Literature Review of Telemedicine System for Emergency Health Tribulations

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***Abstract*—During the past decade, more and more people have been able to avoid physically going into work by telecommuting from their home computer to diagnosing their emergency health problems. Medicine has taken a cue from this growing trend by combining telecommunications technology and medicine to create telemedicine and tele-health care. While healthcare professionals have always communicated with one another over the telephone, telemedicine kicks things up a notch by utilizing sophisticated satellite technology to broadcast consultations between healthcare professionals who are oceans apart or only a few miles away. Videoconferencing equipment and robotic technology have helped to make doctor's offices and medical facilities as close to one another as the nearest computer screen. There are two popular types of technology used for telemedicine applications. The first of these is called "store and forward". In this paper we describe the Importance of telemedicine applications in real time applications and other.**

***Index Terms*—emergency health problems, Telecommunication technology, tele-health care, store and forward, telemedicine**

I. Introduction

Around the world, there are many programs being used in a variety of ways to provide technologically-advanced healthcare. Telemedicine can be used in the remotest parts of the world or in places as close as a correctional facility, helping to eliminate the dangers and costs associated with the transportation of prisoners to a medical center. Also on the horizon for telemedicine is the development of robotics equipment for tele-surgery applications which would enable a surgeon in one location to remotely control a robotic arm for surgery in another location. The military has been at the forefront of development for this type of technology because of the obvious advantages it offers for use on the battlefield.

II. Telemedicine

Increasingly rapid advances in information and telecommunications technology are revolutionizing life and business around the world. The impact is being felt in the health sector with many new applications of these technologies. Telemedicine is essentially the use of both information technology and telecommunications to provide health services or support health service provision over a distance. The aim of this chapter is to outline the major new health uses of these technologies, what is this technology, describe the technologies, and provide a guide covering the key principles in this technology [1].

The following scenarios are designed to show the wide variety of possible applications using current standard technology.

A hospital or clinic without an orthopedic surgeon uses a digital scanner and computer to relay an X-ray of a broken limb plus relevant history and examination findings to an orthopedic surgeon in a distant hospital to get advice on treatment and whether referral to the distant hospital for operative treatment is required. The provision of the X-ray image allows much better advice than a phone discussion alone. A small child is brought to a clinic after taking drugs prescribed for someone else. The clinic worker uses a computer to consult a drug information database for the appropriate course of action. A doctor in a district hospital wants to maintain their level of professional expertise. By using a computer and the Internet (World Wide Web) the doctor is able to read the online versions of medical journals. Articles on particular topics are identified using online access to Medline. Information technology can be an important tool for empowering people and enabling them to be more productive and effective in their work. It can also be a tool that exacerbates division and inequality by creating sections of the community which are information-rich and others that are information-poor. The aim of telemedicine developments should reflect this. Telemedicine should always aim to support health workers providing care as close to the patients as possible. This means information resources should be provided to all levels starting at primary care and clinical telemedicine should be used where possible to prevent referrals to district or tertiary hospitals and support care at the more local level. Used in this way, telemedicine can strengthen care at the primary care and district level. Appropriate use of technology is all important. Telemedicine should be used to meet locally identified needs, and adequate technical support for users must be available. Telecommunication and computing technologies are becoming highly interdependent on each other and increasingly difficult to differentiate initiates in Fig. 1.

This process is known as convergence and, together with telecommunication deregulation around the world, is resulting in advances in telecommunications technology as great if not greater than in computing.

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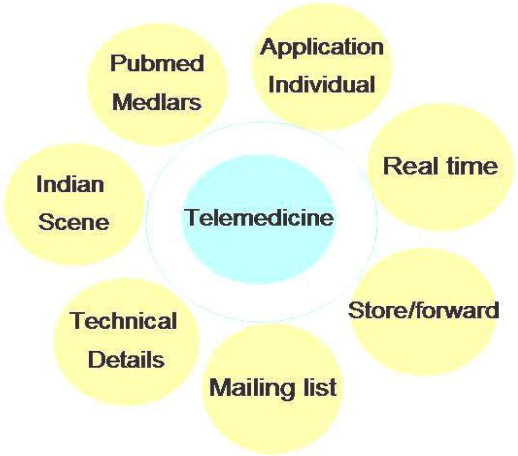

Figure 1. Basic telemedicine system

III. Literature Review about Telemedicine

Tele-Health is a tool for access. Can be asynchronous (store and forward) or synchronous (interactive). Technology needed includes: patient exam camera, digital electronic stethoscope, fiber-optic horoscope, fiber-optic ophthalmoscope, digital camera, document camera, intra-oral camera, laser caries detector, clinical video (Polycom, Vcom), and clinical exam rooms. In regards to transmission spectrum, you need to have good quality (ISDN and LAN) while maintaining secure lines. Maritime Medical Genetics Service (MMGS) serves about 2 million people (Babineau and Ludman, 2004). Reimbursement can be an issue: some third party payers reimburse, Medicare pays universal (although only from certain sites), and Medicaid does not reimburse. State licensure is an additional issue, although it was suggested that the consultation exception could be used. Future directions of telemedicine include more investigation of reimbursement, transmission costs, and financial state of federal and state budgets, interoperability, new compression algorithms, asynchronous patient driven consultations, and internet medicine shown in Fig. 2 [2].

The study reports on the Maritime Medical Genetics Service based in Halifax, Nova Scotia, which delivers care to ~2 million people (only regional genetic services). The furthest point is 7.5 hours away by car. The program was developed out of necessity, as some patients were not willing to travel that far. Phone discussions were started but not felt to provide optimal services. At the time of the article, there were 8 locations with tele-health links to the IWK Health Centre where MMGS is located. The MMGS carried out pilot project with cancer genetics. Satisfaction with services was good, and therefore they moved on to other types of genetic cases where a physical exam was not required (includes prenatal genetic counseling and follow-up of metabolic disorders). They also allowed the option of having a second visit and result session for HD predictive testing counseling via videoconference (the first session was required to be face-to-face). Health care providers did not feel as much of a connection with patients, but the patients reported high levels of satisfaction. A special protocol was developed for individuals with hereditary hemochromatosis, since most patients were treated at time of referral and genetic counseling was not considered urgent. To provide education, a group session was held with a hematologist, hepatologist, geneticist and genetic counselor. 70 people attended in person, 27 went to a telehealth site and participated via videoconference. MMGS has not done telemedicine for consultations where a physical exam would be required due to cost of high resolution cameras and special training to the support staff. They may reconsider since more clinics are obtaining high resolution cameras. Telemedicine in Maine and Florida has been used for diagnosis of genetic disorders, although it was noted that training of onsite care provider and patient willingness to cooperate influenced the quality of the exam. Overall, the MMGS reports good experiences with Telegenetics, although equipment malfunctions periodically occurred. Even in Canada, licensure and liability across province lines and reimbursement issues can be a limitation [3].

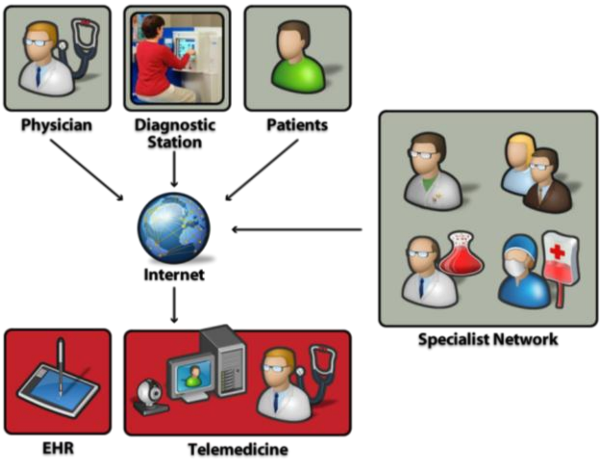

Figure 2. Overview of telemedicine system in real time applications

This paper reported on the experiences of telemedicine in Vermont. The program was divided by phases. In Phase 1, they reported failed and dropped connections and lack of confidence by the doctors in the new technology. In Phase 2, they used ISDN lines with daily testing, multiple cameras, and new ceiling-mounted telemedicine units. The top 10 specialties using telemedicine included: mental health, cardiology, pediatrics, dermatology, neurology, orthopedics, radiology (military bases), home care, endocrinology, surgery (wound care). Pediatric applications included: cardiology, diabetes, asthma, ophthalmology, ENT, school-based, orthopedics, trauma & critical care. The Vermont telemedicine project also has contracts with prisons. It was noted that Store & Forward medical care was not reimbursable [4].

This report gives an overview of existing laws regarding telemedicine by state. Endorsements are the most common method used to allow an individual licensed in another state to practice in their state, although it can be a lengthy and complicated process. The Federation of State Medical Boards (FSMB) developed an act for abbreviated licensure process for outside doctors providing telemedicine to their state. 8 states have approved similar acts. The National Council of State Boards of Nursing (NCSBN) developed a mutual recognition model, and 20 states are using the interstate compact [4], [5]. Description of the Northern Main Telehealth Network (NMTN), used for clinical, educational, and administrative purposes, includes satisfaction surveys and cost analysis [5].

An English study of comparing telemedicine to face-to-face encounters with cancer genetic counseling, 16 telemedicine and 21 face-to-face encounters showed a similar increase in knowledge, decrease in anxiety, and satisfaction levels [6].

Report on a pilot study of tele-genetics in Wales for cancer genetics in 1998 with small sample size. Study involves only eight patients, although they rate high satisfaction with telemedicine genetic services (higher than satisfaction of genetic nurses providing onsite support, who did not feel needed). Establishing rapport was a concern of the genetic consultants elevates in Fig. 3 [7].

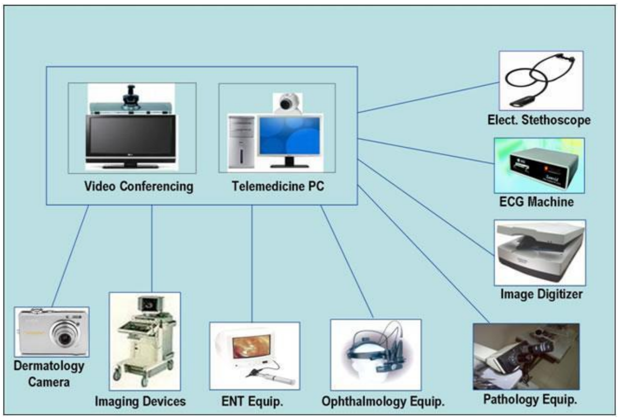

Figure 3. Typical and prototytype telemedicine system

Report on telemedicine with the Queensland Clinical Genetics Service in Australia, the only genetics service provider in the state (~3.5 million people). For the initial study, they only offered teleconferencing when physical exam was not required, mostly for cancer genetics. Telemedicine and face-to-face groups were both seen in Brisbane to remove advantage of travel time and cost [8]. A document camera was also used in the telemedicine visits. People involved with 24 encounters were surveyed (16 tele-genetics and 8 face-to-face), demonstrating a positive response from doctors, genetic counselors, and patients. Limitations included: videoconferencing was more difficult when multiple family members present and funding was problematic [9].

Review and classification of 66 "scientifically credible" studies on telemedicine that included comparison with alternative model of care, each study is listed and classified in the appendix concludes that there are not many good-quality studies on the analysis of the benefits of telemedicine [10].

Early telemedicine project called the Georgia Statewide Telemedicine Program (GSTP) between the Medical College of Georgia and the Telemedicine Center with the Ware County Health Department. Study reports on 333 consults from 1995-1997, 16% were genetics. Of the response from the doctors, most thought it could be successful, 44% thought cost-effective, 48% thought time effective, 33% thought patients would find acceptable, and generally opinions of telemedicine improved over a year. Families were overall satisfied. It was noted that telemedicine was more likely to be successful when part of integrated health services delivery (not sole mode of patient care) [11].

The study reported on a 3 year pilot Telegenetics project in rural Maine. They used ITV technology with existing ISDN phone lines. 4 barriers were identified: lack of knowledge of telemedicine services, lack of understanding of the role of genetic services, location of ITV unit, hospital credentialing and privileging processes for physicians. Many presentations to given to physicians to educate about telemedicine services. The study included 24 rural sites and 125 patients. Most patients were pediatric (64%). Patient satisfaction was good (3.56 on 4.0 scale), although there was only a 25% response rate [12].

Commentary on Marcin *et al.* article that lists several obstacles to telemedicine, including difficulties in having equipment and coordinator, willing specialists, knowledgeable local physicians; reimbursement issues; and medical liability [13].

This needs assessment identified barriers in access to subspecialty care traveling, missing work, and obtaining medications. The study looked at 130 telemedicine consultations for 55 CSHCN in rural areas. Specialties included Endocrinology, Psychiatry, Gastroenterology, Hematology, Oncology, Nephrology, and infectious disease. Overall satisfaction was rated very high, although 2 of 22 did not feel that the telemedicine gave an adequate examination [14].

Editorial referring to Telegenetics in Maine article by Lea *et al.* "The need for innovative approaches to the provision of services arises from the increasing awareness of the need for genetics services in many aspects of health care, continued shortage of genetics professionals, and economics of the provision of genetics services dictating their primary location in tertiary care centers." The editorial notes that telemedicine does change delivery of care and calls for prospective studies of Telegenetics consultations and face-to-face consultations looking at accuracy of diagnosis, diagnostic impact, and patient outcomes. Authors write that the challenges lie in "extensively evaluating Telegenetics technologies, properly adopting them, and making informed decisions about their appropriate use" [15].

The report examines current key issues with telemedicine including payment issues, legal issues, privacy issues, infrastructure, evaluation, and emerging trends. Lack of reimbursement remains a large obstacle. Several organizations (such as the American Psychological Association and American Dermatology Association) have created specific telemedicine standards and guidelines for their fields of specialty [16]. OAT is working with groups to expand clinical guidelines and promote safety and security. The Joint Working Group on Telemedicine (JWGT) is trying to work with states to assess feasibility of creating common licensure application forms.

The authors reviewed 612 articles that presented data on cost benefit of telemedicine. Only 55 were categorized by cost topic, only 22 met quality criteria, 20 used simple cost comparisons (none used cost utility analysis), 7 looked at the level of use needed to compare to traditional services (none were found to be sufficient), and 15 of 24 did not provide details of sensitivity analysis. Conclusion was that there is no good evidence about the cost-effectiveness of telemedicine [17], [18].

IV. Real Time Telemedicine

Utilized when a face-to-face consultation is necessary, the second most widely-used technology is two-way, interactive television (IATV). This is when the patient, along with their healthcare provider (a doctor or a nurse practitioner) and a telemedicine coordinator (or a combination of the three), gather at one site (the originating site), and a specialist is at another site (the referral site) which is usually at a large, metropolitan medical center. Videoconferencing equipment is placed at both locations allowing for a consultation to take place in "real-time". Videoconferencing technology has decreased in price over the past few years, and many of the computer programs are no longer as complex as they once were, allowing for healthcare professionals to use nothing more than a simple desktop videoconferencing system. Almost all areas of medicine have been able to benefit from videoconferencing, including psychiatry, internal medicine, rehabilitation, cardiology, pediatrics, obstetrics, gynecology and neurology. Also, many different peripheral devices like hodoscopes (which help doctors look inside the ear) and stethoscopes (which enable a doctor to listen to a person's heartbeat) can be attached to computers, aiding with an interactive examination. Many healthcare professionals are becoming more creative with the technology that's available to them in order to conduct telemedicine. For example, it's not unusual to use store-and-forward, interactive, audio, and video still images in a variety of combinations and applications. Use of the Web to transfer clinical information and data is also becoming more prevalent, and the use of wireless technology is being used to provide ambulances with mobile telemedicine services of all kinds. Around the world, there are many programs being used in a variety of ways to provide technologically-advanced healthcare supposed in Fig. 4. Telemedicine can be used in the remotest parts of the world or in places as close as a correctional facility, helping to eliminate the dangers and costs associated with the transportation of prisoners to a medical center. Also on the horizon for telemedicine is the development of robotics equipment for tele-surgery applications which would enable a surgeon in one location to remotely control a robotic arm for surgery in another location. The military has been at the forefront of development for this type of technology because of the obvious advantages it offers for use on the battlefield. As wonderful as the advent of telemedicine is, there are still drawbacks that people need to know about, like the fact that many states will not allow out-of-state physicians to practice medicine unless they are licensed in that particular state [19]. The Centers for Medicare and Medicaid (CMS) have placed restrictions on the amount given in reimbursements for telemedicine procedures, and many private insurance companies will not reimburse at all for this technology, although states such as California and Kentucky have legislated that insurers must reimburse the same amount for a telemedicine procedure as they would for an actual face-to-face consultation. There are also underlying fears of malpractice suits for physicians engaged in telemedicine because there is a lack of hands-on interaction with patients. However, several studies show that most people who have experienced long-distance healthcare via telemedicine have been quite satisfied with the care they received. There are also the technological problems which can hamper the progress of telemedicine, like the fact that regular telephone lines tend to be inadequate in handling many of the tele-medical applications. Also, many rural areas still don't have the cable wiring or other kinds of high bandwidth telecommunications needed to access the equipment required for more sophisticated medical uses [20]. One other obstacle stands in the way of progress, and that's the issue of funding. During 2005, the Technology Opportunity Program (TOP) will not receive funds for telemedicine/tele-health, and the Office for the Advancement of Tele-health (OAT) will not be able to fund any new programs either. The good news is that some private corporations and telecommunications companies are trying to fill the financial void created by the lack of funding.

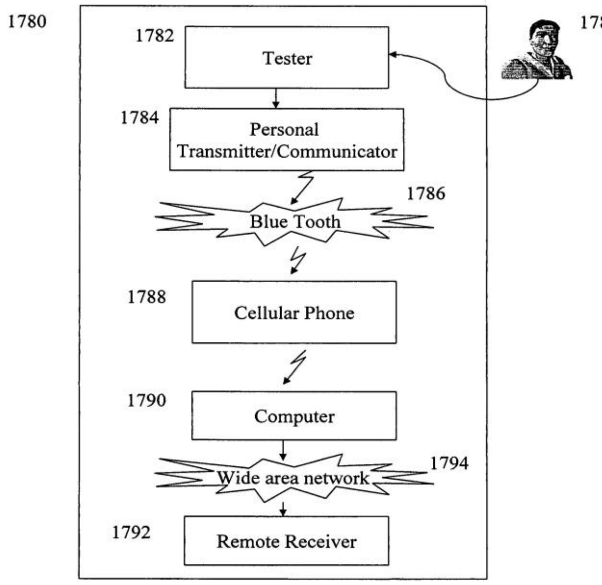

Figure 4. Real time telemedicine application for recent usage

All in all, the advantages of telemedicine definitely outweigh its detractors, with it soon being just another way to see a healthcare professional. The future of telemedicine will not only be advantageous for those in rural communities, but will also offer people who are homebound within metropolitan areas with a way to access specialty care. Eventually, everyone could have a personal diagnosis system through their home computers, and it will monitor our health status on a daily basis, as well as have the ability to automatically notify a medical professional when we become ill. Telemedicine, tele-health, and e-health will continue to combine the best of medicine, technology, and telecommunications, which will help make our lives healthier and safer.

A. Store and Forward Type Telemedicine

This is used for transferring digital images from one location to another. A healthcare professional takes a picture of a subject or an area of concern with a digital camera. The information on the digital camera is "stored" and then "forwarded" by computer to another computer at a different location. This type of technology is utilized for non-emergent situations, when there's time for a diagnosis or consultation to be made, usually within 24 to 48 hours, with the findings then sent back. The most common use of store and forward technology is with tele-radiology, where x-rays, CT scans, and MRIs can be sent from within the same facility, between two buildings in the same city, or from one location to another anywhere in the world. There are hundreds of medical centers, clinics, and individual physicians who use some form of tele-radiology. Many radiologists are even installing appropriate computer technology within their own homes, allowing them access to images sent directly to them for diagnosis, eliminating an unnecessary and possibly time-consuming trip back into to a hospital or clinic. Tele-pathology is also another common use of this type of technology, with images of pathology slides sent from one location to another for diagnostic consultation. Dermatology is one area that greatly benefits from the store and forward technology, with digital images of different skin conditions taken and sent to a dermatologist for diagnosis mentioned in Fig. 5 and Fig. 6.

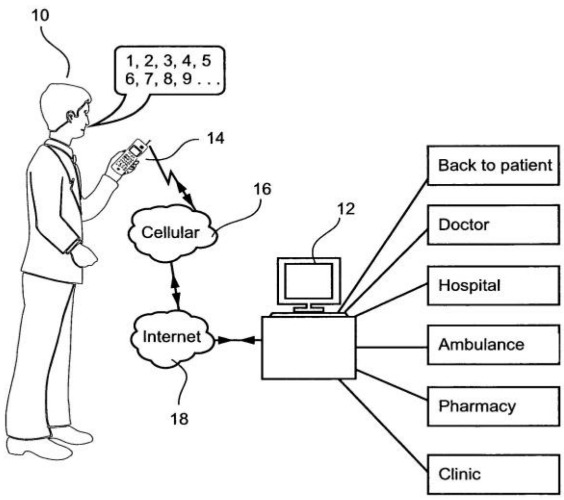

Figure 5. Internet based telemedicine system

B. An Internet-Based Telemedicine System

The development of an Internet-based telemedicine system that permits remote diagnosis of radiological images is one type of telemedicine. This system has been commercially served by XRay21 inc. for small and/or rural hospitals. The system architecture of internet based telemedicine system consists of sender clients, receiver clients, and a database server, which are all connected with one another through the Internet. A sender corresponds to a hospital, and a receiver corresponds to a radiologist. A database server plays two roles here: One is to handle requests issued by the sender and receiver clients, and the other is to store/retrieve patients' information into/from a database. A hospital transmits the patients' information to the database server. The database server receives that information and stores it in the database. A radiologist retrieves that information by requesting it from the database server, reads it, and transmits its diagnosis results back to the database server. Then, hospital refers to the results diagnosed by the radiologist [1].

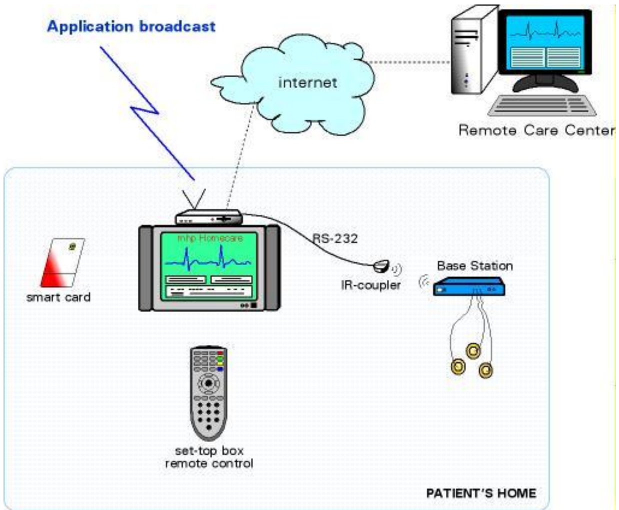

Figure 6. System Design and modeling

V. MEDLAN: System Design and Modeling Issues

This is another type of telemedicine system. It consists of the two main parts: The mobile trolley that exists in the Accident & Emergencies ward (A&E) and the consultation point, within the hospital. The mobile trolley consists of a high performance laptop computer that is equipped with a WLAN PCMCIA card that will permit total mobility within the A&E room and beyond. An access point within the A&E room, acts as a transceiver for the network data to be transmitted to and received from the rest of the network structure. A high quality digital camcorder is connected to the laptop and with the use of the IEEE1394 protocol, high-resolution video and audio is transmitted. Additional medical instruments (like Otoscopes, dermascopes etc.) are also connected to the laptop providing a low weight compact roaming system. It is expected that the weight of the contents of the mobile trolley would not exceed 4kg. In the consultation point (that can be at any location within the hospital) the consulting physician can have a choice of teleconferencing either from a fixed computer within the existing hospital network, or a mobile laptop, sharing the same mobility advantages as the former laptop. It will even be capable of transmitting video to a PDA pocketsize computer, thus taking advantage of the recent developments in PDAs. This way (and by placing additional access points to the general area where the consulting doctor would be), the doctor can move around the area while only carrying a 200 grams PDA. The PDA will be equipped with a PCMCIA card and it would be able just to receive video.

VI. Health Applications

A. General Approach

The continuing advances in telecommunications, health information, and telemedicine offer a significant opportunity to improve the effectiveness and efficiency of health services. It is an area which cannot be ignored when planning and providing health care. The aim is to choose those technologies which are both cost-effective and address high priority health needs. The most up to date high technology can be very alluring but often the use of more common and cheaper but well tested technologies is more appropriate. Every country has different individual health priorities, technical infrastructure, geography, culture and funding constraints and so appropriate technology choices will be different from country to country. Directing resources to building a reliable telephone service and introducing hospitals to personal computers may be appropriate priorities for one country's situation, whereas developing tele-consultation services to allow patients in geographically remote areas access to specialist advice from a tertiary referral centre may be appropriate in another. As economies grow and the cost of technology falls it is to be expected that step-by-step adoption of higher levels of technology would be appropriate.

The following health applications are not necessarily exclusive and projects may well use a mixture of technologies to achieve a variety of ends. All these wrathful applications are mentioned in Fig. 7.

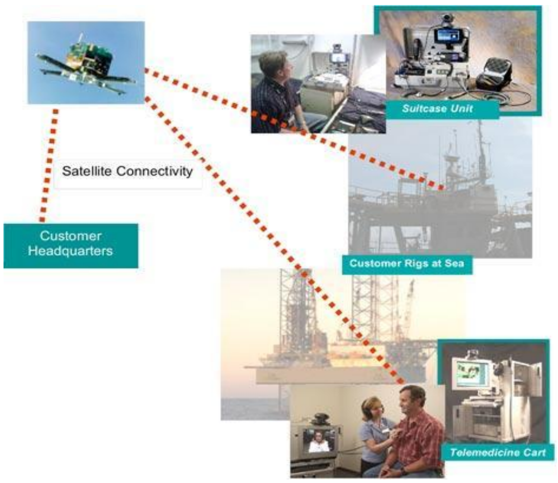

Figure 7. Oriented application procedure for telemedicine

B. Tele-Consultation

Tele-consultations can be carried out either by telephone or by using video-conferencing. Phone consultations between a patient and a health professional are a common informal part of health care for getting minor medical advice. Video-conferencing adds greater rapport to the medical-history gathering process and also allows the signs and symptoms of the patient to be demonstrated and viewed at the remote end.

This can be augmented by pictures of X-rays which can be sent either by using the video-conferencing equipment and a suitably placed backlit X-ray viewing box or utilizing a parallel system which uses a digital scanner to digitize the X-ray and then send the digitized image via the phone lines. Tele-consultation in this fashion has been used successfully in specialties as diverse as psychiatry, orthopedics, dermatology, renal medicine, medical oncology and emergency medicine. It can be used also for interpreter services. The aim of tele-consultation programs is generally to improve access to scarce health expertise for outlying patients and obviate the need for patients to travel long distances for a consultation. It can be used to support patient management at facilities lower down the referral hierarchy.

C. Diagnostic Reporting

Radiology images can be electronically transmitted from a remote location to a central location for reporting or review and second opinion. This is common in many places around the world and would be regarded as well proven technology .The minimum equipment for this is a digital scanner of sufficient quality, a telephone connection and computers and software to transmit and regenerate the image. This is often done in a store-and-forward mode so that the image can be viewed and reported at the convenience of the reporter. In pathology there is generally a very high quality color image required and this is technically more difficult to achieve. As a result, this does not seem to be as common an application of telemedicine as radiology.

D. Accessing Health Information

Access to information can be extremely empowering for health workers. Using computers to access information has the advantages of being extremely cheap compared to hard copy; such information is also capable of being continuously updated. An example of this is using a computer to remotely search the Medline database of journal article abstracts available on the World Wide Web.

E. On-Going Education of Staff

The maintenance and improvement of health professionals' knowledge and skills is a key determinant of the quality of a health service. Nearly all of the technologies discussed here can be used for educational purposes. Audio-conferencing and video- conferencing can be used to conduct lectures, tutorials and discussions between a numbers of geographic sites for Health promotion and preventative health. The mass media has a major role in health promotion and in educating the public about preventative health measures. Online health information is only likely to be significant if and when computers become a ubiquitous form of mass media.

F. Electronic Patient Records

Efforts are under way in some countries to develop comprehensive electronic medical records which allow real-time electronic access to the individual patient's clinical records wherever that patient may be.

Health is widely regarded as many years behind other service industries in developing this type of infrastructure.

VII. Current Applications in Various Fields

Third-generation mobile phones are expected to be extremely popular and fuel further replacement demand. Telecommunication firms all over the world are preparing to deploy third-generation networks. 3G mobiles provide a next generation mobile phone service that aims to offer high-speed 2Mb/s communication using high transmission efficiency in the high frequency 2GHz band. This will allow multimedia communication (such as animated images), atypical example of which is viewing TV on a mobile phone. In addition to increasing capacity for more users, 3G services deliver fast and secure wireless connections to the Internet and exciting new data applications for mobile devices. These applications and services include position location and mapping, audio and video content, application downloading over the airwaves-multimedia messaging, video conferencing, multi-user games and more. Many firms are trying to place smart card functions in phones so that they can be used as ticket and money, etc. Last summer, using noncontact IC function, NTT DoCoMo began to provide various services including electronic money, credit card, electronic ticket, and in/out management of offices. By using noncontact IC function, mobile phone becomes “electric wallet”. NTT DoCoMo now uses Sony’s Felicia which could be a defector standard of noncontact IC in the world. Also, home security and remote monitoring system is another example of 3G mobile phone applications. You can monitor your home from a remote location, not just view images of what is happening around the premises via a video camera, but also monitor the thermostat of your house were proposed in Fig. 8.

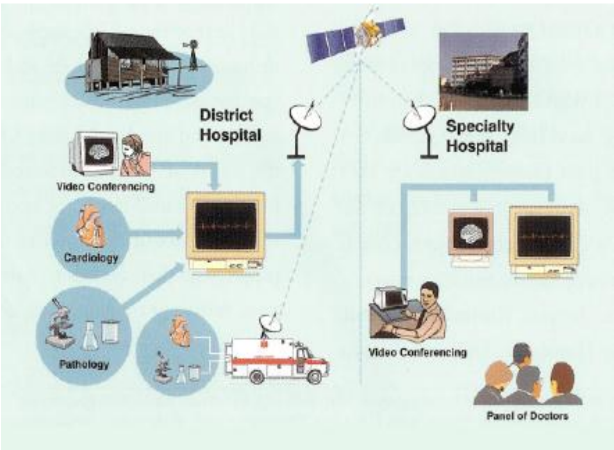

Figure 8. Total health spending apart from tele-health

There is a central box to link all of the monitoring devices and a portal you can access anywhere via a web browser or mobile phone to see what's happening in your home. 3G technology is also applied for location based services (LBS). People are expected to use the location capabilities of phones to find nearby restaurants, shops, stations, hotels, etc. GPS equipped mobile phones can precisely indicate the position of wandering elderly persons or small lost children.

A. Current Applications in Telemedicine

Japan is faced with a rapidly aging society. Currently, about 3 million people need daily personal assistance, and about 15 million have chronic disabilities. Mobile phone service became ubiquitously available throughout Japan. When it becomes 3G, relatively high volumes of digital information can be carried. 3G mobile phone offers major advantages for interactive video traffic. With the emergence of mobile phone networks, a number of systems which use mobile phones to transfer vital signs such as electrocardiogram (ECG) and heart rate have increased instead of early mobile medical system using satellites to establish communications between remote sites and base hospitals. The goal of our project is to develop a health management system in which several vital signs are monitored using a sensor without constraints or discomfort, and without disturbing daily activities. Our health care system automatically measures a person’s health status via special sensor integrated with a mobile phone. To monitor human health constantly without disturbing user’s normal daily activities, the wearable sensors and devices for physiological data collection should be designed to be so small that they will not affect the appearance and function of the user. Applications of mobile phone have become diversified and derive many services.

For example, we can use of 3G networks for simultaneous transmission of video, medical images, and ECG signals. They describe a portable tele-trauma system that assists healthcare centers by providing simultaneous transmission of a patient’s video, medical images and ECG signals, required throughout the pre-hospital procedure. The performance of the system is evaluated over commercially available 3G wireless cellular data service and real network conditions. With the commercially available 3G wireless links, their system can simultaneously transmit video, still-ultrasound images, and vital signs.

Conclusions

Telemedicine system help for positively in real time applications and it is enhanced for diagnosing for emergency problems. In this article we focused importance of telemedicine system and emerging applications in real world. The entire article was investigated through various research orientations and extracted from different catalogs. The following diagram explains incremental change of telemedicine usage from past decades. From following Fig. 9 i.e. bar diagram facilitates variation between the tele hospital clinics and tele home. According to Literature survey, more and more people around the world utilizing tele hospital clinics leads to a huge development in real time world medicine system.

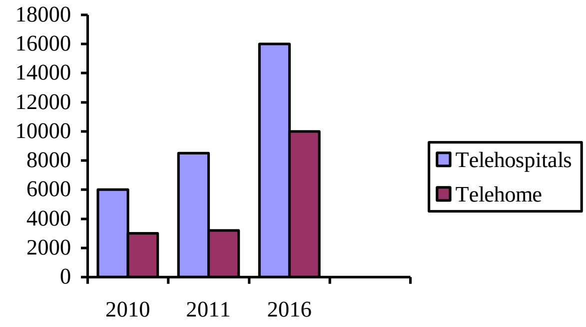

Figure 9. Performance evaluation of telehealth and medicinal systems

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