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TELEMEDICINE

INTRODUCTION:

Telemedicine applications play an increasingly important role in health care and provide tools that are indispensable for home health care, remote patient monitoring, and disease management that encompasses not only rural health and battlefield care, but nursing home, assisted living facilities, and aviation applications. Advances in technology including wireless connectivity and mobile devices will give practitioners, medical centers, and hospitals important new tools for managing patient care, electronic records, and medical billing to ultimately enable patients to have more control of their own well being. As the nation once more addresses health care reform, the contributions of telemedicine need to be fully understood and appreciated and reimbursement policies must be in place for these applications

DEFINITION:

Telemedicine can be defined as, the use of modern information technology, especially two-way interactive audio/video Tele-communications, computers, and telemetry to deliver health services to remote patients and to facilitate information exchange between primary care physicians and specialists at some distance from each other.

BASICS OF TELEMEDICINE APPLICATION:

1. Delivery of health services by health care professionals.

2. Using communication education technology

3. For diagnosis, treatment, research,evaluation& continuing education

4. Distance is a matter

5. In interest of advancing the health of individual and other communities. (WHO)

HISTORY OF TELEMEDICINE:

- Care at a distance (also called in absentia care), is an old practice which was often conducted via post; there has been a long and successful history of in absentia health care, which - thanks to modern communication technology - has evolved into what we known as modern telemedicine.
- In its early manifestations, African villagers used smoke signals to warn people to stay away from the village in case of serious disease. In the early 1900s, people living in remote areas in Australia used two-way radios, powered by a dynamo driven by a set of bicycle pedals, to communicate with the Royal Flying Doctor Service of Australia.

- The first interactive Telemedicine system, operating over standard telephone lines, for remotely diagnosing and treating patients requiring cardiac resuscitation (defibrillation) was developed and marketed by Med Phone Corporation in 1989. A year later the company introduced a mobile cellular version, the MDphone. Twelve hospitals in the U.S. served as receiving and treatment centers.
- Monitoring a patient at home using known devices like blood pressure monitors and transferring the information to a caregiver is a fast growing emerging service. These remote monitoring solutions have a focus on current high morbidity chronic diseases also.
- In developing countries a new way of practicing telemedicine is emerging better known as Primary Remote Diagnostic Visits whereby a doctor uses devices to remotely examine and treat a patient. This new technology and principle of practicing medicine holds big promises to solving major health care delivery problems.
- Primary Remote Diagnostic Consultations not only monitors an already diagnosed chronic disease, but has the promise of diagnosing and managing the diseases that a patient will typically visit a general practitioner

SPECIALITIES IN TELEMEDICINE:

Telemedicine covers a growing number of medical specialties such as

- Cardiology
- Homecare
- Radiology
- Emergency care
- Surgery

- Dermatology
- Psychiatry
- Oncology
- Pathology
- Ophthalmology
- Hematology
- E.N.T.
- Nephrology

Emergency telemedicine:

- A recent study identified three major barriers to adoption of telemedicine in emergency and critical care units. They include:
- Regulatory challenges related to the difficulty and cost of obtaining licensure across multiple states, malpractice protection and privileges at multiple facilities.
- Lack of acceptance and reimbursement by government payers and some commercial insurance carriers creating a major financialbarrier, which places the investment burden squarely upon the hospital or healthcare system.

Tele-nursing:

- Tele-nursing refers to the use of telecommunications and information technology in order to provide nursing services in health care whenever a large physical distance exists between patient and nurse, or between any number of nurses. As a field it is part of Tele-health, and has many points of

contacts with other medical and non-medical applications, such as Tele-diagnosis, Tele-consultation, Tele-monitoring, etc.

- Tele-nursing is achieving significant growth rates in many countries due to several factors:
- the preoccupation in reducing the costs of health care, an increase in the number of aging and chronically ill population, and the increase in coverage of health care to distant, rural, small or sparsely populated regions.
- Among its benefits, Tele-nursing may help solve increasing shortages of nurses; to reduce distances and save travel time, and to keep patients out of hospital. A greater degree of job satisfaction has been registered among Tele-nurses.

Tele-pharmacy

- Tele-pharmacy is the delivery of pharmaceutical care via telecommunications to patients in locations where they may not have direct contact with a pharmacist.
- It is an instance of the wider phenomenon of telemedicine, as implemented in the field of pharmacy. Tele-pharmacy services include drug therapy monitoring, patient counseling, prior authorization and refill authorization for prescription drugs, and monitoring of formulary compliance with the aid of teleconferencing or videoconferencing.
- Remote dispensing of medications by automated packaging and labeling systems can also be thought of as an instance of Tele-pharmacy. Tele-

pharmacy services can be delivered at retail pharmacy sites or through hospitals, nursing homes, or other medical care facilities.

Tele-rehabilitation:

- Tele-medicine is the delivery of rehabilitation services over telecommunication networks and the Internet. Most types of services fall into two categories: clinical assessment (the patient's functional abilities in his or her environment), and clinical therapy.
- Some fields of rehabilitation practice that have explored Tele-rehabilitation are: Neuropsychology, Speech-language pathology, audiology, occupational therapy, and physical therapy. Tele-rehabilitation can deliver therapy to people who cannot travel to a clinic because the patient has a disability or because of travel time.
- Two important areas of Tele-rehabilitation research are
  - (1) demonstrating equivalence of assessment and therapy to in-person assessment and therapy, and (2)
  - (2) Building new data collection systems to digitize information that a therapist can use in practice. Ground-breaking research in Tele-haptics (the sense of touch) and virtual reality may broaden the scope of Tele-rehabilitation practice, in the future.

Tele-trauma care:

- Telemedicine can be utilized to improve the efficiency and effectiveness of the delivery of care in a trauma environment. Examples include:

- Telemedicine for trauma triage: Using telemedicine, trauma specialists can interact with personnel on the scene of a mass casualty or disaster situation, via the internet using mobile devices, to determine the severity of injuries.
- They can provide clinical assessments and determine whether those injured must be evacuated for necessary care. Remote trauma specialists can provide the same quality of clinical assessment and plan of care as a trauma specialist located physically with the patient.

Telemedicine in the trauma operating room:

- Trauma surgeons are able to observe and consult on cases from a remote location using video conferencing. This capability allows the attending to view the residents in real time.
- The remote surgeon has the capability to control the camera (pan, tilt and zoom) to get the best angle of the procedure while at the same time providing expertise in order to provide the best possible care to the patient.

Tele-cardiology:

- ECGs, electrocardiographs, can be transmitted using telephone and wireless. Willem Einthoven, the inventor of the ECG, actually did tests with transmission of ECG via telephone lines.
- This was because the hospital did not allow him to move patients outside the hospital to his laboratory for testing of his new device.

Tele-transmission of ECG using methods indigenous to Asia

- This system enabled wireless transmission of ECG from the moving ICU van or the patients home to the central station in ICU of the department of Medicine. Transmission using wireless was done using frequency

modulation which eliminated noise. Transmission was also done through telephone lines.

- The ECG output was connected to the telephone input using a modulator which converted ECG into high frequency sound. At the other end a demodulator reconverted the sound into ECG with a good gain accuracy. The ECG was converted to sound waves with a frequency varying from 500 Hz to 2500 Hz with 1500 Hz at baseline.
- This system was also used to monitor patients with pacemakers in remote areas. The central control unit at the ICU was able to correctly interpret arrhythmia. This technique helped medical aid reach in remote areas.
- In addition, electronic stethoscopes can be used as recording devices, which is helpful for purposes of Tele-cardiology. There are many examples of successful Tele-cardiology services worldwide.

Tele-psychiatry:

- Tele-psychiatry, another aspect of telemedicine, also utilizes videoconferencing for patients residing in underserved areas to access psychiatric services. It offers wide range of services to the patients and providers, such as consultation between the psychiatrists, educational clinical programs, diagnosis and assessment, medication therapy management, and routine follow-up meetings.
- Most Tele-psychiatry is undertaken in real time (synchronous) although in recent years research at UC Davis has developed and validated the process of asynchronous Tele-psychiatry.
- Recent reviews of the literature by Hilty et al. in 2013, and by Yellowlees et al. in 2015 confirmed that Tele-psychiatry is as effective as in-person

psychiatric consultations for diagnostic assessment, is at least as good for the treatment of disorders such as depression and post traumatic stress disorder, and may be better than in-person treatment in some groups of patients, notably children, veterans and individuals with agoraphobi.

Tele-radiology:

- Tele-radiology is the ability to send radiographic images (x-rays, CT, MR, PET/CT, SPECT/CT, MG, US...) from one location to another.For this process to be implemented, three essential components are required, an image sending station, a transmission network, and a receiving-image review station. The most typical implementation are two computers connected via the Internet.
- The computer at the receiving end will need to have a high-quality display screen that has been tested and cleared for clinical purposes. Sometimes the receiving computer will have a printer so that images can be printed for convenience.
- The Tele-radiology process begins at the image sending station. The radiographic image and a modem or other connections are required for this first step. The image is scanned and then sent via the network connection to the receiving computer.
- Today's high-speed broadband based Internet enables the use of new technologies for Tele-radiology: the image reviewer can now have access to distant servers in order to view an exam.
- Therefore, they do not need particular workstations to view the images; a standardpersonal computer (PC) and digital subscriber line (DSL) connection is enough to reach keosys central server. No particular software

is necessary on the PC and the images can be reached from wherever in the world.

- Tele-radiology is the most popular use for telemedicine and accounts for at least 50% of all telemedicine usage.

Tele-pathology:

- Tele-pathology is the practice of pathology at a distance. It uses telecommunications technology to facilitate the transfer of image-rich pathology data between distant locations for the purposes of diagnosis, education, and research. Performance of Tele-pathology requires that a pathologist selects the video images for analysis and the rendering diagnoses.
- The use of "television microscopy", the forerunner of Tele-pathology, did not require that a pathologist have physical or virtual "hands-on" involvement is the selection of microscopic fields-of-view for analysis and diagnosis.
- Tele-pathology has been successfully used for many applications including the rendering histopathology tissue diagnoses, at a distance, for education, and for research.
- Althoughdigital pathology imaging, including virtual microscopy, is the mode of choice for Tele-pathology services in developed countries, analog Tele-pathology imaging is still used for patient services in some developing countries.

Tele-dermatology:

- Tele-dermatology allows dermatology consultations over a distance using audio, visual and data communication, and has been found to improve efficiency.
- Applications comprise health care management such as diagnoses, consultation and treatment as well as (continuing medical) education. The dermatologists Perednia and Brown were the first to coin the term "Tele-dermatology" in 1995.
- In a scientific publication, they described the value of a Tele-dermatologic service in a rural area underserved by dermatologists.

Tele-dentistry:

- Tele-dentistry is the use of information technology and Tele-communications for dental care, consultation, education, and public awareness in the same manner as Telehealth and Telemedicine.

Tele-audiology:

- Tele-audiology is the utilization of Telehealth to provide audiological services and may include the full scope of audiological practice.
- This term was first used by Dr Gregg Givens in 1999 in reference to a system being developed at East Carolina University in North Carolina, USA.

Tele-ophthalmology:

- Tele-ophthalmology is a branch of telemedicine that delivers eye care through digital medical equipment and telecommunications technology.
- Today, applications of Tele-ophthalmology encompass access to eye specialists for patients in remote areas, ophthalmic disease screening, diagnosis and monitoring; as well as distant learning.
- Teleophthalmology may help reduce disparities by providing remote, low-cost screening tests such as diabetic retinopathy screening to low-income and uninsured patients.

Tele- ENT:

- An innovative telemedicine network for the comprehensive provision of care for ENT medical conditions was successfully launched within structurally weak areas.
- Illnesses of the ear, nose and throat are common and often ambiguous. In individual cases, seemingly trivial complaints can quickly develop into diseases with considerable impairment or threat to health. For this reason, comprehensive coverage of the population is necessary. This is, however, increasingly turning into a bottleneck situation, especially in the less-densely populated areas in the north-eastern part of the country.
- Telemedicine technology is used to ensure provision of ENT specialist skills, i.e. to improve patient treatment and care.
- The focus of the network is on conciliary emergency care at night and on weekends. At these times, the physicians in the partner hospitals create videos or photos, and then send them to Greifswald.

- Thus, the ENT specialists – and, if necessary, together with physicians from other disciplines – have access to x-rays, laboratory results and other patient information. The case conference is held in this way, and ends with a recommendation on treatment.
- These recommendations are described in detail and cover all the relevant information in writing; they are then sent back to the local physician over the Tele-ENT system as a PDF file. The physician can then decide on the further care and treatment of the patient with sole and exclusive responsibility.

Tele- nephrology:

- It is a process utilized by a Nephrologist, as well as other doctors and specialists, to reach patients in remote locations, as well as improve consults. It is a complex integrated service that is used in medical facilities, doctor's offices, and other medical centers around the world. It is a spin off from telemedicine, which has been around for more than 50 years.
- Technology has changed drastically over that time. It all began with the use of electromagnetic signals and being able to send information among long distances. Think the telegraph, radio, and telephone; these were early forms of communication.
- However, it wasn't until the beginning of the 20th century that people began to see how these items could be used to further the medical field.
- A Nephrologist is a doctor who handles problems with the kidneys. The first Tele-nephrology system was introduced in 2009 by giving it to five family practices to try. By 2011, more than 28 facilities were utilizing this system, as well as 5 hospitals solely for nephrology care. Nurse practitioners became very important, as they worked on behalf of the family physician to lighten t

Tele-homecare:

- THC is a subfield within Tele-health. It involves the delivery of healthcare services to patients at home through the use of telecommunications technologies, which enable the interaction of voice, video, and health-related data. The management of care is done from an external site by a healthcare professional.
- It is often interchanged with remote patient monitoring however, Tele-homecare is not strictly patient monitoring because it incorporates a range of health care delivery through education, emotional and social support, information dissemination, and self-care help and suggestions.
- The implementation of THC helps to better manage patients with chronic health conditions such as heart disease, COPD, diabetes, etc., and less visits to primary health care services can result. THC increases the accessibility to health care services especially as the need for homecare rises with the aging population.
- Additionally, THC can help create networks of services between hospitals and primary care providers, thereby allowing patients better access to services. In addition to improving management of chronic conditions and increasing access to healthcare, THC is believed to reduce costs of healthcare.

Tele-Oncology

A variety of cancer services are offered to MCA members through the Tele-Oncology Service, which is sponsored by the University of Kansas Cancer Center and the University of Kansas Center for Telemedicine and Tele-health.

The services include:

- Facilitation of clinical consultations via interactive Tele-video
- Live presentation of continuing and community education events via ITV
- Technical and research consultation; and state-of-the-art video production.

Tele-surgery:

- Remote surgery (also known as Telesurgery) is the ability for a doctor to perform surgery on a patient even though they are not physically in the same location. It is a form of Tele presence.
- Remote surgery combines elements of robotics , cutting edge communication technology such as high-speed data connections, elements of management information system While the field of robotic surgery is fairly well established, most of these robots are controlled by surgeons at the location of the surgery.
- Remote surgery is essentially advanced telecommunicating for surgeons, where the physical distance between the surgeon and the patient is immaterial.
- It promises to allow the expertise of specialized surgeons to be available to patients worldwide, without the need for patients to travel beyond their local hospital.
- Remote surgery or Telesurgery is performance of surgical procedures where the surgeon is not physically in the same location as the patient, using a robotic Tele-operator system controlled by the surgeon.
- The remote operator may give tactile feedback to the user. Remote surgery combines elements of robotics and high-speed data connections. A critical

limiting factor is the speed, latency and reliability of the communication system between the surgeon and the patient, though trans-Atlantic surgeries have been demonstrated.

THERAPIES USED BY TELEMEDICINE:

Tele behavioral therapy:

- A behavioral therapy program using telemedicine (e.g. Skype) has been shown to be effective in both research studies and in usual clinic practice. The process is the similar to individual face to face therapy. You 'meet' the therapist on camera, in your own home or local clinic and they offer treatment from their clinic.
- The procedures in the therapy should be the same and cover the same material, which can be sent electronically, which is also convenient.
- The program should be the same length as face to face treatment and results of effectiveness appear to be similar. Using telemedicine means that people do not have to miss work or school through travel to clinics.

- We asked some people to feedback on the experience of having therapy for tic management using telemedicine. The information below was kindly written by a teenager and an adult who had behavioural therapy for tics using telemedicine:

TELE MUSIC THERAPY

- As a therapist, my mind always asks "What part could music therapy play with this? Today, we're talking about Telemedicine technology. Be sure to catch parts 1 and 2 from last week!

- Increasingly, music therapists find themselves as integral parts of interdisciplinary teams. If a music therapist works at a hospital that owns one of these devices, all they need is an i-Pad to join in on team meetings with patients.

What role could music therapy play?

- Increasingly, music therapists find themselves as integral parts of interdisciplinary teams. If a music therapist works at a hospital that owns one of these devices, all they need is an i-Pad to join in on team meetings with patients.

- I imagine assisted living facilities for older adults using these devices for medical care of their patients. As having a music therapist travel out to these facilities, particularly those in remote locations, can prove costly, perhaps the music therapist could lead sessions from a central location.

- The therapist could facilitate multiple group and individual sessions in the span of a single morning across a vast geographical footprint.

Telemedicine Vs in-person therapy to treat bulimia nervosa

- Newer ways of delivering mental health services are bringing many treatment options to people with eating disorders. For example, telemedicine or the internet can now be used to deliver therapy to people who live in areas with limited access to mental health professionals.
- Numerous authors, such as Mair and Whitten, have reported that delivery of mental health services through telemedicine is equivalent to traditional in-person service for treating both children and adults with depression.

- Dr. James Mitchell and colleagues have shown that delivering a manual-based empirically supported treatment for bulimia nervosa (BN) via telemedicine was generally as successful as delivering the treatment in person
- All patients and therapists completed the at 2, 8, and 16 weeks. At the 2-week point, patients completed the suitability of treatment and expectation of success measures.

GROWTH OF TELEMEDICINE APPLICATIONS:

2001:Tele-radiology-still images

2002:Tele-cardiology-moving images

2003:Tele-pathology,Tele-ophthalmology.

2004:Tele-oncology, Tele-surgery

2005: Mobile Tele health-augmentation

2006:Telemedicine for primary healthcare-VRC

TYPES OF TELEMEDICINE:

Telemedicine is practiced on the basis of two concepts:

- Real time[synchronous]
- Store-and-forward[asynchronous].

Real time telemedicine:

- It could be as a telephone call or as complex as robotic surgery. It requires the presence of both parties at the same time and a communication link between them that allows a real-time interaction to take place.
- Video-conferencing equipment is one of the most common form of technologies used in synchronous telemedicine.There are also peripheral devices which can be attached to computers or the video-conferencing equipment which can aid in an interactive examination.For instance, a Tele-otoscope allows a remote physician to see inside a patient's ear; a Tele-stethosecope allows the consulting remotephysician to hear the patient's heartbeat.
- Medical specialties conducive to this kind of consultation includes psychiatry, family practice, obstetrics, gynecology, neurology, and pharmacy.

Store-and-forward telemedicine:

- It involves acquiring medical data and then transmitting this data to a doctor or medical specialist at a convenient time for assessment offline. It does not require the presence of both parties at the same time.
- Dermatology, radiology, and pathology are common specialties that are conducive to asynchronous telemedicine. A properly structured medical record preferably in electronic form should be a component of this transfer.
- Telemedicine is the most beneficial for populations living in isolated communities and remote regions and is currently being applied in virtually all medical domains.
- Specialties that use telemedicine often use a "Tele"- prefix; for example, telemedicine as applied by radiologists is called Tele-radiology. Similarly telemedicine as applied by cardiologists is termed as Tele-cardiology,etc.

APPLICATION OF TELEMEDICINE:

- Rural health
- School health
- Prison health
- Emergency medicine health
- Home health care
- Disaster management
- Military telemedicine

TECHNOLOGY TRENDS IN TELEMEDICINE:

- The concept of telemedicine was introduced more than 30 years ago through the use of telephone and slow scan images. However the enabling technology has grown considerably in the past decade.
- The term telemedicine in short refers to the utilization of telecommunication technology for medical diagnosis, treatment and patient care.
- Telemedicine system consists of customized medical software integrated with computer hardware, along with medical diagnostic instruments connected to the commercial VSAT (Very small Aperture terminal) at each location or fiber optics.
- The greatest impact of telemedicine may be in fulfilling its promise to improve the quality, increase the efficiency and expand the access of health care delivery system to the rural population and developing countries.

- Third generation wireless cellular system will offer video telephony that can facilitate the transfer of real time images to help with communication between a patient or a care giver and health professionals.
- Interestingly this technology offers exactly the kind of cost effective solutions for the specific needs arise in the rural area situation. Being cost effective it opens an innovative way to connect rural areas to the cities.
- These techniques promise to greatly improve the cost and convenience associated with long term outpatient monitoring and could potentially extend monitoring to the broader healthy population for preventive diagnostics and alerts. while research into Tele-surgery helps to jump start robotics in the operating room, distant operations have remained an elusive application. However it may eventually prove to be one of the most significant uses of robotic surgery.

AREAS OF TELEMEDICINE:

- Many users consider telemedicine a partial solution to problems of delivering health care to remote areas or areas underserved by clicians.
- Current Tele-medical technology benefits from recent developments such as the decreased cost and improved quality of the coder decoder (codec) equipment used in interactive digital video systems and the expansion of fiber-optic cable networks.
- The authors outline some pioneering telemedicine programs of the 1960s and 1970s and describe two recently activated systems in Texas. One network, serving the western two-fifths of the state, links faculty members from four campuses of Texas Tech University Health Sciences Center with almost 40 rural communities.

- The other connects the state hospital and three other facilities in Austin with four health care sites in the town of Giddings, 65 miles away. Besides serving patients, the systems provide continuing medical education and support to reduce the isolation of rural health care professionals.
- Primary goals include evaluation and certification of Tele-medical training and analysis of the cost feasibility of Tele-medical services.

TECHNIQUES OF TELEMEDICINE:

- Telemedicine is a rapidly evolving field as new technologies are implemented for example for the development of wireless sensors, quality data transmission.

- Using the Internet applications such as counseling, clinical consultation support and home care monitoring and management are more and more realized, which improves access to high level medical care in underserved areas.

JOB OPPORTUNITIES FOR NURSING IN TELEMEDICINE:

- Tele-health nurse leader
- Tele-health nurse in medical surgical
- Tele-health nurse in orthopedics
- Tele health nurse practioner
- Tele health clinical staff nurse
- Nurse assistant
- Tele health clinical care coordinator
- Tele health case manager
- Telehealth admission counselor

- Patient care technician
- Clinical resource nurse
- Clinical quality analyst
- Office coordinator
- Personal assistant
- Telemetry technician
- Triage advice nurse
- Clinical instructor
- Home care case manager
- Nurse account manager
- Nurse supervisor
- Clinical care coordinator
- Tele communication specialist
- Physical therapist
- Promotion assistant
- New product launch manager

TELE EEG:

- This paper reports an experience in the setting-up and evaluation of a telemedicine solution to provide an electroencephalography service between a secondary hospital placed in Calahorra (Calahorra Hospital Foundation, FHC) and a tertiary hospital placed in Logroño (San Pedro Hospital, HSP).
- We have evaluated technical and clinical aspects of the Tele-EEG (electroencephalography) service as well as the impact over patients, health staff and hospital organization for 6 months. During this period, there have been performed a total of 116 clinical consultations.

- With reference to patients' opinion, 98% of them stated to be satisfied with the new Tele-EEG system and 75% of them preferred it rather than the conventional one, due to they reduce traveling expenses and the total invested time in the EEG test.
- This new service has been also very appreciated by medical staff, who assure thanks to the Tele-EEG service the access for patients to this type of clinical test is improved.

TELENURSING – VEDIO CONFERENCING:

- Telemedicine and Tele-health solutions powered by Video are increasingly vital in a world where doctors are in short supply, costs are on the rise and communities lack access to care.

- Hospitals, research centers and physician clinics can visually connect their patients with healthcare professionals for everything from routine checkups and home health services to Tele-stroke assessments and surgical consults.

- The Video VirtualDesign service ensures success for care providing organizations looking to implement effective and sustainable Tele-health programs.

- VirtualDesign is comprised of a proven repeatable framework for Tele-health program design and is complemented by live coaching from experts with years of experience and expertise in building and deploying successful Tele-health programs.

- Specialists in the field of neurology are using video conferencing to schedule virtual office visits with patients in rural areas where hospitals and clinics may not have an on-staff neurologist.

- In cases of stroke, neurologists can be connected in minutes for a remote patient consult in order to provide a timely and sometimes living-saving assessment and diagnosis.

- Along with Tele-stroke, Video solutions also support Tele-neurology in the treatment of dementia, epilepsy, multiple sclerosis, Parkinson's disease, and other condition

- The REACH Health telemedicine platform is gaining acceptance in America's emergency rooms, ICUs and patient rooms for neurology, Pulmonology, cardiology, psychiatry and other applications.

- The software-based REACH system is integrated with Video's video collaboration platform to improve clinical workflow and enable remote consults. Medical experts can connect in minutes from any location to observe and interact with a patient, check vital signs, and review lab data as if they are at the patient's bedside.

TELEMEDICINE IN NURSING EDUCATION:

- Many nurses around the world provide expert nursing care through distance technologies but few undergraduate programmes expose nursing students to the full range of technologies available.

- Nursing education in Telehealth needs to reflect the roles and responsibilities and capacity for knowledge building and innovation of the various constituencies within the profession.
- Registered nurses and advanced practice nurses will need complementary but different knowledge and skills than nurse administrators.
- The former will need technical proficiency in using common Tele-health modalities and the ability to integrate Tele-health in their practices.

BENEFITSOF TELEMEDICINE:

- The specialist actually hears your medical history and current condition directly from you and your provider instead of the specialist receiving a dictated note in the mail.
- With the use of ENT medical peripherals such as a nasopharyngoscope, your provider can pass this medical peripheral into your nasal passage which will allow your provider and the ENT specialist simultaneous crystal clear video of your throat and vocal cords.
- The specialist may ask you to cough, pronounce letters, etc. in order to get the best outcome for the diagnosis.The specialist can diagnose and recommend treatment immediately.
- Your provider has the opportunity throughout the examination to ask questions and learn from each and every consultation. The continual education of your provider via medical consultations is an immeasurable benefit to all his patients.

CONDITIONS RECOVERED THROUGH TELEMEDICINE:

Top 5 health conditions for telemedicine treatment:

- **Active heart monitoring**
  For at-risk patients, wireless heart monitoring devices have already proven to reduce hospitalization through early detection of heart failure.

- In addition, these devices are able to limit the time that physicians spend looking at data that is not pertinent, Brisbourne says, since they only send notifications with information that is outside an acceptable range.

- **Blood pressure**
  Wireless sensor nodes have become cost-effective, compact and energy efficient, which allows for continuous cycle reporting and electronic dispatch in urgent situations.

- It is important, however, to distinguish in this category between "critical monitoring" and "convenience monitoring." The former is able to account for stress, eating habits and other external triggers more completely and pinpoint life-or-death issues. The latter includes iPhone Apps for the merely curious consumer.

Diabetes

Wireless glucose monitoring devices can send alerts to patients and doctors when values move outside an acceptable range. These devices can also monitor for dietary intake that would affect a patient's course of action.

- Prescription compliance:
  Patient health risks -- and the risk of hospital admission -- are greatly reduced by eliminating medication misses. But there's also a need to ensure

that people take entire drug courses and eliminate the potential for re-prescribing, says Brisbourne. Billions of dollars each year reach their expiration date in patients' medicine cabinets, he notes.

- Additional intangible benefits include fewer provider phone calls, and even shorter wait times in provider offices by eliminating visits from improper prescription utilization.

Sleep apnea

- Telemedicine devices for sleep apnea can handle both investigatory and direct treatment. The two-way nature of the devices can report on sleep patterns, body position and breathing to refine research and treatment course for any given patient.

- There's a direct cost saving here as well, says Brisbourne, as the devices directly eliminate the need for expensive polysomnography exams and limit the need for overnight hospital stays, on an ongoing basis

OTHER CONDITIONS RECOVERED BY TELEMEDICINE:

1. Congestive Heart Failure (CHF)

- Congestive heart failure is a weakening of the heart and its blood supply mechanism. Diseases that cause heart failure are varied.
- The most common causes are:
    - Artery diseases–Coronary artery disease (CAD)
    - Artery blockages-Heart attacks
    - Damaged heart muscles

- High blood pressure

Limitations of Traditional Management Methods

❖ Traditional management methods have been less effective when it comes to encouraging an active patient role in the treatment. The incidences of people with CHF requiring re-hospitalization are high. This also results in a high mortality rate for people who have suffered from heart failure. Patient empowerment in this area is important.

How Telemedicine Can Help Manage CHF

Home-monitoring devices can be used by doctors to remotely gather vital patient data, such as

● Weight
● Blood pressure
● Heart rate
● Oxygen saturation levels

Other advanced devices can also help monitor patient data:

● Some devices can transmit ECG (Electrocardiogram) data
● Sounds using an electronic stethoscope
● Videoconferencing for direct interviews

2. Stroke or Cerebral Vascular Accident (CVA)

Limitations of Traditional Methods

- Traditional methods of following up with stroke patients have a high cost burden. Strokes are a time-critical condition; brain damage can result within minutes since blood flow is blocked. Prompt and proper treatment is critical.

How Telemedicine Can Help Stroke Suffers

- Tele-stroke systems exist which help connect experts with each other via electronic means. This existing network can be improved via telemedicine. Additional benefits include:
    - Rapid diagnosis
    - Treatment can be supervised by specialists remotely
    - Quicker administration of tissue plasminogen activator (tPA)

3. Chronic Obstructive Pulmonary Disease (COPD)

- COPD is a group term for lung diseases that are serious and progress over time. The most common are emphysema, chronic bronchitis,

Limitations of Traditional Methods

- COPD management is more effective when lung health is frequently monitored.

How Telemedicine Can Help COPD Patients

- Telemedicine can help patients and doctors by making frequent, remote measurements of lung health using

- Tele-spirometry
- Tele-consultations with pulmonologists
- Web-based patient education systems can help COPD sufferers self-manage and monitor symptoms.

❖ One study explored the benefits of a telemedicine system designed for COPD patients. The results of the study showed that the intervention was successful and effective. The approach combines 4 areas:

1. Real-time ambulant activity coach
2. A web portal for self-treatment of exacerbations
3. An online exercise program
4. Tele-consultation

❖ Encouraging the patient to take an active role in disease management can reduce mortality rates and improve health. Frequent communication between the doctor and the patient can help identify a problem before it gets worse. Telemedicine also helps in making treatment processes more transparent and lowers hospital costs.

LEGAL CONSIDERATION FOR NURSES PRACTICING TELEMEDICINE:

❖ Telemedicine is fraught with legal, ethical and regulatory issues, as it happens with Telehealth as a whole.

❖ In many countries, interstate and inter-country practice of Telenursing is forbidden(the attending nurse must have license both in their state/country of residence and in the state/country where the patient receiving Telecare is located.

- The Nurse Licensure Compact helps resolve some of these jurisdiction issues.
- Legal issues such as accountability and malpractice, etc. are also still largely unsolved and difficult to address.
- Ethical issues include maintaining autonomy, maintaining a patient's integrity as well as preventing harm to a patient.

DRAWBACKS OF TELEMEDICINE:

- Telemedicine also can eliminate the possible transmission of infectious diseases or parasites between patients and medical staff.
- Some patients who feel uncomfortable in a doctor's office may do better remotely. For example, white coat syndrome may be avoided.
- The downsides of telemedicine include the cost of telecommunication and data management equipment and of technical training for medical personal who will employ it.
- Virtual medical treatment also entails potentially decreased human interaction between medical professionals and patients, an increased risk of error when medical services are delivered in the absence of a registered professionals.
- Another disadvantage of telemedicine is the inability to start treatment immediately. For example, a patients suffering from a bacterial infection might be given an antibiotichypodermic injection in the clinic, and observed for any reaction, before that antibiotic is prescribed in pill form.

IMPORTANCE OF TELEMEDICINE IN NURSING AND CLINICAL TEACHING:

- Power and identity - having direct access to information about conditions and treatments can increase patient control and autonomy; this improves discussions between patient and professional, and changes the traditional relationship where patients are passive. Conversely, being monitored at home can make patients feel less in control
- Trust - both patient and professional must trust the technology to be safe and effective. In some cases, decisions made by an unseen professional via telemedicine are seen as less trustworthy than those made face to face
- Equity - variations in access to technology can translate into inequity in service provision. Older people, those with physical disabilities and those on lower incomes use the internet less than others .
- Nursing practice is rooted in individualised care for the patient, based on establishing a nurse-patient relationship. Nursing literature, the popular press and patient advocacy groups support and value this element of nursing and therefore the challenge is the ability to balance the fundamental practice of 'hands-on, face-to-face' care with new methods of technology-assisted nursing practice such as telephonic and remote nursing.

ADVANTAGES:

- Many patients feel uncomfortable to go to hospital or doctor-chamber. This system creates communication among patients & healthcare professionals maintaining convenience & commitment. Moreover,
  through Telemedicine medical information and images are kept confidential and safely transferred from one place to another. So people can believe this system and feel comfort to seek help from it.
- It saves lives in the emergency situations, while there is no time to take the patient at a hospital.

- In many rural communities or remote places or post-disaster situations, consistent healthcare is unavailable. Telemedicine can be applied in such places or situations to provide emergency healthcare.
- This system is useful for the patients residing in inaccessible areas or isolated regions. Patients can receive clinical healthcare from their home without arduous travel to the hospital.
- Modern innovations of information technology such as, mobile collaboration has enabled easy information sharing and discussion about critical medical cases among healthcare professionals from multiple locations.
- Telemedicine has facilitated patient monitoring through computer or tablet or phone technology that has reduced outpatient visits. Now doctors can verify prescription or supervise drug oversight. Furthermore, the home-bound patients can seek medical-help without moving to clinic through ambulance. Thus, cost of health care has been reduced.
- This system also facilitates health education, as the primary level healthcare professionals can observe the working procedure of healthcare-experts in their respective fields and the experts can supervise the works of the novice.
- Telemedicine eliminates the possibility of transmitting infectious diseases between patients and healthcare professionals.

DISADVANTAGES:

- lack of ability to touch or directly examine a patient by physician
- technical skill is needed by physicians
- network connection error / failure / delay
- incorrect information / communication gap can lead to irrelevant diagnosis

CONCLUSION:

Telemedicine is one of the most advanced telecommunication facility in the field of medicine. It is an advanced facility for the betterment of health. It stands as a mile stone in the field of health care delivery system. Remote areas are the main focal point of this technology. Even it acts as a reference guide line for physicians and health care providers. It enables discussion and conferences of medical team members from various parts of the world.

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Michael E, Professor of Surgery Chancellor and Director of DeBakey Health Center,perfomed an open-heart operation at The Methodist Hospital on May 2, 1965. The procedure consisted of replacement of the aortic valve with an artificial prosthesis. As I performed the operative procedure, representatives of the Geneva University Medical Faculty in Geneva, Switzerland, watched the operation. I described the operation as it was in progress and answered questions from the group in Geneva, whom I could see and hear on my monitor in the operating room through the interactive television link-up that "Early Bird" afforded. Sitting in their amphitheater, the European physicians could also see and hear me. The Director-General of the World Health Organization, Dr. M.G. Candau, participated, along with Professors Jean-Claude Rudler, Charles Mentha, and others, in what was a

successful experiment in the intercontinental exchange of medical knowledge through the use of interactive television.

NET REFERENCE:

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