Chapter

Barriers to Development of Telemedicine in Developing Countries

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Abstract

Affordability, accessibility, availability, and quality of healthcare services have always been a burning issue for the mankind. The issue of health care is always crucial for the governments and countries irrespective of their financial status. Continuous efforts are being made by policy makers, administrators, and researchers to provide quality health care to the people at the cost that they can afford. Developed countries have adopted many alternative tools and technologies to leverage the supply of good health care but quality and cost of health care are still big issues in these countries. Developing countries are far behind in adopting technology to reduce the cost and improve the quality of health care. Telemedicine has emerged as a new hope to remove the bottlenecks in the healthcare seeking. Developing countries have adopted telemedicine technology in a hurry without proper planning and strategy. Despite more than two decades of adapting telemedicine, developing countries have not achieved any significant success in reducing the cost of care or improving the access of care. This chapter has tried to explore the various barriers to the development of telemedicine in developing countries. Proper enlisting and detailing of these barriers will definitely help governments to understand the loopholes and bottlenecks in the implementation of telemedicine and help them to develop appropriate solution.

Keywords: telehealth, telemedicine, barriers, developing countries, health care

1. Introduction

Increasing population in the developing countries has created more demand of health care. Demand of affordable and quality health care is increasing day by day. Rapid demand at the global level for healthcare management is increasing over the past few decades, increasing emphasis on healthcare quality [1]. People in poor countries have less access of health care and poor have even less access of healthcare services within the country [2]. Assessing the appropriate health care and improving the quality of care have been a serious issue in developing countries [3]. Many times, quality of public health care in developing countries has been neglected and attention is only given to technical aspects than the interpersonal components [4]. The cost of health care in developing countries has always been a crucial issue. Out of pocket expenditure on health care has increased many folds. Catastrophic health expenditure is posing a threat toward a household's financial ability to maintain its basic needs [5].

There are many barriers like geographical access, availability, affordability, and acceptability to access the health care in developing countries [6]. These barriers become more problematic to women, children, old, and physically handicapped population. Even though the health service provision and the geographical access have improved, local women may not use the services unless the provided services meet their demands in quality and cultural manners [7].

To overcome the barriers, healthcare sector is now using telemedicine solutions to increase the reach of its services to population. The mindboggling developments in Information and Communication Technologies (ICT), particularly, the web-based technologies have opened up new possibilities in providing better health care to population. Telemedicine is gradually coming up as a viable policy option for the governments in developing countries [8].

Telemedicine is the use of electronic communications and information technologies to provide clinical services when participants are at different locations [9]. Telehealth is used to encompass a broader application of technologies to distance education, health promotion, preventive services, consumer outreach, and other applications wherein electronic communications and information technologies are used to support healthcare services. According to WHO, "Telehealth involves the use of telecommunications and virtual technology to deliver health care outside of traditional healthcare facilities" [10].

In a broader and detailed way, World Health Organization (WHO) defines telehealth as: "The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities" [11].

Telemedicine is restricted to the use of IT for treatment and medical care whereas telehealth cover a broader area, where IT is used to enable the environment where people can enjoy their life at fullest. Although both these terms carry a different meaning altogether but in developing countries, both these terms are used interchangeably.

Mobile Health (mHealth) helps in patient education, health promotion, disease self-management, decrease in healthcare costs, and remote monitoring of patients and can improve healthcare delivery for developing countries [12, 13].

Lots of efforts are being made by governments (policy makers, researchers, and administrators) to develop the telemedicine network across their geographical boundaries but pace of development is slow and acceptance of technology to population is not picking up. Unfortunately, the technology that has been developed to remove or minimize the barriers to the healthcare seeking currently faces lots of barriers itself and its development has not been happening as it was expected by policy makers and researchers.

It was expected that telemedicine will reduce the burden of hospitals, suffering of patients, out of pocket expenditure, need of transport, hospital fear, and save the time and money of general public. It was also expected that it will increase the quality of care and will develop the trust among patients toward telehealthcare system. We cannot deny the partial development of telemedicine and few success stories in many parts of the world but the leverage, which we have expected from telemedicine is still lacking. Then question arises where is the problem? Why telemedicine is not picking the pace and why it is not becoming popular among service providers as well among the patients.

Many telemedicine pilot programs have been launched in developing countries in last three decades. Many evaluation studies [14, 15] have been conducted to know the success and failure of telemedicine networks and programs across the globe. Whatever success we see mostly happened in the developed countries but in most of

the developing countries, success of telemedicine program is limited. This chapter will explore the various hurdles in the development of telemedicine and its operations in developing countries. Despite many benefits offered by the telemedicine, it has not been utilized fully to serve humanity and is underused [6, 7, 16–18].

There are many barriers in the adoption of telemedicine and adoption failure is serious issue, which needs to be discussed and explored. According to a study, about 75% of the telemedicine projects are abandoned or failed outright and called as failed projects and this percentage goes up to 90% in developing countries [19]. Until we are not able to find out, enlist, analyze, and understand the barriers in the deployment and development of telemedicine, we cannot ensure success of telemedicine program. Following crucial barriers are currently working in the field of telemedicine implantation and operation.

1.1 Barriers to telemedicine programs

1.1.1 Policy barriers

For smooth functioning and development of any system, we need to have definite policies and procedures at State and National level. These defined rules, regulations, procedures, and protocols are necessary to help a telemedicine system to run smoothly and safely and ensure that population receive a quality healthcare services. In many developing countries, there are no uniform and standard telemedicine policy, which leads confusion for designing telemedicine-related services, program, and its smooth implementation.

Many practitioners have fear of malpractice-related legal issues and which prevents them to actively participate and develop telemedicine program. Malpractice liability is an important barrier in the practice of telemedicine services. Certification and credential barriers also de-motivate practitioners. There is no public policy related to telemedicine for the end users, which can ensure privacy, confidentiality, and security of patient's health information during teleconsultation [8]. There are weak regulatory frameworks related to reimbursement in government as well as in private sectors against the teleconsultation services.

Because health is a state matter, state government should frame policies, programs, guidelines, and regulations regarding telemedicine practices and also allocate sufficient financial resources for telemedicine development. In few developing countries, telemedicine policy exists but implantation framework is absent [8].

There is lack of established international framework on telemedicine and also there is little consensus or understanding on uniform international standards for telemedicine practices. Telemedicine provides services across the state, country, and international borders, so there should be, at least, common international understanding on this issue.

Standardization of both hardware and software, as well as guidelines for practice, would help program managers to overcome interoperability, portability, and security issues [11].

1.1.2 Organizational structure

Lack of formal organizational structure to deliver telemedicine services is the biggest barrier for the development of telemedicine services in any country. Because being a hybrid discipline, it needs collaboration with all possible stakeholders at each level of the healthcare delivery system. Lack of collaboration between the stakeholders in the absence of specific policy becomes bottleneck in the development of telemedicine.

Department of Health and Family Welfare and Department of Information Technology should have a national level formal collaboration to develop a national telemedicine network. There are examples of such collaboration and presence of telemedicine department in few developing countries like India but it is patchy, broken, and not well established [8].

The absence of structured organization is another barrier in transforming telemedicine-related vision and political will into policies at central level. If there is no such policy, then framing of program related to accomplish those political wills become impossible. Lack of specific time bound and result-oriented programs become difficult to implement and evaluate. Systematic planning of implementation of such telemedicine programs, its concurrent monitoring, and final evaluation demands lots of trained human resources.

1.2 Lack of accreditation or regulatory bodies

There is no specificity and standardization in the practice of telemedicine, which poses accreditation issue. Lack of accreditation of telemedicine facilities creates fear among the users as well as providers. Absence of accreditation councils and regulatory bodies leaves telemedicine in isolation. Medical Councils and other health councils should take responsibility to regulate the practice and procedures of telemedicine.

There is lack of uniformity in telemedicine regulations across the world. In the absence of definite regulatory policy and guidelines, physician has apprehension and fear to practice telemedicine. Medical and health councils of different countries still find that proposed definition of telemedicine has deficiencies. These councils do not consider telemedicine as a new discipline or a new branch of medicine. Regulators consider that telemedicine presents challenges and assume that it is new and unproven. There is no clarity what to be regulated. An enabling regulatory environment is required to ensure appropriate, adequate, and quality delivery of healthcare services [20].

1.2.1 Lack of team of champions

Once telemedicine system is deployed and is placed, then there is a need of project champions, who will implement the telemedicine program. The three major champions are clinical champion, IT champion, and telemedicine champion [21]. Success of any telemedicine program depends on these champions but these champions are very few in developing countries, so most of the deployed telemedicine program die very soon after their piloting. There are also deficiencies in the training and job orientation of these champions. In most of the cases, they are not well oriented about their roles and responsibilities.

1.3 Lack of telemedicine champions

There is a paucity of dedicated, focused, and visionary telemedicine leaders in developing countries. These leaders are brand ambassadors of telemedicine and are carrying the flag of telemedicine high even in the adverse situations. Whatever telemedicine work, we see in these developing countries, are only due to individual efforts of these telemedicine champions.

1.4 Lack of clinical champions: physicians

Training is an import part of skill development and the organizations should develop a training schedule to train health professionals for smooth delivery of telemedicine services [21]. It is very important to provide training to all government

officers regularly. Without proper knowledge of IT of government officers, e-governance project will never see the real face of the project [22].

Most of doctors are not aware about the latest information technology and find difficulty to used modern IT gadgets. There is lack of telemedicine experts in healthcare sectors. There is a need to include few chapters related to telemedicine in Medical education curriculum to sensitize and orient budding doctors to learn the technical part of this discipline. There should be separate telemedicine education secretariat and directorate in Ministry Medical Education like in Ministry of Health care, which will promote the development of telemedicine [8].

1.5 Lack of paraclinical champions: nurse providers

Telemedicine health services are also assisted or provided by nursing staff but their contribution in telemedicine is not recognized and acknowledged. Role of nursing staff in expansion of telemedicine could be very vital if proper training and guidance is provided to them. Most of the developing countries do not have trained telenursing officers or staff who can contribute in the development of telemedicine network.

There is also lack of proper institutional training program in the course curriculum like traditional nursing courses. Until nursing students are sensitized toward this new technology, they are not going to make carrier in telenursing. Apprehension and fear toward telemedicine can only be removed through providing the knowledge about telemedicine. There should be basic telemedicine nursing lesson in their course curriculum. Telenursing is still a remote concept in the developing countries, where focus is mainly on telemedicine.

1.6 Lack of IT champions: teletechnicians

Telemedicine is a hybrid system, which involves the medical as well as ICT domain for complete understanding of the telemedicine solutions and its delivery. There is a serious lack of such technical persons, who can run day-to-day business of telemedicine. To run any telemedicine system properly, trained technical manpower is required. There is lack of technical champions in the field of telemedicine in India, especially in the field of health care and only voluntary champions here and there are visible.

It is common fact that many provider physicians and clients cannot fix the technical problems arising from computer system and ICT network. So, for a proper and smooth functioning of telemedicine system, we need trained and expert manpower to establish a stable and continuous communication during teleconsultation [25]. Unfortunately, there is serious lack of such trained persons in the system in most of the developing countries.

There are very few institutions in developing countries, which train and develop this special group of technicians. It is very difficult to find a person who has undergone training in Medicine and in Information Technology.

1.6.1 Technological barriers

Technology itself is becoming a barrier in the development of telemedicine in developing countries. High cost of replacing the older technology is not affordable for many stakeholders.

1.7 Rapid upgradation of ICT

Due to rapid advancement of telemedicine technology, many state-of-the-art facilities and equipment (software and hardware) become obsolete and outdated.

A complex and often unwieldy technical infrastructure may yield disappointing evaluations until it becomes more ubiquitous and user-friendly [23]. People working with these outdated technologies become demotivated and frustrated and lose interest in providing services through old technology system. Government also finds it difficult to replace, which is easily due to lots of budgetary requirement for newer technology.

Failure of telemedicine network in Madhya Pradesh, India, is an important example, where Indian Space Research Organization (ISRO) sponsored equipment like camera, television sets and other equipment and software were not utilized for a longtime and became outdated and nonfunctional. Repair and replacement of these equipment and software are so costly that government is not willing to get it repaired and whole telemedicine network has collapsed [14].

Time gap between acquiring hardware and development of customized software is so large that by the time software is ready, the hardware becomes obsolete. This mismatch between software and hardware also create a bottleneck in the development of effective telemedicine solution.

1.8 Inadequate ICT infrastructure

Many developing countries have inadequate availability of Information and Communication Technology (ICT) such as computers, Internet network, printers, and electricity for proper implementation and running of telemedicine program. Internet access and power supply are other issues related to failure of telemedicine network in rural and remote locations [14, 18, 24]. One of the important hurdles to effective delivery of telemedicine solution to rural and remote locations in developing countries is incomplete and insufficient ICT infrastructure.

1.9 Initial huge start-up cost of ICT infrastructure

Telemedicine set up can deploy varieties of information and communication technologies (ICTs) for transmitting information through texts, pictures, audios, and videos to a variety of healthcare providers. Cost depends on the type of ICT being used for the start-up. For setting an audio visual ICT platform for teleconsultation needs huge investment. Budgetary constraints become a major barrier in the development of telemedicine network in developing countries [7, 18, 19, 24]. A sustainable financial support is needed to purchase, deploy, operate, and maintain the sophisticated telemedicine platform [19]. Telecommunication expenses, training of service providers and clients, and need for newer ICT platforms require most of the expenditure.

1.10 Low Internet connectivity

Most of the telemedicine applications require a high speed and reliable Internet bandwidth to run smoothly. Tele-surgery, real time tele-ophthalmology, real time tele-radiology, and emergency consultation are some examples of such applications [25]. Unreliable and low wideband Internet pose barriers in smooth delivery of telemedicine service.

For real-time teleconsultations between providers and clients, there is a need for reliable and high speed Internet availability. Internet coverage is still bottleneck in many developing countries, especially in rural and remote areas. Most rural areas do not have the financial capital to independently invest in a broadband network that would provide high-speed Internet to their inhabitants. Telecommunications ("telecom") companies are the primary providers of high-speed Internet, but they invest very little in rural areas because such investments are not as profitable [26].

Internet connectivity for transmitting patients' files, records, pictures, and videos are still limited in many areas, including in China, India, Indonesia, the Philippines, and Vietnam [27]. Recently, it has been observed that Internet access is growing and also the cost of Internet is coming down, which is a good sign for the development of telemedicine on developing countries.

1.10.1 Legal barriers

Telemedicine practices has eliminated many physical and emotional barriers to healthcare seeking but have raised many legal and ethical issues, which are normally not encountered during traditional healthcare delivery. Legal considerations are a major obstacle to telemedicine uptake [8, 21, 28].

1.11 Online prescription

There is no legal framework of e-prescription, digital prescription, or mobile-based SMS prescription. Digital prescriptions are not approved and accepted by Medical Council of India (MCI) or any other regulatory authority [8]. Online prescribing policies vary across the countries and across the states within countries.

Concerns have been raised over various issues like whether an appropriate patient-provider relationship has been established, lack of an adequate physical examination of the patient, accuracy of the patient's history given the self-reporting of the patient over a telehealth connection, and not meeting state medical board licensing requirements [29]. There is no standardized legal framework to protect practitioners as well as clients for online prescriptions in developing countries.

1.12 Malpractice liability

Most of the doctors are afraid of Consumer Protection Act due to malpractice-related issues. There is a lack of specific standard operating procedures (SOPs)/guidelines for the telemedicine practice [8]. Legal issues surrounding patient privacy, safety, security, and confidentiality also play vital role in teleconsultation. Very little information exists on the extent of malpractice liability and telehealth [29]. Medical malpractice-related legal issues should be identified and addressed for smooth practice of telemedicine.

1.13 Licensing of telemedicine/telehealth service providers

Highly sophisticated, safe, secure, and speedy teleconsultations have reduced the distance barrier in healthcare seeking and have improved the healthcare access. In order to avoid malpractice in telemedicine, healthcare professionals should be specifically trained for telemedicine as they do for traditional medicine [30]. Poor availability of experts and trained professions raises legal implications and warrants licensing of telemedicine providers.

The responsibility of licensing to telemedicine providers falls under the purview of the state licensing councils or boards of a particular country. These policies governing telemedicine and physician licensure vary widely across the country [29].

Licensing ensures that physicians meet academic and clinical competence standards for the telemedicine practice. It protects public from unqualified and substandard physicians and healthcare professorial. Licensing also helps to enforce continuing standards [31].

1.14 Informed consent before teleconsultation

Need for a prior written or verbal informed consent for any telemedicine consultation and treatment misrepresents telemedicine as a different form of service, rather than as a useful tool that enhances diagnostic and treatment services.

Healthcare providers need to have a clear understanding of what their legal and ethical responsibilities are. Similarly, patients must receive the protection of adequate standards of care and know that the person to whom they are entrusting their health has the proper qualifications [31].

The lack of clear-cut legal guidelines, rules, and regulations hinders the telemedicine to improve healthcare access and healthcare quality through information and communication technology [31].

1.14.1 Financial barriers to telemedicine development

Although telemedicine can be leveraged to increase access to care and reduce the cost of care but that is mainly true for the user's point of view. Story is different if we look from the side of providers or healthcare organizations. For establishing a telemedicine unit, it needs lots of financial investment. It becomes more difficult for the developing countries to allocate huge budget for the investment in telemedicine.

Establishing and operating a "Telemedicine Unit" require purchasing the equipment needed to setup the system at both provider's and consumer's end (in the hospital, clinic, or pharmacy); maintaining the equipment; training the physicians and local healthcare workers on the technology; and compensating the physicians. There are many other costs are involve in delivering teleconsultation like payment of Internet and electricity bills, salary of support staff, other recurring costs etc.

These total costs are so high that many proposals of establishing or starting telemedicine program never take off, or even if it starts, it dies soon and cannot sustain on a long-term basis. Many telemedicine pilot projects have failed because of high maintenance cost [14].

The costs of telemedicine are often high in developing countries, because of low awareness between both patients and local healthcare workers, low information technology literacy, and limited access to infrastructure and technology [27]. Telemedicine service providers are generally unable to bear all costs alone and expect government or development partner to support financially for the sustainability of the telemedicine projects.

Most of the telemedicine solutions and programs tend to be government funded, at least in their initial phases. Due to some reasons, if government stops funding, the system becomes unsustainable as there is no alternative business model. So dependency on public support is another financial barrier in the development of telemedicine in developing countries [27].

Cost incurred in purchase, installation, and maintenance of telemedicine services (telemedicine and communication equipment) are very high and do not give proper return on investment (ROI), so there is less economic benefits to the practitioners, which leads to the bankruptcy and closure of many health facilities in rural communities and also prevents further telemedicine expansion to communities needing specialized services [32]. Insurance companies do not reimburse the teleconsultation bills and payments, which further force the practitioners to stop the telemedicine services. Many hospitals and clinics perceive that telemedicine solutions are too expensive to implement.

1.15 Reimbursement and insurance barriers

Reimbursement of telemedicine services has been reported as one of the important barriers in developed countries [17, 22, 33, 34]. When patient avails healthcare services through telemedicine system, insurance claim may not cover the cost of care as it is not delivered through traditional healthcare system. Such discrimination seldom occurs in developing countries, where health insurance is still a rare commodity [30].

1.15.1 Social barriers in the development of telemedicine

Social and culture milieu of the community and society of a particular country also creates lots of barriers in adapting, utilizing, and sustaining telemedicine services. The lack of ICT literacy, awareness, language barriers, and cultural gaps between the service providers and patients etc. are also major factors, which prevent further development and expansion of telemedicine network in developing countries.

1.16 Resistance to change

A lack of support to newer ICT tools has been observed from both parties (providers and users). Several studies have revealed that the resistance to change has been reported toward telemedicine from providers (physicians) as well as from users (clients/patients) for newer technology [14, 19, 25, 33, 35].

1.17 ICT literacy

In developing countries where general literacy is not even adequate, we can imagine the awareness level of population toward ITC literacy. Poor awareness toward modern technologies and their use in delivering health care seems to be a big barrier in developing countries. People in developing countries are not much aware about the benefits offered by telemedicine. Even physicians are short of IT knowledge and not updated. Poor awareness level creates fears and resistance toward ICT technology and create hurdle in the adoption and development of telemedicine. Age also plays an important role. Many older physicians do not feel comfortable dealing with ICT technology. Some patients, particularly older patients, are hesitant about the new technology.

Many healthcare professionals are not comfortable working with computers and modern gadgets and consider technology extra work for them. They also fear that telemedicine may lead to job loss or a reduction in their bedside presence [27, 33].

1.18 Lack of confidence

There is lack of confidence in patients about the outcome of telemedicine. It is difficult for them to believe that machine can provide healthcare demands without visiting physician face to face [25]. This cultural perception and attitude toward newer technology also possess threat to the development of telemedicine. Even many physicians also think that patient consultation and treatment are incomplete without touching the patient and prefer face-to-face consultation than remote consultation through ICT platform. Some medical practitioners do not want to opt telemedicine practice due to the fear of medical indemnity.

Barriers to adoption and sustainability of rural telehealth embody several factors that must be considered when planning, developing, implementing, and evaluating a rural telehealth program [32].

1.19 Industry-oriented telemedicine

There are three players in the telemedicine viz. physicians as service providers, IT Industry as supplier of technology, and public as user. One of the major hurdles of development of telemedicine in developing countries is the passiveness of provider physician and users.

Most of the telemedicine tools and technologies are developed and supplied by the developed countries and they have strong market influence in the developing countries. IT industry people are very active and try to influence policy makers and administrators in the health system to sell their IT technology (telemedicine-related hardware and software). Their focus is only to sell and install the telemedicine tools and equipment and leave the system for the physician to run.

Failure is bound to happen if providers and users are not taken into account while developing the telemedicine platform. For example, in Madhya Pradesh, India, ISRO and top-level administrators at ministry level decided to implement telemedicine solutions across the state but it failed badly as there were no takers at ground level. Physicians were not convinced and adequately trained for newer technology and public as a user was not aware about the benefit of the platform [14].

2. Conclusion

Health care in developing countries is in the midst of a paradigm shift, from a traditional provider-centered, disease-oriented approach to a patient-centered, health-management model. Telemedicine has influenced almost all aspects of healthcare and many success stories have reported the role of telemedicine in improving healthcare access, reducing cost of care, and enhancing the quality of care. Telemedicine could be an important tool in achieving healthcare coordination and reducing healthcare disparities.

Despite of so much development and successful work in the field of telemedicine, it has yet to become integral part of healthcare system. Success of telemedicine only depends when it becomes integral part of healthcare delivery system and not as a stand-alone project. Now, it is time to take telemedicine from pilot mode to routine operational mode in mainstream health services delivery system.

There is tremendous pressure on governments to provide accessible affordable and quality healthcare to its people. Only alternative and innovative methods like telemedicine can help to fulfill this gap. Current status of telemedicine in developing countries is not very satisfactory and passing through a stage of crisis. This chapter has explored the various barriers in the development of telemedicine in developing countries.

These various barriers mentioned above are impeding the speed of expansion of telemedicine in developing countries. It is now time to minimize the abovementioned barriers and remove the bottlenecks for smooth development of telemedicine network across the globe for the betterment of humanity.

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Notes/thanks/other declarations

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