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Telemedicine: A new tool for transforming future healthcare

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Abstract---Telemedicine is the solution to the problem of delivery of health services in far flung areas. It is the use of computers and automated data to deliver technologies and promote healthcare when the patients are located far away from the professionals. Its future looks bright with more widespread acceptance by more medical professionals and patients in different forms. There has to be a smart balance between technology and the human intelligence. However, telemedicine cannot be the panacea and surely cannot replace old fashioned medicine everywhere especially emergency medicine. More measures are required to make this change more successful and acceptable.

Keywords---telemedicine, telehealth, healthcare.

Introduction

Rising population in the developing nations has generated an ever increasing demand of affordable and equitable health system. Over the past few years, there is an increasing need of quality healthcare.¹⁹ Worldwide, rural population has less access to well-timed as well as good quality medical care because specialist physicians are mostly located in urban areas. Telemedicine is the solution to the problem of delivery of health services in far flung areas.¹⁰ Telemedicine is the use of computers and automated data to deliver technologies and promote healthcare

when the patients are located far away from the professionals.¹¹ It is an important tool that utilizes modern technologies for the delivery of health-care services. It permits healthcare professionals like doctors to diagnose and treat patients using technology without the patients' actual visit to the hospitals. Telemedicine encompasses applications which includes intensive care monitoring, surgeries, disease trends monitoring and public awareness. It also aids in the study, assessment and the current learning activities of health-care employees.¹⁵

Historical perspective

Historically it all started in the 20th century in USA where heart rhythms were sent using phone lines.²⁶ Gradually photos of radiographs were transferred by telephone between different cities in Pennsylvania.⁴ Eventually, the growth of telemedicine was fuelled by NASA.⁵ Secondly, the advancements in telemedicine were aided by introduction of televisions. In the second half of 1950s, the use of television in hospital settings and its acceptance among health workers led to further advancement in this field. The first live video consultation for neurological examinations was done by physicians at University of Nebraska (USA) in 1959.¹³

Technical set up of Telemedicine

The mechanical and manpower requirements vary depending on the type of telemedicine services that the hospital envisages but the basic requirements are the following:

1. High speed broadband internet: high frequency internet connection to connect both the doctor and the patient is a must for providing telehealth services. In developing and underdeveloped countries, it poses as a significant deterrent in the provision of high quality health care. Many rural health care organizations fail to deliver the services because of the lack of these basic infrastructural facilities. High resolution camera devices and proper lighting sources along with high speed broadband connections are a prerequisite of telehealth. They allow doctors to see and hear patients even when they are miles apart. Now a days, digital stethoscopes are used to listen to heart sounds and respiratory sounds over long distances.⁹
2. Availability of trained tech support staff: These are needed to revive the telehealth system in case of disturbances. They complement health care workers in the provision of high quality health care services. These workers are the backbone of the whole system and can work in different sister organizations thereby reducing the running costs.²⁵
3. Technical skill enhancement of participating employees: New challenges necessitate the need to acquire new skills. COVID pandemic has forced the need to learn newer techniques and skills. Healthcare workers have acquired new computer and technological skills in order to cope up with the newer challenges.¹⁸

Utilization of telemedicine

1. 1 Telenursing: implies provision of technology in delivering virtual nursing to patients who are located far off from hospitals or in aged care homes.

Certified nurse works as case managers or do patient triage and regular counseling in call centers who are operated by specialized organizations²². It's an upcoming branch with which the scope of nurses' practice is intensifying. It's very helpful to the regions where there is current shortage of nurses.

2. Tele pathology is also known as digital pathology where the high quality slide imaging and virtual microscopy can be used for teaching, diagnosing and doing scientific research using digital images of microscopic slides. The pathologist can send the samples as an electronic image which can be stored in the database. It is way better than using images of glass slides through the light microscope. It is very helpful to overcome the problem of shortage pathologist in some remote areas.²⁹
3. Teleradiology: allows radiologists to review digital prints from a remote location while sitting in the comfort of his office. This allows for a comprehensive and good quality health care delivery. These remote areas are generally short of medical specialists. It also allows professional opinion from multiple specialists in case of an ambiguity as images to be viewed simultaneously by users in different locations than would otherwise not be possible.⁷
4. Telepharmacy: helps the pharmacist to review the prescription, inform the patients about any possible side effect of medications and do drug refills using telemedicine. It enables a qualified pharmacist working in a major hospital to supervise and train new or junior pharmacy colleagues working in remote areas using audio visual aids.¹⁷
5. Teleophthalmology – it involves transmitting of ophthalmic images to specialists. It combines digital equipment and communication technology that helps in optimizing eye care and monitoring of chronic eye conditions such as diabetic retinopathy which is fairly common. This aids in cost cutting for the government and improves availability of eye specialists for poor and noninsured patients.²⁰
6. Telecardiology is one of the upcoming branches in telemedicine. The patients can send ECG's and other blood reports using telemedicine to experts at the receiving ends. This can provide them with the specialist care even in the far off areas. Telecardiology can also be used to monitor the heart rhythm of patients implanted with pacemakers living in remote locations.²⁴

Advantages of Telehealth

The increasing global population has led to an increased need for the medical professionals. Telehealth provides a wonderful connection between patient and doctor thereby helping in providing aid to diagnose and treat patients. It provides a number of advantages over traditional medicine: ⁸

- Telehealth provides easy contact to patients in remote areas with lack of specialist care. It improves health care delivery with lesser expenditure. ²³
- Significant reduction in time and costs of patient transportation by using telemedicine in peripheral health set-ups. By reducing patient travel and waiting times, it allows for comparable or improved quality of care.
- Monitoring home care in a better way

- Improvises communications between doctors working in different areas
- Local provision of specialized health care where patient cannot be transferred.
- Lifelong care is possible, practical and profitable.
- improved communication between different specialists which leads to improved patient care. This is especially important for emergency physicians working in remote areas e.g. stroke management by neurologists and emergency physicians using telemedicine.¹
- Mental health issues patients are better managed by using the tele psychiatry consultations.¹²

Telemedicine as an emergency tool during the COVID-19 Pandemic

Hospitals in under developed countries have limited resources. COVID pandemic put a lot of strain on the already weak health care infrastructure. The hospitals have limited number of ventilators, beds, and health workers who were not well equipped to tackle situations like this. The infection control equipment like gloves and other PPE were also short in supply. Due to these reasons, many health care facilities were hesitant to offer medical help, fearing threat of COVID virus.²⁷ However, other communicable and non-communicable diseases (NCD) illnesses like diabetes, asthma, maternal and child health services, malnutrition, COPD, cardiac conditions, cancer, and mental disorders, health conditions need proper and timely hospital visits. Guaranteeing basic medical facilities to these patient groups was the biggest issue. Telehealth provided the solution to this problem.²⁸

In the last few years of COVID-19 pandemic, one of the greatest benefit of telehealth was the reduction of consultation in the clinics, hence significantly decreasing the spread of infections from one person to another. In the current pandemic, telemedicine comes with added advantages to both the healthcare providers and receivers:

- A. Individuals with chronic diseases like bronchial asthma, hypertension, and diabetes mellitus conditions are particularly susceptible to COVID-19. These conditions require constant monitoring and medication compliance. Telehealth substitutes clinic visits and provides more protection against COVID in these groups.²¹
- B. Counselling services to patients and their relatives can be provided by using telemedicine without getting exposed to the infections.
- C. Patient load on the hospitals has been reduced by providing diagnosis and treatment to patients by using telemedicine. This automatically reduces the chances of contracting infections during hospital visits.
- D. Setup of Electronic intensive care units (e-ICUs) in certain hospitals has enabled medical professionals to monitor multiple patients at a time. Great developments in telemedicine have been made in this pandemic and it has shown that how the emergence of telemedicine can tackle the ever growing need to face diseases in future.¹⁴

Challenges Faced while Implementing Telemedicine

In last three-decades, various telemedicine were envisaged in various third world countries. Several evaluation studies were directed to evaluate the feasibility of telemedicine.³ Although many noticeable benefits have been provided by telehealth, still it is not very much popular and is under used. Introduction of new systems and processes is often tough.¹⁶ This segment highlights some of the hurdles to the application of telemedicine.

Budget issues for the system development –Telemedicine requires budget and planning to make the remote or developing areas more robust in the field of information and communication. Establishment of Telemedicine Unit requires funds for purchasing the necessary equipment needed at both provider level as well as at the hospital level. Funds are also required for the maintenance and for the training the local healthcare workers on the technology. A huge budget is compulsory to install required infrastructure. Technical constraints like the knowledge of the hardware and software installation needs to be addressed. Frequent support from qualified manpower is also required. In poor and developing countries, high costs of technology and communication expenses sometimes render telemedicine economically unfeasible.

Government Support: Telemedicine solutions and programs requires support from the government, at least in their preliminary phases. Only the state can fund financially and exercise the authority to make it feasible.

Acceptance in the medical fraternity: Doctors are not fully convinced and acquainted with this new technology. Deficiency in the knowledge to use newer Information Communication technology has been reported from physicians as well as from patients leading to lesser inclination for newer technology⁶

Teamwork – The implementation of the telemedicine program requires eminent leaders and experts. This team requires best doctors and IT professionals.²

Future Directions

Telemedicine can certainly play an important role in supporting the development of current healthcare structure from both a patient and healthcare viewpoint. Its future looks bright with more widespread acceptance by more medical professionals and patients in different forms. However, telemedicine cannot be the panacea and surely cannot replace old fashioned medicine everywhere especially emergency medicine. There has to be a smart balance between technology and the human intelligence. They should be complementing each other so as to have a healthier future. Secondly, more measures are required to make this change more successful and acceptable. These measures include more responsibility from the government for the healthcare of its people, more nationwide standards, more patient education, and gradual and updated technological solutions.

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