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Short Communications

Telehealth

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Abstract

Telehealth is the delivery of health-related services and information via telecommunications technologies. Telehealth delivery could be as simple as two health professionals discussing a case over the telephone, or as sophisticated as using videoconferencing between providers at facilities in two countries, or even as complex as robotic technology. Telehealth is an expansion of telemedicine, and unlike telemedicine (which more narrowly focuses on the curative aspect) it encompasses preventive, promotive and curative aspects. Originally used to describe administrative or educational functions related to telemedicine, today telehealth stresses a myriad of technology solutions. For example, physicians use email to communicate with patients, order drug prescriptions and provide other health services..

Around the world, people are living longer and striving to lead independent, happy, and healthy lives. At the same time, we are seeing a dramatic rise in the number of people with illnesses and high costs associated with managing and treating them [1].

The healthcare community is looking for new approaches to meet these challenges and is seeking approaches where [1].

- Patients remain at home
- Patients and clinicians work together to achieve the best outcomes
- Patients are viewed in their totality, including their health status, as well as their social network, and their individual capabilities and preferences

Backed by nearly a decade of ethnographic and health research, Intel believes innovations in personal telehealth technology will help usher in an era of patient management marked by new ways of envisioning the delivery of care [1].

To realize this vision, we are committed to developing technology to better care for the aging and ill personal health solutions that are based on the specific needs of these populations and designed to allow people to age in place and take a more active role in their health management.

Our hope and our expectation is that these telehealth advances will allow people to harness the true power of information from the comfort of their own homes, turning that information into action and better health outcomes.

Out of the 195 countries according to the World Bank, 152 are developing countries. Ironically, developing countries have 84% of the world's population, 93% of the burden of diseases and 11% of the global healthcare spending and it cannot get worse. If we see the geographical spread more than two billion people live in just South Africa and South East Asia. These are the

countries with low income, high population growth, and low standard of living with no significant industrialization. It is important to note that 80% of all deaths happening due to chronic diseases happen in developing countries. These countries have issues with regards to environmental sanitation, safe drinking water, undernourishment, and limited access to preventive and curative care. Approximately 80 % of the DALY's (disability adjusted life years) are lost due to chronic diseases before the age of 60. Illness, ignorance, and poverty are a three-headed monster. Adding to the already over-burdened, underfunded healthcare system is the rate at which these countries are growing old. These countries will become old before they become rich. It is estimated that by 2030, elderly population will grow to 22% of the population. There will be more people above the age of 60 than the children below 15 years [2].

The only way to address the current healthcare needs is to fuse basic healthcare with basic technology

Developing countries have a poor doctor-patient ratio. For some countries in Africa, there is one doctor for every 50,000 people. South Africa has 1.3% of the health professionals but 25% of the global burden of diseases. No doubt that people in these countries spend a greater portion of their income on healthcare. Developing countries can be rightly classified as HPSA – Health Professional Shortage Areas [2].

Telehealth is the delivery of health-related services and information via telecommunications technologies. Telehealth delivery could be as simple as two health professionals discussing a case over the telephone, or as sophisticated as using videoconferencing between providers at facilities in two countries, or even as complex as robotic technology [3].

Telehealth is an expansion of telemedicine, and unlike telemedicine (which more narrowly focuses on the curative aspect) it encompasses preventive, promotive and curative aspects. Originally used to describe administrative or educational functions related to telemedicine, today telehealth stresses a myriad of technology solutions. For example, physicians use email to communicate with patients, order drug prescriptions and provide other health services [3].

Telehealth provides remote physiologic monitoring of patients with chronic illness such as diabetes mellitus or heart failure. Most commonly, it is provided at homes in conjunction with nurse home visits. Chronically ill patients use devices that measure blood pressure, weight, blood oxygen or glucose levels on a daily basis. Healthcare providers, patients and family caregivers closely monitor the readings and rapidly respond to deviations from normal. Several studies have shown the benefits of telehealth in providing rapid response and, therefore, reducing hospitalization and emergency department use. The benefits are many, but the technology does present some challenges for the agency providing the services. Here is a look at suggested strategies to overcome the challenges and provide successful, cost-effective telehomecare [4].

The outcome of telehomecare intervention is heavily, if not completely, dependent on the people providing the intervention. Their attitude towards the value of the technology is important to a successful programme. Often, the attitude starts from the top management. Management must communicate the value of the programme to their staff and implement support structures that enable operations to proceed. For example, managers must recognize that telehealth adds time to the nurse's day because of equipment set-up and patient teaching. Expectations about productivity may need to be adjusted. Also, the staff must be properly trained for installing and using the equipment. One strategy when developing the procedures for the programme is to get staff at all levels of operation involved in conversation, education and feedback. Any barriers should be identified and solutions devised [4].

Clinical uses of telehealth technologies [3]

- Transmission of medical images for diagnosis (often referred to as store and forward telehealth)
- Groups or individuals exchanging health services or education live via videoconference (real-time telehealth)
- Transmission of medical data for diagnosis or disease management (sometimes referred to as remote monitoring)
- Advice on prevention of diseases and promotion of good health by patient monitoring and follow-up.
- Health advice by telephone in emergent cases(referred to as teletriage)

Nonclinical uses of telehealth technologies [3]

- Distance education including continuing medical education, grand rounds, and patient education
- Administrative uses including meetings among telehealth networks, supervision, and presentations
- Research on telehealth
- Online information and health data management
- heathcare system integration
- asset identification, listing, and patient to asset matching, and movement
- overall healtcare system management

- patient movement and remote admission

Telehealth modes [3]

Store-and-forward telehealth

In store-and-forward telehealth, digital images, video, audio and clinical data are captured and "stored" on the client computer; then at a convenient time transmitted securely ("forwarded") to a clinic at another location where they are studied by relevant specialists. The opinion of the specialist is then transmitted back. Based on the requirements of the participating healthcare entities, this roundtrip could take between 2 to 48 hours. In many store-and-forward specialties, such as teleradiology, an immediate response is not critical. Dermatology, radiology and pathology are common specialties that are conducive to store-and-forward technologies

Real-time telehealth

In real-time telehealth, a telecommunications link allows instantaneous interaction. Video-conferencing equipment is one of the most common forms of synchronous telemedicine. Peripheral devices can also be attached to computers or the video-conferencing equipment which can aid in an interactive examination. With the availability of better and cheaper communication channels, direct two-way audio and video streaming between centers through computers is leading to lower costs.

Examples of real-time clinical telehealth include:

- Telemental health-- the use of videoconferencing technology to connect a psychiatrist with a mental health client
- Telerehabilitation
- Telecardiology
- Teleneurology
- Telenursing
- Teleradiology
- Teledentistry

Remote patient monitoring

In remote monitoring, sensors are used to capture and transmit biometric data. For example, a tele- EEG device monitors the electrical activity of a patient's brain and then transmits that data to a specialist. This could be done in either real time or the data could be stored and then forwarded.

Examples of remote monitoring include:

- Home-based nocturnal dialysis[5]
- Cardiac and multi-parameter monitoring of remote ICUs
- Home telehealth
- Disease management

Benefits of Telehealth [2]

- Outpatient visits are about seven times more expensive than electronic consultation
- Rural population doesn't need to travel to difficult terrains
- Telemonitoring can avoid white coat hypertension
- CVD is the cause of death for 65 % of diabetic patients. If telehealth is introduced the death rate can reduce to 58.5%. With telehealth 10% of the pre-diabetic patients will not develop diabetes.
- Telemonitoring can reduce emergency room visits
- Telemonitoring can get timely interventions thus saving lives
- Telehealth can deliver direct to patient service – educational, preventive, and administrative
- Telehealth has been known for fewer human interventions, thus reducing the chances of human errors
- Fewer missed appointments
- Increased compliance and adherence to treatments
- Improved coordination
- Universal access to EMR and specialist advice
- Telehealth empowers the chronic patients for self & managed care. Allows home-based health
- Telephone/eConsult lasts approximately 10 minutes compared to 3-6 minutes for consultation with a doctor
- Privacy is protected
- Patient-centric care
- Equivalent outcomes at lower costs.

Different controlled studies have shown that telehealth in chronic patients leads to 40% reduction in emergency room visits, 63% reduction in re-hospitalisations, 22% reductions in total bed days, and cost of care is 27% less in telemonitoring groups [2].

It is stated in a few reports that disease management saves USD 4.8 for every dollar spent and telehealth saves USD 5.6 for every dollar spent [2].

Disadvantages of Telehealth [6]

Although telehealth clearly has a wide range of potential benefits, it also has some disadvantages. The main ones that can be envisaged are:

1. A breakdown in the relationship between health professional and patient

2. A breakdown in the relationship between health professionals

3. Issues concerning the quality of health information

4. Organizational and bureaucratic difficulties

On balance, the benefits of telemedicine are substantial, assuming that more research will reduce or eliminate the obvious drawbacks.

Challenges for implementation of Telehealth in the India [7]

The telehealth initiative in India has not been free of challenges and controversies. There are inevitable difficulties associated with the introduction of new systems and technologies.

Expensive technologies are simply out of the reach of health organizations in developing countries, which may have more immediate priorities (such as providing nutrition, sanitation and vaccinations to the population). Developing countries need low-cost, sustainable solutions for the local delivery of primary healthcare and efficient access to medical expertise, when needed. In addition to all the normal barriers to telehealth, developing countries potentially have a number of unique difficulties, such as:

a) Infrastructural Inadequacy

The inadequacy of the infrastructure includes the following:

i) The majority of rural and remote health-providers do not have access to telecommunications infrastructure that will support anything other than basic exchange of electronic information, such as e-mail. Technology infrastructure to enable the provision of telehealth clinical services requires, in general, high bandwidth communications facilities, which are at present expensive to install or make available to end-users, and for the end users to connect with and to use.

ii) Lack of money to purchase the technology or telecommunications

iii) Limited numbers of people, who know how to operate, install or repair the technology or telecommunications

iv) Limited access to parts for repair

v) Limited access to electricity and unstable electrical supply

vi) Health-care system that may be poorly organized and poorly funded

vii) Limited number of health-professionals

b) Lack of Government-Support

Any technology especially in its primary stage needs care and support. Only the government has the resources and the power to help it survive and grow. But most of the third-world countries are not the favored ones. Mostly, no such initiatives are taken by the government to develop telemedicine.

c) Patients' Fear and Unfamiliarity

There is a lack of confidence in patients, about the outcome of telemedicine, due to lack of education. The main problem is that any treatment consists of two factors, first is chemotherapy i.e. treatment by medicines and the other is psychotherapy that means treatment by emotions, which is absent in e-medicine.

d) Licensure and Accreditation

Telemedicine creates conflicts between states, or countries, over the rules and regulations of accreditation and licensure. Medical licenses are issued by states, and therefore it becomes illegal to practice medicine in any other state, since rules for accreditation may differ between them.

Limitations of Tele-Health [7]

• Poor relationships between Patient & healthcare provider

• Poor relationships between Healthcare Professionals

• Need for Additional training

• Interference in Organizational Affairs

• Difficult Protocol Development

• Incompatible Technology

• Under-utilisation

Projects on Telehealth in India-few examples [8]

i) **Real-Time Bio-Surveillance Program (RTBP): Directorate of Public Health and Preventive Medicine, Tamil Nadu, India**

This is an example of mobile Tele-Health application in disease surveillance project of the Government. This project is a collaboration of IITM's Rural Technology and Business Incubator (RTBI), LIRNEasia, Sri Lanka, National Centre for Biological Sciences, Bangalore and Department of Health and Family Welfare, Tamil Nadu., The Directorate of National Vector Borne Disease Control Programme in India publishes the status on their website, from data being collected through paper based system.

ii) **Sustainable Telehealth Network for preventive and curative interventions – World Health Partners & Neurosynaptic Communications, Uttar Pradesh, India**

This project is an example of Tele-Health in a large network delivering routine curative/palliative care delivery linking rural and urban entities and personnel, run by a not-for-profit organization. This project is a Tele-Health initiative of World Health Partners in collaboration with private and NGO resources harnessing technology and existing social and economic infrastructure.

iii) **Remote Continued Medical Education (CME) network – Sanjay Gandhi Post Graduate Institute of Medical Sciences(SGPGIMS), Lucknow, India**

This is an example illustrating Telehealth infrastructure adoption in education to medical personnel, by medical education institutions. In one initiative, SGPGIMS is spear-heading several pioneering initiatives of Tele-Health in form of continued education, disease surveillance and other allied area in collaboration with a number of hospitals across the country.

The way forward for Telehealth [2]

Despite countries like the US that spend over USD 7000 per capita the healthcare issues remain unaddressed. So there is a lesson to be learnt that just spending more on healthcare does not solve the problem. We don't need just healthcare delivery, but pro-activeness and innovation in healthcare delivery to address the issue. We will have to reduce healthcare cost, avoid chronic disease burden and increase positive outcomes.

Telehealth should be used as the de facto POC (point of care) tool for preventive care and follow up care in chronic disease management.

Seeing the situation in developing countries telehealth is the only economically viable way to address the elderly population, rural areas, preventive care, chronic diseases, and increasing healthcare costs within current limitations.

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