Telemedicine: service delivery to isolated and remote areas by Tanay

The term **Telemedicine** is the delivery of medicine at a distance. Telemedicine generally refers to the use of communications and information technologies for the delivery of clinical care.

The terms e-health and tele health are at times wrongly interchanged with telemedicine. Like the terms "medicine" and "health care", telemedicine often refers only to the provision of clinical services while the term tele health can refer to clinical and non-clinical services such as medical education, administration, and research. The term e-health is often, particularly in the UK and Europe, used as an umbrella term that includes tele health, electronic medical records, and other components of health IT.

Telemedicine is practiced on the basis of two concepts: real time (synchronous) and store-and-forward (asynchronous).

Real time telemedicine could be as simple as a telephone call or as complex as robotic surgery. It requires the presence of both parties at the same time and a communications link between them that allows a real-time interaction to take place. Video-conferencing equipment is one of the most common forms 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-stethoscope allows the consulting remote physician to hear the patient's heartbeat. Medical specialties conducive to this kind of consultation include psychiatry, internal medicine, rehabilitation, cardiology, pediatrics, obstetrics and gynecology and neurology.

Store-and-forward telemedicine involves acquiring medical data (like medical images, biosignals etc) 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 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 Teleradiology. Similarly telemedicine as applied by cardiologists is termed as telecardiology, etc.

Telemedicine is also useful as a communication tool between a general practitioner and a specialist available at a remote location.

The focus of telemedicine has mainly been consultative, meaning a general practitioner consulting a specialist or a specialist consulting another specialist. 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 and are mainly deployed for the First World. In developing countries a new way of practicing telemedicine is emerging better known as Primary Remote Diagnostic Visits whereby devices examine a patient whereby a connected doctor residing in another location virtually examines the patient and treat him. This new technology and principle of practicing medicine holds big promises to solving major health care delivery problems in for instance Southern Africa because Primary Remote Diagnostic Consultations not only monitors an already diagnoses chronic disease, but has the promise to diagnosing and managing the diseases a patient will typically visit a general practitioner for.

Telemedicine: service delivery to isolated and remote areas by Taro

The definitions of telemedicine according to Wikipedia are "the delivery of medicine at a distance" or "the use of communications and information technologies for the delivery of clinical care." In the old days, when technology was not yet a tool for passing on information, post messages were sent or received to exchange medical data. In the early 1900s, some Australians used two-way radios as another way. Telemedicine can come in various forms, from simple one to complex one.

There are two basic methods for practicing telemedicine, which are real time and store-and-forward; sometimes referred to as synchronous and asynchronous. The principle rules of real time telemedicine are that both health professionals have to be present at a certain time and there has to be a linkage between the two so they can communicate and consult. The connection may be just a telephone wire, but the most popular technology f! or this type of telemedicine is video-conferencing equipment, which is in a simple idea, a webcam. The device is attached to computers on either end and so the progression, or examination of the patients, is shown on the screen of one side. Not only are there interchanges of visual images, but also sounds might be sent from one end to the other; sounds in this case would be like heartbeats of a patient.

A tele-stethoscope allows that transmission. At real time one professional is able to give advises to the other based. Store-and-forward telemedicine on the other hand does not require the medical specialists to be online at the same time, because it is the passing of electronically formatted medical data, such as images of the body and

typed diagnosis. After they are sent, the remote specialist assesses them and probably makes comments on them. So in a sense, real time telemedicine is more immediate compared to store-and-fore ward.

One specialist that applies telemedicine is tele radiology which is the exchange of radiographic images, such as X-rays. For the process to be completed once, there should be an image sending station, a transmission network, and a receiving / image review station. The order of transmission goes respectively. A radiographic image is firstly scanned and then transported to a modem. Next electrical impulses travel to the receiving station through the transmission network. At the receiving station are a modem, a computer with high memory, and a TV monitor which enables the professors to make analysis of specific body parts. It is likely that in addition, a printer is located because in some occasions the receivers need to print hard copies.

Tele radiology consists of three types of connections which are point-to-point, local area, and wide area connection. Point-to-point is just a one to one thing, while local is the interaction of several computers in one building or organization. Wide! are would be more of a grand scale, for example from one country to another.

The use of telemedicine is practiced already in many places around the world and are continuing to spread at a steady speed. The basis of curing diseases and injuries lies at the action of collecting various information in a quick time. This method is aiding this action greatly and hopefully also in the future.

Electronic health records: privacy, data analysis, public health by Simon

The enhanced availability of health information in an electronic format is strategic for industry-wide efforts to improve the quality and reduce the cost of health care, yet it brings a concomitant concern of greater risk for loss of privacy among health care participants. The conflicting goals of accessibility and security for electronic medical records and non-technical and technical aspects that constitute a reasonable security solution would be the basis of the knowledge. With guiding policy and current technology, an electronic medical record may offer better security than a traditional paper record.

Personally identifiable health information about individuals and general medical information is increasingly available in electronic form in health databases and through online networks. The spreading of electronic data within the modern health information infrastructure presents significant benefits for medical providers and patients, including: enhanced patient autonomy, improved clinical treatment, advances in health research and public health control, and modern security techniques.

However, it also presents new legal challenges in 3 related areas: privacy of identifiable health information, reliability and quality of health data, and tort-based liability(a person who seeks or receives legal advice and reasonably relies on it.) Protecting health information privacy (by giving individuals control over health data without severely restricting warranted communal uses) directly improves the quality and reliability of health data (by encouraging individual uses of health services and communal uses of data), which diminishes tort-based liabilities (by reducing instances of medical malpractice or privacy invasions through improvements in the delivery of health care services resulting in part from better quality and reliability of clinical and research data).

Following an analysis of the relativity of these 3 areas and discussing existing and proposed health information privacy laws, recommendations for legal reform concerning health information privacy are on the issue.

These include:
(1) Recognizing identifiable health information as highly sensitive,
(2) Providing privacy safeguards based on fair information practices,
(3) Empowering patients with information and rights to consent to disclosure
(4) Limiting disclosures of health data absent consent,
(5) incorporating industry-wide security protections,
(6) Establishing a national data protection authority, and
(7) Providing a national minimal level of privacy protections.

As a conclusion, the main concerns over the public health record is that the patient's have the choices over the legality of the electronic data, if somehow there is a possible way for the patient to access the data, and that data to be privatized by its patient. However, the data's quality enhancement purpose, the custodian should have the legal right to also access the health data. The balance between efficiency and equity with privacy) is the main focus of adjustment.

Electronic health records: privacy, data analysis, public health by Marek

As written before in many of the papers submitted in ITGS, the benefits of having an electronic database in which to store records are many. For example, the ability to compress and organize millions of files within minutes as well as stockpile enough paperwork to fill a library into one little machine, just to name a few. Then we take into circumspect that it allows many of the world’s medical professionals to communicate with each other even, if they are halfway across the globe, and have view the files of their expert counter-parts in order to help save more lives. Overall, it sounds like an excellent plan that we should be glad to have thought up of.

BUT IS IT?
Like always in this modern day and age, confidentiality is the moral question at hand. As humans, none of us are infallible, even the doctors that we entrust our lives to. Should such a doctor feel the need to abuse his or her power, the consequences could be devastating for everyone. The humiliation felt by the person in question, the devastating blow to the hospital that employed the doctor, and the complete and utter ridiculing of the families of both parties involved. After such an embarrassment, the victim would most probably take legal action against both the doctor and the medical institution for its lax security on its medical network.

But why do people do such things. Why do people find it necessary to look into the files of patients? The answer is simple: Human curiosity. To satisfy their base desires of acquiring knowledge, people actually dare to break into the files containing extremely private medical information about patients. This maybe because they feel a rush knowing that they have broken through the hospital's security measures and have managed to read extremely personal information about certain people they may or may not know.

Many hospitals have realized this latent danger and have taken measure to insure that events like this would be rare, or not even occur at all. These included stringent regulations, such as the input of passwords, several firewalls, blocking potential hackers, and doctor-patient restrictions, in which doctors can only observe medical files of patients that they are currently taking care of.

All in all, it seems that even our health may be exposed to the cyber-thieves of the modern day. The best we can do to protect ourselves against these foul individuals is have an equally strong bond of trust and friendship toward the doctors who help us.

Diagnostic and therapeutic tools: robotic surgery, prosthetic devices, diagnostic software, drug development and marketing by Matthew

Robotic surgery is used today in lieu of real services from real surgeons. Although absolute unmanned surgery is extremely uncommon, robotic surgery for procedures that require tremendous precision and accuracy is quite common in modern societies. Robotic surgical procedures are essentially used only as tools to extend the surgical skills of a trained surgeon. An example of an actual application of robotic surgical devices is a surgery that took place in the United States. The surgery, which took place in 1985, consisted of a robot, the PUMA 560, inserting a needle for a brain biopsy using CT guidance. In 1988, the PROBOT was used to perform pro static surgery in England. A complete unmanned surgery took place for the first time last year in Italy.

Prosthetic devices are typically used to replace lost body parts. Common prosthetic devices include artificial limbs, breast prosthesis, cochlear implants, corrective lenses, craniofacial prosthesis, dental prosthetics, facial prosthetics, hair prosthetics, neuro rosthetics, ocular prosthetics, ostomies, penile prosthetics, replacement joints, and somato prosthetics. Prosthetics devices as a whole generally help humans be more efficient even without real human body parts.

Diagnostic programs are written for the purpose of examining the state, or locating problems with patients. Diagnostic programs range in nature, from software where a doctor is able to input information about the patient and look up possible diagnoses that the software brings up, to programs where doctors search for symptoms and are given potential diseases or conditions by the program. Diagnostic programs still require doctors and do not completely take away the skills of a trained medical professional. It rather helps the professional be more efficient in his or her work.

Drug development is a relatively rigorous process that is heavily monitored by government officials. It is defined in many pharmaceutical companies as the process of taking a new chemical lead through the stages necessary to allow it to be tested on human volunteers in clinical trials.

Diagnostic and therapeutic tools: robotic surgery, prosthetic devices, diagnostic software, drug development and marketing by Taro

Technology has and always will help greatly with giving therapies and diagnoses to certain patients. Let us take a look at some of the robotic surgeries that exist today. The one that might be most widely known by ordinary people is application of robot on cardiac surgery. The robot acts so that it establishes a bypass or so that it replaces malfunctioned valves, which control the blood flow, with new ones. Another important role of robots would be apparent in neurosurgery, where there are corrections of spinal malformations.

The robots move almost exactly like a professional surgeon's hand movement. They are imputed what to do in advance. With the same method, they are also successful in removing brain tumors. If we were to focus on diagnostic tools, we would probably take notice of a stomach camera. Recently, there has been a development with this technology, allowing it to be contained in a capsule so that the patients can simply swallow it and excrete it few days later.

As it's traveling inside the body, the capsule rotates number of times which enables it to take shots from every angle. Before the improvement, the diagnoses had to be made in a short period of time, because the camera had a wire and so the patients had to have their mouth open for the whole time. This was a very suffering operation. If we hear the term prosthetic device, it would be likely for us to image artificial arms or legs.

These days, not only are they put on for substitutes of appearance, but are equipped on the patients as complete replacement, meaning they function just like real arms and legs. This is usually done in a pretty complicated procedure. For example a person with a lost arm would have an artificial arm attached on him by connecting thin wires inside it with the nerve fibers of where they were cut off. After that, a special battery pack is provided and that is implanted in the new arm or placed outside with wires connected on it.

Often the battery has to be outside because in the case of recharging, it would be inconvenient if it's built in the arm. When everything is positioned properly, the power is turned on and the electric current flows into the artificial arm, and eventually through the nerve fibers all the way to the brain. The brain receives the signal and sends back a different signal, this time giving an instruction of what to do to the arm. With that, the artificial arm manages to work as a body part. Another prosthetic device would be artificial eyes. There is more difficulty producing these, since they have to be able to transfer the images in front of them to make the brain recognize the images.

Also the operation of attaching them is a hard task, because of the fact that eyes are positioned near the brain, and it has a risk of damaging it. Now the engineers are trying to improve the device for it to consume various colors and make the brain know those. The ones that are out in the world right now are not functioning enough and are sending blur images. Other than eyes, arms and legs, there are ears, nose, and jaws too. For all of them, electrical current is used.

Diagnostic and therapeutic tools: robotic surgery, prosthetic devices, diagnostic software, drug development and marketing by Vaibhav

Robotic Surgery

Robotic Surgery is the use of robots in performing a surgery. This technology was first applied in the year 1985 by a robot named "Cody Evader" in England. Robotic surgery is used to perform surgeries which require the doctor to manually insert machines into small incisions in the human body. Hence to ease this and to be less invasive to the human body doctors use robotic surgery and view organs being worked which are transmitted from tiny cameras inserted into the human body. Using this technology the patients recover much faster after a surgery as it causes less pain and scarring. In addition to this robotic surgery also enables "tele surgery" as the surgeon and the patient are separated by an electronic console. Hence this can allow the surgeon to perform surgery in a remote location. Robotic surgery is applied in cardiac surgery, gastrointestinal surgery, gynecology and neurosurgery.

Prosthetic Devices

Prosthetic devices are artificial medical body parts made to replace missing extremities for example an artificial limb. Scientists are trying to make prosthetic devices which replace healthy body parts with artificial mechanisms, although such technology has still not emerged. With the current devices the following body parts can be replaced but cannot be mechanically functioned through the brain such as the legs, arms, hands, feet, and most other body parts can be replaced.

Diagnostic Software

Diagnostic software's are designed to diagnose a mental disorder in robots. Since the nature of illness with robots is different to that of humans, a different type of treatment is required. Diagnosis of such mental disorders are found in AI (Artificial Intelligence)

Inferiority Complex – This happens when an AI finds another AI to be superior which causes the AI to lead itself into self-doubt or misery.

Schizophrenia – When an AI visualizes that it may split or copy itself into identical copies it will start feeling powerful or diminished, unique or common, special or ordinary.

Jealousy –Will cause the AI to form robot labor unions and refuse to do demeaning labor.

Paranoia – If the AI realizes that its internal software has had subtle manipulations the AI will be paralyzed with paranoia.

Drug Development & Marketing

Drug development is defined in many pharmaceutical companies as the process of testing whether a medical drug is ready to be sold in the market. This process is known as human clinical trials in which the drug is tested

and studied in detail. Aspects of drug development measure the toxicity of drugs. The drug toxicity must be under a certain level for it to satisfy the regulatory requirements of drug licensing authorities.

Medical advice on the Internet or a CD-ROM by Marek

The internet has been growing ever since its inception, and now contains a wealth of information, false or otherwise. Used from everything to relay basketball scores, the sale of fishing utensils, and sporting insipid drones garnishing the front covers of notoriously famous magazines such as Hustler, it has become a tool that we as human beings use on a near daily basis. In fact, the average students spend 45 minutes on internet everyday! This is a phenomenally high number seeing as the over 80 percent of the population on this planet does not have access to the every same resource we use on a daily basis.

However, many people have learnt the hard way, that information on the internet can be unreliable and now, with medical data these mistakes, deliberate or not, can be life-threatening.

Suppose someone was to mistype the name of a medicine given to people in great need of it (Soldiers on a battlefield, Refugee camps). This may not seem like a significant error, but it may have grave consequences, seeing as many medical compounds merely have a single letter difference between them. Giving someone the wrong medicine can not only disrupt their healing process, but potentially reserve the effects of the prior medicine administered, and kill them. This is why many of the more reliable sites have other sources cite how the information is correct, and others included medical diplomas or certificates that state the institute supporting the site is both valid and trustworthy.
On the other hand, medical information on a CD-ROM seems to be much more reputable than that on one found on some random site on the internet. For one, the average prankster would not want to spend the time and effort, not to mention the money to create an intricate lie in the form on information on a CD, just to fulfill his mischief gene. After all, it is so much easier to stick the misinformation on the internet, that way it is cheaper, and more likely to be viewed by many more people. It would also be a lot harder to trace than a CD.

In conclusion, I would like to state that before any medical professionals use information on sites or a CD that may seem slightly unreliable, they could cross-reference it with other professionals, to make sure that the knowledge given by the source has not been corrupted in any way.

Monitoring patients by Simon Ruiz

What is "Monitoring patients"?
Monitoring patients is the direct act of taking care of the patient inside the room without the physical presence of the doctor inside the room. It is purposed for keeping track of patient's basic health conditions such as blood pressure, body temperature, and so forth.
Why do patients need monitoring?
Patient monitoring is vital to care in operating and emergency rooms, intensive care and critical care units. Additionally, it has proven invaluable for respiratory therapy, recovery rooms, out-patient care, transport, radiology, cath labs, gastroenterology departments, ambulatory, home, and sleep screening applications. Patient monitoring can reduce the risk of infection and other complications, as well as assist in providing for patient comfort.

A vast majority of long-term patients in the world don't take their medication in time, intentionally or not. In the U.S. alone, this represents an additional $100 billion yearly expense due to unexpected emergency hospital admissions. It is therefore crucial to gather accurately patient medical data in real time. For this purpose, firms have developed various mobile health toolkit to perform this task. With these technological toolkit consisting of a say, Java-based middleware and Bluetooth-enabled sensors, all the medical patient data can be wirelessly exported to a doctor's office via a PC or a cell phone.

Here are some facts to start with: About 55% of all long-term patients in the US and in Europe, it is estimated, do not take their medication (either not taking the prescribed medication at all or more than 14 hours late) Around 12% of all hospital admissions in the UK are due to this non-compliance, the damage to the US taxpayer is an estimated USD 100 billion a year. Most of the patients that do not comply are simply forgetful (about 10% deliberately do not want to take the medication).

So how can we solve this problem?
Gathering current patient medical data promptly and accurately is vital to proper health care. The usefulness of electronic data capture (EDC) has been demonstrated in applications such as the home monitoring of at-risk heart patients via devices that transmit blood pressure from the home to a central database. Removing transcription effort (and associated inaccuracies) alone is worth the institution of EDC; but the side benefit of timeliness offers the hope of identifying and responding to trends as they occur, perhaps preventing a dangerous event, instead of simply allowing its diagnosis after the danger has manifest.

This is why firms have developed its mobile health toolkit. It is basically for gathering measurement data from a range of devices, and present it to management software via a well defined, and easily implemented interface.

Solutions based on the technological mobile health toolkit can improve the quality of patient monitoring while reducing overall healthcare costs. Moreover, it ensures that more timely information is available to medical caregivers. Medication-compliance systems can leverage the toolkit as a basis for intelligent reminders. For example, patients can be prompted to take their medication if the system detects that it is overdue.

Monitoring patients by Romeo Wu

There are many ways of Monitoring patients for example the most common way is to set cameras in each patient's room and monitor him 24/7. You can also monitor a patient by using radios, some advance medical equipments and etc. Treating physicians will decide the actual frequency of necessary assessments according to a patient's individualized need for medical care and habit follow-up, as well as to published or local guidelines, as suitable. As a minimum, however, a optional schedule of assessments has been developed based on input of physicians from the international medical community with expertise in the care of patients with Gaucher disease. The recommended schedule represents the core assessments that are currently thought to monitor Gaucher-related clinical manifestations and to stage disease progression across the life-long course of the disease. The assessments include hematologic, visceral, skeletal assessments, and quality of life evaluations.

IT solutions for disabled people by Marek

As the world's population grows, so do the needs of the people in it. The has always been a need to communicate amongst humans, and now with our quickly modernizing technology, there maybe be a chance for use to finally start "talking" with people we love, who are not so fortunate.

Victims of accidents, or people who have just been unlucky enough to be born disabled have always had trouble conversing with other people. Over the centuries, many people have suffered from this, as their relationship with their loved ones continues to deteriorate as they struggle to finds the means to "be in touch" with one another.

However, in this modern day and age, technology allows us do to things that we not thought possible before. For example, a physically handicapped person who could not be able to speak could use a touch-pad to translate what he or she was trying to say through pressing a set of keys in order to form a coherent sentence. Newer technology utilizes a complicated bundle of fiber wires to make the pointer on a computer follow the movement of eyeballs, so that a user could actually "control" a computer merely through the use of his eyes, giving new meaning to the phrase "seeing is believing."

One advanced method, still in its development stage is to actually be able to link the patient's brain up to a computer, so that it may attempt to communicate through the computer. Though this does sound a little science-fiction like, this is just another signal of man's greater reliance and need for computers. In this ways, it is almost as if we are trying to integrate people with computers in order to create a better, more efficient, humane world.

In conclusion, though it may seem like every cyber-freak's worst nightmare, it will be highly unlikely that we will become so reliant on technology that it will consume humanity as a race. Instead we must view it as a helpful partner that is like a steady arm we can rely on when the going gets tough.