-end description of the requirements.

	Telemedicine Vendor Assessment Parameters for Commissioning:	End-to-end description of the requirements:
Sr. No	**Key Features: Requirements**	**Description:**
1	Patient Registration via Mobile App, Web Portal	The patient registers via the Web Portal or Mobile App. Patient demographic data will be captured here.
2	Patient Registration via in-house call centre	The patient calls the in-house call Centre. The call Centre resource registers the Patient.
3	Online Chat Bot	To assist Patients during their registration and the initial self-assessment process.
4	Online Appointment booking/Online Appointment Cancellation.	The patient searches for a speciality and a consultant. He can view the available slots and book a teleconsultation appointment. OTP is generated, and the payment link is shared with the Patient.

5	Payment Gateway	To facilitate payment/refund (on cancellation) of relevant consultation charges. Once payment is confirmed, the Appointment is confirmed.
6	SMS notification to Doctors and Patients	Notification of confirmation of appointment (Post successful payment) to the Patient and the consultant. Email/SMS reminder/notification to the patient, e.g., for upcoming patient triaging and appointments.
7	Patient self-assessment	The patient can enter or share their patient history, including a history of present illness, Personal History, Surgical history, family history, recent medications, allergies, and other relevant information.
8	The patient can upload Lab Reports, X-ray/Scan Images, and share multimedia files.	The patient can upload their past or current pathology or diagnostic report. They can also share multi-medical files with the doctor or consultant.
9	Consultant Interface	The Doctor/Consultant can view records and current assessment details entered by Patients. The doctor or consultant can add or edit the Patient's self-assessment, as well as add their clinical notes. Raise Prescription, Investigation advice, etc…
10	Utility to facilitate the creation of speciality-wise EMR Templates.	Specific EMR templates for clinical departments, e.g Dermatology, Orthopaedics, Ophthalmology, General Surgery, Cardiology, etc, EMR Agnostic.
11	Note pad for consultants as an option	For patient education purposes, use a digital notepad to draw diagrams
12	Additional features of adding diagrams/ pictorials	ready reference diagrams and pictorials for adding to consultants' notes and progress notes
13	Integration with ICD-10 and DSM-5	
14	Integration with CIMS or 3rd party Drug Formulary and Customization of the drug formulary	Drug-Drug and Drug-Allergy Interactions. Drug nutrient interaction and allergy pop-ups.
15	Waiting Room facility	This is to facilitate teleconsultations for patients who will register and consult via outreach centres.
16	Separate workflow for outreach centres	This is to facilitate teleconsultations for patients who will register and consult via outreach centres.
17	The patient implied Consent.	Patient Consent is recorded before the start of the teleconsultation in one of two ways: as a series of questions or as a signed consent form.
18	Telemedicine Practice Guidelines.	Compliance with Telemedicine Practice Guidelines published by the Indian Medical Council.
19	HIPAA (Health Insurance Portability and Accountability) and DISHA (Digital Information Security in **Healthcare** Act) Compliance.	Please specify with documentary evidence.
20	lab values trend analysis	Graphical trend analysis of Lab values of a patient across patient consultations.
21	Referral Workflow	The consulting Doctor can refer to another Consultant.
22	MIS Dashboard	A dashboard for senior executives to facilitate data analysis. Graphical trends. Please specify the trend charts available under the Dashboard. E.g. a) Daily/Weekly/Monthly Consultant wise numbers, b) Daily/Weekly/Monthly Speciality wise numbers, c) Consultant Wise revenue, d) Diagnosis analysis (Period Wise/Area wise) d) Payment History. e) Operation time a patient has gone through from registering online/phone to getting a consultant and follow-ups f) Financials/ earnings at the end of the day/weekly/monthly. g) Demographic slices.
23	Business intelligence tools are analytically incorporated.	
24	MIS Reports	Preloaded a set of essential reports. Please specify the reports available.
25	Custom Report	Utility: The customer can create their own set of report formats as needed.
26	Integration with Speech-to-Text Solutions	If integrated, please specify the solution.
27	Integration with POC (Point of Care) Medical Devices	ECG, BP, Heart Rate, Auscultation, Oxygen saturation, temperature, etc. Data is transmitted in real-time to the Consultant. Supports a wide range of point of care (POC) diagnostic tests like Fetal Doppler, Blood Urine tests, etc. Other Devices: Please Specify.
28	Integration with Existing HMIS	Please specify the available APIs to facilitate a Bi-directional interface with the HMIS ERP.
29	Utility to send Bulk SMS and Bulk E-mails to registered patients based on Diagnosis, Area-based filters.	To facilitate health awareness, launch preventive checkups or other medical programs, and health-promoting packages
30	Handholding and Training During the implementation	Please specify the Training methodology. Is it on-site or off-site? Availability of an online LMS system. Availability of Training manuals. Provide complete training program calendars and schedules, along with the corresponding topics. What is the duration of the Handholding period? Others, please specify.

31	Post-implementation support and Service	Please specify whether call centre-based support is available. If available, is it 24/7? Other, please specify.
32	Scope for harnessing the clinical data for Academic and Teaching purposes.	Please specify.
33	Business intelligence tools are analytically incorporated	Please specify whether this is a 3rd party tool or developed in-house.
34	Artificial Intelligence Layer	Please specify.
35	Online Patient Experience Feedback	Please specify.
36	NPS scoring and rating	Consultation feedback rating system
37	User-friendly features.	Please specify your USPs.
	Commercials - Software as a Service (SAAS)	
38	User-Based License	
39	Pay-per-use model (Transaction-based)	
40	Any other Hybrid Model. (Please specify)	
41	Periodic Payout commercial model.	
42	Any other integration effort Costs.	
43	License Period.	
44	Renewal Cost post License Period.	
	Others	
45	Quality Certification	Please specify third-party product certification, Certificate Validity, and registration details.
45	Trial Run Period/Free Pilot Period/POC	Please Specify
46	Legal Compliances	Please specify if you had any legal litigations against the user organizations
47	Privacy policy.	MOU/ Agreements terms and conditions.

Source: Authors' own.

Quality aspect: The Tele EHR, which is web-based, online, and compliant with the Health Insurance Portability and Accountability Act (HIPAA), must be driven collaboratively. Clinical Practice Management (CPM) and medical billing solutions are designed to enhance the quality of care, ultimately benefiting patients. This EHR will enable scheduling appointments, facilitate sharing of templates and prepared questionnaires, and prepare and record patient records during visits, along with SOP notes. This also helps in maintaining the patient's information comprehensively. Customised and configurable templates will help consultants and physicians document patient information, allowing the service provider to focus more on patient care.

Regarding the HIPAA Act:

- Keeps the patients' privacy intact
- Avoid disclosing the patients' medical issues
- Take critical issues offline
- Not to share the patients' pictures on social media
- Avoid sharing confidential information via personal messages.

Health Insurance Aspect: The Insurance Regulatory and Development Authority of India (IRDAI) has permitted teleconsultation to be included in consultation services for the benefit of insurers. As per the terms and conditions of the policy or contract of insurance, along with the guidelines provided by the Medical Council of India, which issued Telemedicine Practice Guidelines on March 25, 2020, during the COVID-19 pandemic and lockdown, has enabled registered medical practitioners to provide telehealth services through tele-technology. IRDAI-registered insurers have been advised to permit consultations through telemedicine, as per the terms and conditions of the policy contract. The policy contract also allows the insurer to settle claims that do not require separate filing with the authority for any modifications.

The policyholder who already has health coverage that includes consultation, as well as those who purchase health insurance in the future, can consist of telemedicine expenses in their claims.

Training and development: The education and practice of telemedicine are currently limited to large-capacity organisations. To include a broad audience of health care professionals and paramedics, training programs need to be developed and participation encouraged. Organisations such as the Telemedicine Society of India and NIHMANS, Bangalore, are hosting webinars to promote telemedicine. The need of the hour is training healthcare workers at the grassroots level in practising telemedicine. The impact of knowledge deception regarding telehealth will support future healthcare immensely in multiple dimensions.

Benefits of Integrated Telehealth: There will be extended availability of doctors for outpatient schedules. The service provider and the hospital as an organisation can extend the duration of the outpatient coverage. Logistic issues for patients due to severe weather conditions can be minimised, and this barrier can be overcome to provide better continuity of care.

Distance Does Not Matter any Longer - India Emerges as a Leader in Telehealth

The promotion of Medical tourism will be an added advantage. Setting up Home healthcare services can be implemented. Mobile healthcare services can be implemented. Interactive remote patient care monitoring, facilitated by technology-driven apps, is a valuable addition to today's fast-paced lifestyle. Integration with Artificial intelligence (AI) and wearable devices helps in geriatric care by enabling remote monitoring at home, saving time, and reducing the risk of hospital-acquired infections. In terms of return on investment, although the projects in isolation may not yield a massive margin of profit, they can still generate business and improve compliance with follow-up.

One of the "must-do" initiatives is integrated telehealth. Not just a standalone teleconsultation platform, but to build an accelerated online-offline integration platform. Virtual care is supplemented with artificial intelligence, but it needs to be synchronised with offline routine care. Digital single door for all health services being delivered, encompassing the entire patient journey throughout the continuum of care—capability to handle home-based care supported by AI, Audio-Video-based diagnostics. The digital platform should cover the ancillary functions to achieve both clinical and financial outcomes.

As there are many optimistic and user-friendly attitudes toward the future use of telemedicine, it's widely accepted and becoming easier to adopt telemedicine technology. To monitor patient data, smart glasses and smartwatches have been adapted for use in healthcare settings, as they transmit data in real-time to remotely situated healthcare service providers. These providers can then automatically transcribe documents during the patient's visit. Some programs analyse a person's emotional state based on facial expressions and can make it possible to monitor the patient's mental health.

Integrated Services Digital Network (ISDN): ISDN is in vogue in today's scenarios. This is a very common dial-up path for transmitting and utilising videoconferencing. These on-demand services are charged by the minute and are also billed at contract rates. In remote rural areas, they are permitted to establish connections of up to 128 Kbps. The site that places the call is billed for the rendered services. This works similarly to the model of long-distance calls. To keep pace with technological advancements, we must overcome administrative barriers. There are challenges, such as state legislation and specific licensing requirements, which are state-specific and mandatory as mandated by medical boards. There may be policies about reimbursement that affect doctors, payers, and patients. The insurance coverage is by the guidelines of the Insurance Regulatory and Development Authority of India (IRDAI), which are currently in effect. The coverage of health insurance has expanded since the post-COVID-19 pandemic.

Telehealth, to a certain extent, has helped overcome socio-economic and geographical barriers to reach patients in remote locations.

Challenges: Multiple studies emphasise the cost-effectiveness and efficacy of commissioning telemedicine projects. These are all theoretical benefits where the data are far more convincing. For any study to be robust, its methodology and strategies must be clearly defined and predefined. Before-and-after studies should be performed with consideration for both outcomes and patient-centricity considerations. This is rarely considered from the end-users' perspectives. Most of the telemedicine verticals are focused on feasibility and patient acceptability. These two terminologies are entirely different aspects and are not the same. Face-to-face interactions, where doctors and patients touch, feel, and form emotional bonds, are often lacking in professional settings. This is the most significant limitation of human-to-human connectivity and rapport building. Face-to-face interaction and consultation may cost the same or possibly less than online alternatives. Still, they will always have added advantages, allowing for a more effective clinical approach to capture symptoms and signs.

The effectiveness of telemedicine is mostly dependent on the data of the project where it is implemented and how the technology is robustly utilized. An example of this is establishing a Telemedicine ICU, which can reduce mortality and help enhance training skills and capabilities. The studies have also provided data showing reduced mortality and little to no impact. Without proper and clear evidence regarding effectiveness, resources become ineffective and underutilised.

The infrastructure for telemedicine, along with legal and regulatory requirements, needs to be structured on a need-based approach. There are challenges related to regulatory aspects. Cross-state labiality has yet to be defined, and cross-hospital credentialing and the sharing of documents have not been adequately defined and structured. However, this is not a trivial matter.

There is a possibility that patients' demands may be met, and catering to their needs can be facilitated with the help of technology, such as smartphone applications. These facilities may cross national boundaries. With today's regulations in place, there are barriers to crossing borders and distance-based care, which is currently performed informally. To formally and strategically provide distance-based care, it is better to maintain technology-based equipment to keep up with the rapidly changing phases(Porter and Lee 2015).

The consequences are intended, and the overall encounters are preferred to be face-to-face. If the provision of telecommunication is streamlined, telemedicine consultations are preferred without an increase in cost. There are factors of unintended consequences and interpersonal, as well as interprofessional, relationships that should be considered when delivering services.

Telemedicine is a significant addition to the policy coverage, as it assumes importance in managing chronic diseases and during pandemics. By 2020, with projections calculated to be nearly $36.3 billion, the future looks bright for telemedicine, and it is likely that all the barriers will be overcome.

Limitations:

- Access to technology: In India, the underprivileged may lack access to the internet, smartphones, and video cameras.
- Literacy: Patients may not understand when hospitalisation or admission is required, as advised by doctors.
- The severity of the cases:

Telemedicine is most effective in mild to moderate cases.

Severe and critical cases require more attention, which is only possible at a higher centre where point-of-care services are provided.

- Law and regulations: The medico-legal laws need to be tweaked from the perspective of protecting doctors' rights, and the margin of error, as it increases, needs to be governed.
- Data privacy and confidentiality are to be considered to safeguard patient data.

Guiding principles: Healthcare organizations and service providers who are engaged in providing telemedicine services are to abide by the following core principles:

- The top priority for patient safety is during practices and during implementations.
- Safe, Secure, and effective methods of communication to be utilized.
- Appropriate, evidence-based, and practical approaches are recommended as treatment options.
- A feedback mechanism has to be in place.
- Ensure patient satisfaction and implement strategies to achieve it in all dimensions.
- Integration of telehealth services with regular healthcare practices to bring patient satisfaction concepts to patient delight.

V. CONCLUSION

With the help of technology, we can connect digitally to remote and rural areas, providing urban amenities and holistic healthcare services to the neediest individuals.

Some of the key enablers that would guide the healthcare organization to the future of telehealth are:

- Technological advancements using AI-assisted diagnostics
- Adoption of cloud-based Health Information System
- Integration of healthcare that results in a continuum of care
- Patient engagement framework in congruence with point-of-care devices, and also to network with home-based monitoring devices.
- Structured data is collected in real-time by staff for effective management and the improvement of caregiver support.
- Flexible and integrated payer engagement model
- Response to the changing regulatory compliance.
- Privacy/Security – to address the growing cybersecurity threats to consumer privacy and other healthcare information. A robust system of privacy by design and quality by care needs to be inculcated.

Thus, the telemedicine guidelines in India and their implementation are a significant step forward toward Affordable access to universal healthcare for all.

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