



TELEMEDICINE AND ITS IMPLICATIONS DURING PANDEMIC IN HEALTH CARE

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ABSTRACT Health is wealth. Health is one of the significant treasures of the human community. According to *World Health Organization*, health is a state of physical, mental and social well-being and not merely the absence of disease or infirmity. Health care professionals and *personnels* have been striving hard to provide the best health care facilities to the community. Health care has also been developing with the technologies and adapted itself to suit the rapid race of the modern world. One of the trending options accessible in health care is telemedicine. Though pandemic has emphasized the valuable role of telemedicine, it still has its own pros and cons.

KEYWORDS : Health Sector, Health Care Workers, Medical System, e-Consultations, *Telemedicine and Pandemic*

INTRODUCTION

Medicine is the science and art of caring for a patient. It is the practice of diagnosis, prognosis, treatment and prevention of a disease. Medicine has been in practice since prehistoric times and during those days it was more an art than the science and was related to religious and cultural aspects of the community. With the evolving time it has greatly evolved into an eminent scientific field. Developing technologies has aided the health care with new and precise methods of diagnostic and radiological tests like CT, MRI and ultrasound. Similar to this, one of the promising gifts of Information and Communication technology is telemedicine. It is a way of health care delivery through communicating devices like mobile phones.

The term 'telemedicine' was coined in 1970s. Tele is the Greek word meaning 'distance' whereas mederi is the Latin word meaning 'to heal'. Therefore telemedicine means "healing at a distance" (*WHO, 2010*). According to WHO, Telemedicine refers to "the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of diseases and continuing injuries, research and evaluation, and for the education of health care providers, all in the interests of advancing the health of the individuals and their communities". Though WHO suggests the use of terms telemedicine and tele health synonymously some distinguish telemedicine from telehealth. Telehealth can be defined as "the delivery and facilitation of health and health related services including medical care, provider and patient education, health information services, and self care via telecommunications and digital communication technologies". It is viewed like telemedicine is restricted only to diagnosis and monitoring whereas the telehealth includes preventative, promotive and curative care delivery.

Telemedicine has been already in practice in many countries like Singapore, Cuba, and Pakistan. Now, this pandemic made many countries like India to adopt the practice of telemedicine.

MATERIALS AND METHODS

A study was conducted among 250 health professionals who include 130 medical students and 120 medical practitioners. The online survey was conducted through Google forms and responses were recorded. The questionnaire includes the effect of telemedicine on history, physical examination, diagnosis and doctor patient relationship and its usage in emergencies, expert advice, post - operative care and in providing higher accessibility to rural community.

They were asked to express their opinions on the following statements,

- Telemedicine affects the credibility of history taking
- Diagnosis is hindered in telemedicine
- Clinical examination could be done precisely with telemedicine
- Telemedicine proves to be effective tool under emergencies
- Telemedicine is useful for rural communities
- Telemedicine increases the vulnerability of doctor patient relationship
- Telemedicine is useful in post operative care

- Telemedicine provides higher accessibility in patient care
- Telemedicine is good for surgical interventions when expert advice is needed
- Telemedicine can lead to drug abuse if the credibility of patient history is affected
- They were also asked to rate the efficacy of telemedicine in all aspects out of 5 and comment their views on it.

Findings

The findings of the study were

- 32.23 % of students and 32.58% of practitioners supported the use of telemedicine in all aspects. 24.61% of students and 25.83% of practitioners showed neutrality towards telemedicine. 43.16% of students and 41.59% of practitioners are not satisfied with the use of telemedicine.
- 47.7% of students and 36.6% of practitioners agreed that Telemedicine affects the credibility of history taking and 28.5% of students and 31.7% of practitioners showed neutrality towards this point of view. 23.8% of students and 31.7% of practitioners disagreed with the same
- 81.5% of students and 70% of practitioners accepted that the diagnosis is hindered in telemedicine. 18.5% of students and 30% of practitioners disagreed with the same
- 7.7% of students and 10% of practitioners agreed that Clinical examination could be done precisely with telemedicine and 23.1% of students and 20.8% of practitioners showed neutrality towards this point of view. 69.2% of students and 69.2 % of practitioners disagreed with the same. 60.8% of students and 52.5% of practitioners agreed that Telemedicine proves to be effective tool under emergencies and 17.7% of students and 24.2% of practitioners showed neutrality towards this point of view. 21.5% of students and 23.3% of practitioners disagreed with the same.
- 38.5% of students and 47.5% of practitioners agreed that Telemedicine is useful for rural communities and 23% of students and 26.7% of practitioners showed neutrality towards this point of view. 38.5% of students and 25.8% of practitioners disagreed with the same.
- 48.5% of students and 42.5% of practitioners agreed that Telemedicine increases the vulnerability of doctor patient relationship and 35.4% of students and 47.5% of practitioners showed neutrality towards this point of view. 16.1% of students and 10% of practitioners disagreed with the same
- 73.1% of students and 50% of practitioners agreed that Telemedicine is useful in post operative care and 14.6% of students and 17.5 % of practitioners showed neutrality towards this point of view. 12.3% of students and 32.5% of practitioners disagreed with the same.
- 44.6% of students and 52.5% of practitioners agreed that Telemedicine provides higher accessibility in patient care and 31.5% of students and 20% of practitioners showed neutrality towards this point of view. 23.9% of students and 27.5% of practitioners disagreed with the same.
- 36.1% of students and 35% of practitioners agreed that Telemedicine is good for surgical interventions when expert advice is needed and 28.5% of students and 23.3% of practitioners

showed neutrality towards this point of view. 35.4% of students and 41.7% of practitioners disagreed with the same.

- 77.7% of students and 72.5% of practitioners agreed that Telemedicine can lead to drug abuse if the credibility of patient history is affected and 19.2% of students and 20.8% of practitioners showed neutrality towards this point of view. 3.1% of students and 6.7% of practitioners disagreed with the same.

When they were asked to rate telemedicine out of 5 scores,

- 0.8% of students and 0.8% of practitioners have given the score of 5
- 8.5% of students and 19.2% of practitioners have given the score of 4
- 64.6 of students and 53.3% of practitioners have given the score of 3
- 19.2% of students and 21.7% of practitioners have given the score of 2
- 6.9% of students and 5% of practitioners have given the score of 1

DISCUSSION

Telemedicine And Telehealth

Access, Equity, Quality and cost effectiveness are the common issues faced in health care all over the world. The evolving technologies are revolutionizing health care fraternity to resolve these issues. One of the efficient products of Information and Communication Technology is telemedicine. Telemedicine is considered to be the part of tele - health. According to American Academy of Family Physicians, Tele health refers to the broader scope of remote healthcare services than telemedicine. Simply, telemedicine refers specifically to the remote clinical services while the tele-health can refer to remote non clinical services.

History Of Telemedicine

The history of telemedicine can be traced back to late 19th century and early 20th century. This period marks the transmission of ECG data through telephone wires (*Vinoth & Neha, 2019*). One of the first successes of telemedicine is the transmission of radiological images between two health centres in Pennsylvania. The modern telemedicine evolved around 1960's which was mainly used in military and space technology sectors. First of all, NASA used this technology to provide general medical care to astronauts in space (*Rashid & Gary, 2000*). Recent developments have brought this tool to our door steps creating the newer possibilities for the health care delivery. Besides these patient friendly digital equipments monitoring heart rate, blood pressure, oxygen saturation etc combined with telemedicine is migrating the health care delivery from hospitals and clinics to homes.

Infrastructure Of Telemedicine Technology

Telemedicine consultation centre is the one where the patient is present and here the equipments for transmitting the patient's information is available whereas the telemedicine specialty centre is the one where the specialist is present so that he can interact with the patients from remote areas.

Telemedicine system is the interface between the doctor and patient consisting of hardware, software and the communication channel. Hardware includes the computers, printers, scanners whereas the software consists of the reports of the patient in the form of images, documents and also the user interface for providing easy access. The communication channel is established between the patient and the specialist through satellites, optical fiber cables etc.

The infrastructure of telemedicine consists of different types of telemedicine centres. They are broadly classified as Primary Telemedicine Centre, Secondary Telemedicine Centre and Tertiary Telemedicine Centre. The primary telemedicine Centre will be similar to the Primary Health centres. The Secondary Telemedicine Centre functions to provide access similar to Secondary Health Care Centres and Tertiary Telemedicine Centres provide accessibility to higher levels of specialties as in Tertiary Health Care Hospitals.

Methods Of Practicing Telemedicine

There are different methods of practicing telemedicine basically classified into two categories: Store and forward method and videoconferencing method.

Store and forward telemedicine involves the collection of medical data like radiological images, lab reports etc., and then transmitting these data to a doctor so that he can assess and diagnose when he is free. The

store and forward method still requires the proper history from the patient. This method can also be used for getting expert advice. It is mainly used in tele-radiology and tele-pathology. Remote monitoring technology allows the medical professionals to monitor the patient with the help of self monitoring devices. This is majorly used for monitoring chronic illness like diabetes, hypertension.

Videoconferencing or e-consultation enables real time interactions between clinician and patient. Traditionally, telemedicine was used for specialist treatment. But now, in this pandemic situation it has proven to be beneficial and started its transition to mainstream of delivering health care (i.e.) it has evolved for the management and care of chronic illness, post operative catch up and telemedicine has transformed as tele-pathology, tele-radiology, tele-psychiatry, tele-dermatology, tele-cardiology, tele-nutrition, tele-rehabilitation, tele-neurology, tele-trauma care.

Benefits Of Telemedicine

The primary motive with which the telemedicine was established was providing health care to rural and undeserved patients (*Shilpa & Jessica, 2021*). Currently, it has developed beyond its motive to function as an effective alternative for routine clinical practice.

Telemedicine as an alternative provides various advantages to patients as well as practitioners.

Patients didn't have to spend special time for hospital visits. There are no travel expenses and no wasting of time in travel. Telemedicine interferes less with child or elder care responsibilities. It provides the safe environment to patients as there is no exposure to potentially contagious patients. Telemedicine allows the patient to access the expertise health care which is not available in local area with cost effective means. Telemedicine can also help in preventative care support like weight loss, smoking cessation.

The health care provider is benefited with increased revenue, improved efficiency, better patient follow through and improved health outcomes, fewer missed appointments and cancellations. Telemedicine can also be used for the process of medical education and clinical research (*Brindha, 2013*). It can also aid in improving the communication between health care providers separated by a distance. It is also used for second opinions and dealing with complex interpretations. It can also be used in robotic surgeries in case of emergencies. It also enables the doctor to carry on with the post operative care and chronic illness. It is much preferred in patients with limited mobility. It can prevent the transmission of contagious diseases from patient to medical staff. It can also provide immediate care to patients in emergency situations like ambulatory monitoring and in natural disasters like earthquakes, floods etc... It can also be used in critical care monitoring when the patient cannot be shifted. Telemedicine provides the opportunity for standardization of health care within and across the states which helps in creating a global practice of sharing clinical knowledge.

Besides using the telemedicine for individual Health Care, it can also be used for the assessment of community health. It includes anticipating epidemics and real-time monitoring of diseases locally and globally. It also helps to differentiate and delineate the risk factors particular disease in a population. It provides valuable information of different populations based on risk factor profiles. It can also help in Planning and assessment of strategies and their effectiveness in establishing a good community health.

Limitations Of Telemedicine

Some disadvantages of telemedicine are the limitations in performing physical examinations, the possibility of technical difficulties and security breaches, lack of legal regulations controlling the telemedicine. Some critics comment that telemedicine can affect the continuity of health care provided and add that online interactions are impersonal and dangerous as the health care provider does not have the access to complete history and physical examination of the patient which is the most important part in diagnosis and treatment and it also has limitations in many circumstances where auscultation and palpation is absolutely necessary.

Though it created a ground breaking impact in well developed countries, in developing and under developed nations with limited infrastructure it has many limitations and barriers. Health care infrastructure in many developing countries is insufficient to adapt to

the modernizing approaches of telemedicine. Instability in electrical supply, limitations in internet service in remote areas, computer viruses causes difficulty in implementing telemedicine far and wide. Unreliable connectivity and internet trafficking can lead to poor resolution images for diagnosis delayed imaging which can affect the efficacy of telemedicine slow bandwidth can impose difficulties on live time video conferencing unavailability of widespread interoperability standards for software and equipments pose difficulty even when basic infrastructure is available. Equipments, transport, maintenance and training of staff for this new technology may cause additional financial burden to developing and underdeveloped countries which have little income or little funds for telemedicine.

Lack of legal guidelines and procedures for telemedicine and ethical issues too constitute the barrier in initiating it. Multi State tele-health licensure is essential for providing Medical Services across Geographic borders sharing clinical expertise with patients and other Healthcare providers but it's not possible in many cases. When it crosses borders, different state bodies will be warranting the quality of health care provided and it can have controversies. Ethical issues like informed consent may lead to controversies.

Another important barrier in the effective tele-health practice is the accuracy of data transmission. The accuracy of data transmission is affected by the internet bandwidth and potentially inaccurate patient data due to ignorance. The differences in technological systems also added up to the inaccurate data transmission till data accuracy is regulated by the Digital imaging and communications in medicine format which is the International standard for medical images and associated information. This adds clarity to standards for acceptable format quality for medical images and data required for clinical use and interpretations.

The telemedicine raises many questions regarding the malpractice liability including informed consent, practice standards and protocols. Simply applying existing principles of malpractice liability to telemedicine is not good especially when it is unclear what an appropriate standard of care is. So special attention should be given to this area to prevent negligence deaths and data breaches Telemedicine in comparison with real time face to face clinical examination poses more vulnerability to privacy and confidentiality of patients' health history (Oren & Alexa, 2021). Though most telemedicine platforms are highly encrypted and in accordance with the legal regulations of this state no platform can be hundred percent safe from hackers or data breaches. So, the tele-health providers and technology constructors must take the responsibility for ensuring the compliance with rules and regulations of the state, patients' confidentiality and system security at all times when practicing telemedicine.

It can hinder the trust in doctor patient relationship. If the patient's credibility of history is affected then it can be misleading. The clinical diagnosis can't be done properly without the physical examination of the patient. If the patient is presented with heart burn the differential diagnosis can be difficult without a proper physical examination (Schmiedl & Raghu, 2020). It can even lead to drug abuse if credibility of patient history is affected.

Telemedicine In India

In India there is a differential distribution of Healthcare. City and Urban areas are supported with the better health care facilities than the Suburban and rural areas. On the other hand, the computer literacy is also quickly developing in India. So, Indian practitioners can use telemedicine as the effective tool to establish the better health care for rural and suburban communities The Apollo group of hospitals was a pioneer in establishing the telemedicine in India called Aragonda Project.

Current due to this epidemic the telemedicine has been adopted by various institutions and health care providers throughout India and it is actively supported by Department of Information and Technology, Indian Space Research Organization (Neema & Rakesh, 2020). NEC telemedicine program for North Eastern states, Asian Heart Foundation, State governments and some NGOs. Department of Information and Technology has taken leads for the development of infrastructure and technology, standardization of the resources and they have also formulated some special schemes for selected specialties like oncology, tropical disease management.

The challenges faced in India by the telemedicine are due to the

perspective of medical practitioners and public. The medical practitioners are not completely convinced with the approach of telemedicine. The patients' fear and unfamiliarity adds fuel to the fire. Financial unavailability, lack of basic amenities like transportation, electricity, safe drinking water, relatively low literacy rate in comparison with some developed countries also contributes to difficulties (Aparajita & Sowmya, 2008). In India, the land with cultural and ethnic diversity, the diversity in languages and culture pose some more difficulty in establishing the equity of health care via telemedicine throughout the country. Though there are many barriers still it can prove to be the better tool because of its effective usage in pandemics and disaster management. On 25th march 2020, the Indian government has published telemedicine practice guidelines enabling the registered medical practitioner to provide health care using telemedicine. A Registered Medical Practitioner (RMP) is a person who enrolled in the State Medical Register or the Indian Medical Register under the Indian Medical Council Act 1956 (IMC Act 1956, Telemedicine practice guidelines, 2000).

These guidelines are to be used in conjunction with other national clinical standards, protocols, policies and procedures. Some of the inevitable points of the guidelines are

- A RMP is entitled to provide telemedicine consultations to the patients from any part of India.
- RMPs using telemedicine shall uphold the same professional and ethical norms and standards as applicable to traditional in-person care, within the intrinsic limits of the telemedicine.
- Patient can consult with any RMP for diagnosis/treatment/health education/counseling
- Patient may use this service for follow up consult on his ongoing treatment with the same RMP who prescribed the treatment in an earlier person to person consult
- In cases of emergency, telemedicine consultation should be limited to first-aid, life saving measure, counseling and advice on referral when alternative in person care is available.
- In all cases of emergencies, the patient must be advised for in person care with an RMP at earliest.
- Telemedicine can be used to connect a patient to RMP, caregiver to RMP, RMP to RMP, health worker to RMP and it can be in the text, audio or video according to the necessity
- The explicit consent must be recorded in any format and to be enclosed with other medical documents of the patient.

The guidelines also imposed some restrictions to drug prescription as some of drugs may be having the potential of abuse. According to these guidelines, drugs are classified into 4 categories.

List 'O' drugs can be prescribed with any mode of consultation and they include most commonly used 'over the counter' medications like Paracetamol, ORS packets, antacids etc... This list also includes medicines that may be deemed necessary during emergencies and would be notified time to time.

List 'A' drugs can be prescribed only through video consultation such as antifungal medications and refill medications for chronic diseases such as diabetes, hypertension, asthma etc.

List 'B' drugs can be prescribed through any mode of consultation as these are mostly follow up consultations. This list includes 'add on' medications which are used to optimize an existing condition.

Prohibited drugs are not to be prescribed through e-consultation. These include narcotic and psychotropic drugs.

CONCLUSION

Medicine has been evolving since times. Now, this pandemic also enforced to move the next level of providing health care which is suitably satisfied by telemedicine. Every technology has its own pros and cons and it can be used till it causes no adverse effects on human community. Similarly, it is assured that telemedicine can be the best option to ensure equality in health care if the limitations are resolved through legal guidelines. It is hoped that it will be established in rural areas also with few decades.

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