

Telemedicine: A System of Practicing Medicine

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Abstract

Under the Telemedicine system, a person can practice medicine despite the long distance. The system is facilitated by the use of computers networks created through technology. This is new technology in medicine that spring in the 20th century. It involves giving advice as well as treatment from far distances. The development of telemedicine has benefited from the advancement experienced in information technology. This paper aims at studying the benefits, challenges and on the means to address the challenges in telemedicine. The methodology used is the critical review of current pieces of literature. This paper presents a critical literature review of papers that have studied the Telemedicine. The critical review involves identifying the benefits and challenges that face telemedicine. The benefits identified include fostering the health care services. It is also significant in addressing chronic illness. The challenges identified involve lack of standardization. The system is also facing ethical limits. The methods suggested to address the challenges in telemedicine include the use of reliable devices in the treatment of patients. The second technique is through the formulation of legislations on the communication between patients and physicians in the telemedicine system.

Keywords: information technology, telemedicine, e-health, online health, telehealth

1 Telemedicine: A System of Practicing Medicine

Telemedicine is a system of practicing medicine over long distances by utilizing information technology (IT), networking and computers. The development of telemedicine has been occurring over the 20th and the 21st century. Earlier, patients, used to call up their physicians and inform them about their problems, and doctors used to reply back with advice [1]. One of the first instances in which telemedicine was used was when people on the ships felt ill and needed advice from doctors located on the shore. However, today telemedicine has undergone dramatic transformation. Such has been the development in the field that often the word ‘telemedicine is being replaced by

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‘telehealth’, and in case of the use of the internet – ‘e-health’ or ‘online health’ has been suggested [2]. Telemedicine may not occur between two individuals located in one town or city, but from any urban area to a rural area and sometimes even across continents. Telemedicine may not merely mean actually giving medical advice, but would also include examining the patient and even performing a surgery using a robotic arm. Telemedicine has gone beyond just communication between the doctor and the physician to communications between doctor and the specialists, between the doctor, specialists and the patients and even to a conference between several health professionals. People living away from cities and urban areas can enjoy a high status of health by receiving top quality healthcare through telemedicine [1].

Doctors and other healthcare professionals that are tech-savvy have considered the use of telecommunications in healthcare. The development of the internet and information technology has created new interests from various professions in computers and IT. Telemedicine may not only be for the exclusive need of the rural populations, but for much greater purposes. People today may not even imagine of the potential applications telecommunication and IT has in healthcare. For experts in IT and computers, telemedicine may still be in the infancy phase, but for doctors and physicians who use the system, they feel that although it may be difficult in some instances to use telemedicine due to various limitations in using technology, telemedicine has potentially been a useful application that will be of immense benefits in the future. Many healthcare professionals are also considering using the technology with skepticism and concern that several issues may effectively not be addressed. Although there are few concerns regarding acceptability and use of telemedicine in the rural health centers, a general view is that telemedicine can reap huge benefits and can address various issues. Many of the rural physicians feel satisfied at using such technology [3].

Studies have found that with advancements in information technology, there has been a steady improvement in the field of telemedicine. The costs of using telemedicine technology have decreased, it has become more and more accessible to the society and the benefits have increased. Most of the studies that have been conducted in the field of telemedicine have been pilot and feasibility studies. Many people have not considered using telemedicine because there may be no convincing evidence existing that the same is effective in improving the quality of healthcare and lowering the costs. There seems to be a dearth of scientific evidence. Hence many of the policymakers in the government although have given a go-ahead for such programs have not considered for its use on a long-term basis. They feel that telemedicine is a good technology that still remains unevaluated. Hence a lot of scientific evidence is required to help utilize this technology and consider it on a long-term basis in the health policies [2].

2 Literature Review

One of the first telenursing trials conducted has demonstrated that it is effective in helping patients recover. Many physicians in the past felt that it would be cheaper and more convenient to handle patients in an outpatient setup through tele-consultations. Nursing practitioners have studied that it would be more effective, and easier to treat minor patients through telenursing, rather than create inconvenience by calling the patient to the hospital. [2] conducted a literature review to assess various journals regarding the use and benefits of telemedicine, telehealth and e-health. He assessed several criteria including

cost-effectiveness and economics. He also studied specific areas of telemedicine including telenursing, electronic referrals, tele-consultation, telemedicine for minor trauma, online health service provision, etc [2].

[2] considered that telemedicine has huge implications with relation to home care. The quality of services can be improved and the cost of services can be decreased using tele-nursing. Patients with chronic illnesses can benefit from such services, and it was found that the patient satisfaction levels are often high. In the Kaiser Permanente organization trial, several patients suffering from COPD, congestive cardiac failure, stroke, cancer, anxiety, diabetes, heart disorders, etc, were provided with home nursing through a video phone. The group included case groups that were provided tele-nursing and a control group that was provided regular nursing. The study occurred over 18 months and the healthcare professional visited the case group patients about 17 % less number of times. It was found that the quality of services was similar in both the groups, but the case group had 27 % lower costs compared to the control group. Hence, the use of tele-nursing in chronically ill patients has been strongly suggested in the UK health settings. The tele-nursing equipment includes a videophone, a digital stethoscope, a digital thermometer, etc. As the patient and the nurse can see and talk with each other, there is a greater chance of providing personalized care. Besides, tele-nursing can be a part of nursing curriculum, made to create a special breed of nurses [2].

In another study conducted in Finland, the use of electronic referrals through a messaging system or videophones in outpatient clinics was conducted for about 10 years. More than 50% of the consultations were organized through telemedicine means, and it was found that it could help in reducing the cost by over seven times [4].

Another area in which telemedicine would be really useful is in telemedicine links between the general hospital and the specialty hospital. [2] has concentrated on this scheme. In a case of handing over the patient to the specialty hospital, the general practitioner would retain the patient and instead have televised consultations with the specialists and work on the advice of the specialists. Such scheme is not only useful for the patient and the specialist in providing care, but also for the general practitioner, who would learn new things. A wide range of applications and equipment can be used, and there is scope to improve the quality of care. Such scheme can be used in various specialties including internal medicine, cardiology, psychiatry, orthopedics, ophthalmology, etc. One of the fields where telemedicine would be of specific importance is dermatology. Studies conducted in UK, New Zealand and Norway has effectively demonstrated the cost of care can be reduced and at the same time, the quality of care can be maintained. Often there are questions whether email with attachments or real-time pictures would be better. However, specialists today prefer using both. For example, a physician can view the pictures of an ultrasound real-time and can receive the same in his/her email as an attachment [2]

Another area of application of telemedicine is in the field of trauma care especially if the injuries are minor and there would be huge inconveniences if the patient is taken to the hospital. Such a consultation can be organized with a nurse through videophones. The nurse can see the patient; check if the injuries are serious and if found to be minor can suggest that appropriate wound care be given. In case the nurse finds that there are potential major injuries, then she can call the patient to the hospital and deliver care [2].

Another system of delivering healthcare through telemedicine is online health and call centers that provide health information and advice to the patient. Today, patients are claiming greater autonomy in healthcare by taking a major role in making decisions.

This is also a part required under ethical, moral and legal principles. The patient has to be given all information with regards to his/her body. Hence, there may be instances under which the patient may want to get more information and hence may visit the internet or call a business center for more information. The call center may house healthcare professionals who would be providing information to the patient over phone, videophone, internet chat, etc. In some call centers, there may be such a system that whichever patient calls, based on their requirements, urgency and seriousness of the problem, call would be directed to the appropriate healthcare professional who would be providing specialized advice. Another system often followed would be the patient visiting a particular web site to gain more information about a disease or a condition, treatment procedures, diagnostic tests, etc. In such instances, the cost of healthcare may not be reduced, but the quality of healthcare would be improved as the patient would gain more information about the issue and can have greater control of his/her body by giving more valuable decisions. Today, the internet is flooded with health information and there are chances that the patient may not know which information is evidence-based or contains validated literature. In such an instance, the patient should confirm the findings with the healthcare professionals or should develop a way of validating health information that is present on the internet [2].

[3] strongly feels that one application that is keeping telemedicine alive is its use in the rural healthcare. [5] suggests that consultation through telemedicine means is well-accepted and has high patient and physician satisfaction levels. Physicians and patients liked to consult the specialist located in the urban health center. Campbell et al had another finding that tele-consultations with specialists located in an academic medical center had higher satisfaction levels compared to consultation with specialists in urban health centers. [3] notes that one of the important requirements of any telemedicine system is to ensure that a broadband internet service is provided rather than having an ordinary telephone line internet service. Many of the rural areas across the world do not have broadband or ISDN facilities and hence a telemedicine program may be bound to fail in such a network [6]

[3] also considers that Telemedicine would only be successful if the same is reimbursements through Medicare, Medicaid and other health insurance coverage. Many of the healthcare legislations that provide for health insurance have been effectively modified to provide for telemedicine facilities. Under telemedicine, there is no need for the specialist or physician to be present at the patient's location in order to claim reimbursement. The fee can be shared on a 75:25 percent basis between the physician and the specialist. In the states of Alaska and Hawaii, there are specialized reimbursements policies to help the physicians seek specialist consultations. Medicare and Medicaid have also given priority to the provision of telemedicine facilities to the rural and the far-flung areas, where such facilities are most required. Medicare and Medicaid also provide to certain extent of home care. There is also the need for further studies to look at various other applications of telemedicine. Many states in the US do not have uniform licensure requirements to practice healthcare and provide telemedicine services. These licensure requirements would act as restrictions in providing telemedicine services across the states. Often the doctor who delivers the telemedicine consultation service needs to have an active license in the state the patient is present. Many of the federal based reimbursements schemes do not concentrate the licensure requirements of the healthcare professionals. Hence, there is a chance that such facilities would be used more often. This could help in managing chronically ill patients, provide

home care, etc. The US healthcare system is plagued with several malpractice issues which would push physicians to practice defensive medicine. It should be clearly demonstrated that telemedicine provide satisfaction and ensure that the quality of care is maintained. It has been found that when email services were used between the patient and the physician, there were chances that the physician may delay in providing answers to the patient queries and hence reduce his quality of care. People are also concerned that using telemedicine services may cause certain legal issues to arise. It may be difficult to establish the patient-physician relationship that may exist in a telemedicine setup and hence it would be difficult to assess how a telemedicine system would be legally compliant when fully operable. The American Medical Association (AMA) has earlier criticized the process of giving online prescriptions for patients after holding online consultations. They feel that the doctors may not fully be able to examine the patients and miss out on important signs and symptoms. Hence, they feel that although online prescriptions may be legal, the same may not be ethically or morally good. However, many physicians also feel that using an online system with real-time audio and video contact with the patient can be very useful in making medical decisions [3].

Frey feels that that telemedicine and online medicine has huge implications for the future. Potentially, physicians would replace their stethoscope and thermometers with digital equipment that can record all the vital signs. A patient located in one area of the world can call and interact with his/her physician located in another area. Prescriptions can be sent online, and advice can be sent to other physicians using the online medical records. To provide the patient more information, the physician can suggest a particular web site or tell the patient to look for certain issues that may be present in the web site. Telemedicine also has huge benefits with relation to continuing medical education. One of the areas that would benefit from telemedicine is family practice. Frey considers that technology should be utilized in medicine only under appropriate situations and if there are potential limitations that affect the quality of care or having a negative effect over ethics, the same should be abandoned. The use of telemedicine in the healthcare system should be cautious [3].

[7] feels that telemedicine can play a vital role in transforming healthcare for good. Telemedicine can not only be utilized for consultation between physicians and specialists, but also to store and transmit medical documents and images, monitor the patient's vital signs, ensure that messages are sent and received between the healthcare provider and the patient. Besides, several diagnostic and treatment processes that are complicated can be observed through video-conferencing. Hein feels that in modern medicine with increasing costs and the increasing need to provide healthcare for chronic diseases, telemedicine may be a useful solution. Several factors play a role in determining the requirements of telemedicine in the US healthcare network. These include:-

- Growth of the US population – The population is estimated to grow by 20 % in the next 20 years.
- There is a current shortage of healthcare professionals in the US, and one way of overcoming it would be to have telemedicine as a support service in healthcare
- There is a significant rise in chronic diseases in the US and across the world. This requires a different kind of practice setting in which several follow-up visits may be required. Potentially these follow-up visits can be organized through tele-consultations thus saving costs and time of the healthcare professionals, improving convenience and maintaining the quality of healthcare.

- Elders and physically challenged patients may find it difficult to access healthcare – For such patients, telemedicine may be a useful tool helping them to interact with their doctors from home itself.
- Need to provide healthcare in rural and far-flung areas – Often the patients who may be residing in rural areas may often need to visit the healthcare center in the urban area to obtain specialized and advanced care. This can be effectively prevented if telemedicine facilities exist in the rural setup.
- Need to provide healthcare in emergency [7].

However, Hein also considers that that several barriers may exist to the provision of healthcare through telemedicine means. Some of them include:-

- Security and privacy concerns
- Reimbursements
- Inability to follow common standards and need for interoperability of the systems
- Malpractice issues
- Limited support of the government towards telemedicine(Hein, 2008)

Hein feels that telemedicine can provide innovative employment in the healthcare sector. Preventive healthcare can be practiced and the rate of medical errors can be reduced. As the patient need not to come to the hospital to receive healthcare, there are chances of hospital-borne infections reducing and hence, improvement in the quality of healthcare [7]. The reimbursements for telemedicine services needs strong policies to be made by the Department of Health and Human Services, Medicare contractors of the state and the private insurance companies [7]. Preferably, the model adopted by countries in which the telemedicine setup has been implemented successfully needs to be considered, after looking into the specific issues that may exist in the US healthcare system [8].

3 Discussion

A special committee on telemedicine from the Department of Health, New York State, felt that telemedicine has several special benefits to offer and developments in the field need to be utilized by the physicians and other healthcare professionals. However, there may be challenges for the physician whilst using the telemedicine models. It is important to note that even through telemedicine, the relationship between the patient and the physician can be maintained. Telemedicine is a legal branch of medicine and would also be ethically fulfilled. However, to ensure the same, there is a need to follow certain guidelines and maintain certain standards. For example, the physician should be careful whilst transmitting certain patient information across the internet. In case of emergency care, if the internet network fails or if the power fails, there should be effective backup mechanisms to ensure that vital care is not missed out. Keeping an idea that certain standards and guidelines need to be maintained, the policymakers and stakeholders should develop these based on the requirements. It would always be preferable for the doctor to interact with the patient thoroughly, use reliable and valid online screening tools and ensure that nothing is missed out before giving advice or making prescriptions [9].

Telemedicine can be especially useful in the management of chronic diseases, as the patient can be monitored or followed-up 24 hours a day. In the field of cardiology, telemedicine has been of immense use since the last 20 years. Today, the cardiologist

can look at the vital signs of the patient that is monitored continuously by digital devices and transmitted across the network. Such a system can warn the cardiologist and also the patient that a critical situation has reached and medical care needs to be provided. However, such devices and technology may not be affordable and hence, one of the prime issues faced by telemedicine professionals today would be to help lower the costs of applications that are used in telemedicine. This would increase its use. Smaller hospitals should be in a position to procure this equipment and use it [10].

Another area which is of potential benefit in the area of telemedicine is tele-surgery. This can effectively prevent the need for the patient being shifted by air to a distant location and save time. Many universities across the world have tele-surgery facilities to provide a good experience in education to their students. These students can perform surgeries under the supervision of expert surgeons who may be present across the world. Such a system for tele-surgery may be easy to procure and costing low. In this way education in healthcare can be improved by using telemedicine as a tool [10].

4 Conclusion

Telemedicine is a system that would utilize technology to bridge barriers in healthcare. It is a different approach of overcoming the problems in healthcare, and so far it has been successful in meeting the expectations. Such technology can help to provide advance care and permit information to be transmitted across the network. If certain standards and guidelines are effectively followed, there are chances that the quality of services would be maintained, if not improved. The costs of care would be lowered and the accessibility improved. Telemedicine is an immense tool in teaching medicine and can be used to train students or even junior physicians. Physicians and other healthcare professionals can get in contact with specialists located across the world. However, telemedicine has certain problems especially with being acceptable legally and ethically and the problem of security and privacy. The government, policymakers and other stakeholders need to actively participate in ensuring that the telemedicine network being created is one that would follow all the legal and ethical guidelines. The screening devices used in telemedicine should be reliable and valid, and should permit effective decisions to be made. Physicians should use their discretion whilst prescribing a drug or suggesting any kind of treatment to the patient. Besides, the physician should be aware of the things to be present whilst handling a patient through telemedicine means. In such a case, the electronic medical records should enable certain reminders and alerts for physicians to ensure that medical errors are kept to the minimum [7]. Telemedicine may be legal, but even then the physician should not take any chances. Many of the companies and organizations are failing to develop effective and innovative solutions to problems that may be present in telemedicine today. Besides, effective legislations need to be launched that would enable patients to communicate to the physicians through telemedicine means and claim reimbursements for the same. It is important to consider that although telemedicine cannot be considered as a replacement to face-to-face visits, it can be used as a supplement to the same. Hence, the legislation should be more open to discussion to develop rules and regulations that would permit telemedicine consultations in healthcare [9].

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