Feasibility Study of the Telemedicine systems Deployment in Rehabilitation Centers for Addiction Therapy

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Abstract:

Objective:

This study aim was to determine the feasibility to establish a telemedicine system in one of the rehabilitation and addiction treatment centers in Tehran.

Materials and Methods:

This study was descriptive-cross sectional. The research population consisted of 28 people, who were the head and Senior Executive Manager, financial director, IT manager, physicians, nurses and counselors of the addiction center. Due to the small number of statistical population, a total number of sampling was performed. The field research tool was interview, observation and standard questionnaire. The validity of the questionnaire was assessed by professors and experts and its reliability was assessed using Cronbach's alpha coefficient (0.87). SPSS software was used to analyze the data.

Results:

Our studied center, has the sufficient technical infrastructures needed to implement Telemedicine, and the IT department has a good level of awareness about telemedicine technology. The center does not have any strategic plan that includes telemedicine, and the manager board does not support telemedicine, but the center has the support of the chief executive manager on this matter. The shortage of technical staff, insurance and reimbursement problems, initial costs and medical staff shortages, current costs, and training and medical staff resistance are, in the order of priority, the major barriers to telemedicine implementation, and time barriers, employee attitudes, privacy and licensing issues , issues of confidentiality and competition are less important.

Conclusion:

Considering that the Rehabilitation and Addict Treatment Center has the technical infrastructures necessary for the implementation of the telemedicine system, as well as the IT department manager is familiar with telemedicine technology, the cost of deploying this system in the center is not significant and is cost-effective. It is recommended to develop an appropriate strategic plan, conduct training programs to change the administrative staff culture and coordinate with the insurer's organizations.

Keyword: Feasibility Study, Implementation, Telemedicine, Rehabilitation centers, Addiction Therapy.

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1. Introduction

The application of information technology in the health industry, especially in hospitals and medical centers, has a huge potential for improving the quality of services provided, as well as the efficiency and effectiveness of personnel (Scott RE, 2007).

The rapid development of technology and informatics has encouraged health organizations to acquire the infrastructure and skills needed to provide better-quality advanced medical services (Judi HM, Razak AA, Shaari N & Mohamed H, 2009). Today, healthcare organizations face new technology, called telemedicine (Bangert D, Doktor R, 2003), which creates channels for collaboration, education and distance counselling (Bagayoko CO, Möller H & Geissbuhler A., 2006).

Telemedicine is actually the use of communication technology for patient clinical care and includes various mechanisms for providing electronic services. Telemedicine is a tool that enables the provider to offer health care services to patients in distant locations (Ostbye T, Hurlen P., 1997).

According to the World Health Organization (WHO), telemedicine, is the provision of health services and health, when the gap is a critical issue. Telemedicine uses medical expertise and information and telecommunication technologies to exchange valuable information, to diagnose and treat and prevent diseases and injuries, and to provide continuous education and research and development to improve the quality of health of individuals and communities. (Yelloelees PM, 2005).

Telemedicine first entered the medical dictionary in 1920. The NASA organization was the first to provide astronauts with medical advice and long-distance treatment, using satellites to prepare communication between astronauts and physicians on the ground, thereby assessing the health of the patients (Jennett P, Yeo M, Pauls M & Grahom J, 2003).

In 1985, NASA used information technology to provide assistance after the Mexican earthquake, improving coordination as well as saving thousands of lives. In the Armenian earthquake, international satellite communications called the "Space Bridge Project", were established between different countries, including Russia and the United States, and several regional hospitals with four medical centers in the United States for the purpose of exchanging information and providing

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clinical advice in the form of Two-way voice transmission and high-quality one-way video transmission (Ranjbar H, Borhani F, Abaszadeh A, 2009).

Advantages of using Telemedicine in providing health services include: Saving time for the physician and patient, reducing the transfer of patients to health centers, using the experiences of physicians and specialists everywhere in the world, creating a managed care area in hospitals and health centers (Gholamhoseini L, Sadeghi M &Mehrabi N, 2008). reducing the cost of referral to the office, Reducing errors and raising the speed of counseling, using patient databases, reviewing the process of disease improvement, ease of exchange of laboratory results and Radiological images, improved medical services to rural and remote areas. Increasing access to health care (urban and rural), improving health care quality, reducing medical errors, improving access to information, especially in the context of contagious and pandemic diseases, exchanging new medical findings among doctors around the world (Amirani H, 2015), reducing treatment costs and time, expanding access, creating employment, valuing, compiling statistics and information, developing health insurance, and reducing health-related abnormalities (Moeini E, Bakhtiari Z., 2010)

Meini and Bakhtiari (2003), in their article titled "Identifying and Investigating the Factors Influencing Telemedicine Technology in Iranian Hospitals", considered factors influencing the use of telemedicine technology in three levels:

The national level (the macro environment includes policies adopted, IT infrastructure, beliefs and specific cultural values, and developing culture in relation to the use of new technology, organizational level (environmental and organizational factors) and individual level (Individual characteristics of the user, which is effective in accepting the new technology).

An effective addiction treatment requires patients to attend a rehabilitation center for the following three steps: detoxification, treatment, long-term care. Many patients (and their families) are naturally afraid of these actions, due to the bad social and cultural aspects associated with such institutions. By using Telemedicine, the patient can actually attend rehabilitation sessions and easily use support groups and other social meetings at home. This will reduce the pressure on the system and ensure greater participation of addicted person. Additionally, Telemedicine is a suitable tool for long-term care after the completion of rehabilitation, which is often recommended to prevent worsening of the disease.

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A project directed from February 2013 to June 2014 by Todd Molfenter Mike Boyle, Don Holloway & Janet Zwick (2015), explored the reception of telemedicine administrations among applicants of addiction treatment in five states and one district. The project surveyed the facilitators and boundaries to actualizing at least one of the accompanying telemedicine modalities:

Phone based treatment, web-based screening, online treatment, videoconferencing, cell phone versatile (applications), and virtual worlds. This investigation gives introductory observations into how telemedicine is being actualized in addiction services in five states and one district. The project exhibited that in spite of the significant enthusiasm for addiction telemedicine, yet execution challenges exist. (Todd Molfenter, et al. 2015).

The infrastructure needed to deploy telemedicine includes IT infrastructure, hardware infrastructure, communications and network infrastructure, security infrastructure, laws infrastructure, cultural infrastructure and human capital infrastructure.

Information technology infrastructure includes the choice of telecommunications, video and network technology (Nematolahi M, Abhari Sh, 2013).

Hardware infrastructure is a network of information including hardware, software and network that physically connect computers to the health center.
The main components in the field of hardware and medical equipment include the following:

- Types of platforms provided: desktop computer, tablet, personal digital assistant, mobile phone.
- Platform equipment: Platform-connected camera, platform-connected speaker, platform-connected microphone, platform-connected headset, connectivity to the display screens, type and resolution of platform display screens (Nematolahi M, Abhari Sh, 2013).

The communication between the parties involved in telemedicine, mainly physicians and patients, is carried out in two ways through communication and network infrastructure:

- Synchronous communication: Includes direct call by phone, video conferencing, or web page. During this type of communication, the patient should pay close attention to the issues raised at the same time.
- Asynchronous communication: Through electrical letters and the same. In this case, it is possible to use the expert time more efficiently and more flexibly.

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The main components in the network domain are:

- Communication protocols for telemedicine that are included: Routing Protocol, Fiber Optic Protocol, Radio Service Packet Protocol, Wireless Sensor Protocol, Bluetooth, GPS, Wi-Fi, WiMAX, Satellite Networks.
- Hospital bandwidth consumption for telemedicine deployment (Nematolahi M, Abhari Sh, 2013).

The security of telemedicine is a system that includes a set of rules, standards, behaviors, and tools, and the first step in creating a security system is to create a security policy that is appropriate to the provider of services. The most important goal of a security policy is to give users, network managers, and operational managers an awareness of the facilities and equipment needed to preserve and protect technology and information resources (Saeedinejhad S, Keshvari H, Sharafkhah M & Eimanzadeh M, 2013).

The infrastructure of the laws includes the steps leading to the creation of a safe legal infrastructure in telemedicine systems, including: Establishing rules for activities in cyberspace, taking into account an appropriate identity for the right to make and decide on the legal aspects of telemedicine, the issuance of permits and the determination and implementation of the requirements for a telemedicine system, specifying how to reimburse the cost of telemedicine (Khodadadeh M, Keshvari H, Minagar M & Pournik O, 2013).

Human capital infrastructure involves policies and operations of the human resources manager with a strategic look to individuals as intelligent and valuable capitals. Organizations can improve the quality of manpower by providing comprehensive training and promotion (Rafiei N, Davari F, 2015). Because the power of exploiting manpower and its capabilities in terms of knowledge, intelligence, learning is the same in all societies, the cause of the difference between the societies lies in three areas: lack of purpose, poor management efficiency, lack of Sufficient information (Farahi A, Habibipour F, 2009).

The performance of individuals in each organization reflects their knowledge, skills, behavior, and ethical values. Because the ability and skill of individuals, contribute to the performance and efficiency of the organization, any expenditure on education and development by HRM is a long-term investment that the organization can benefit from, for the long term (Davari F, 2015).

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In our studied Rehabilitation Center for Addiction therapy which is located in Tehran, there are 156 active beds, as well as including a doctor's examination room with full diagnostic, treatment and resuscitation equipments, a psychiatrist / counseling room, a drug room, a nursing room, a waiting room with functionality of group therapy.

2. Methodology

This study was a descriptive cross-sectional study with the aim of investigating the infrastructure of one of the rehabilitation and treatment centers in Tehran for the establishment of telemedicine. The research population, includes the head and the senior executive manager of the center and the financial manager (to examine the financial requirements and the appropriate cultural foundation), the technology and information engineer (to examine the technical infrastructure), physicians, counselors and nurses (given the direct use of telemedicine by these people in the rehabilitation center), was a total of **28** people. Due to the small number of statistical population, a total number of sampling was done.

Two methods of library and field studies were used to collect data. In order to collect the background and theoretical foundations of the research, it includes the history, concepts, applications, and requirements for the establishment of telemedicine at the rehabilitation center, using the library method by referring to articles and searching scientific information databases. It was the product of the extraction of the components of the favorable condition of the medical centers for the establishment of telemedicine.

The current status of the studied Rehabilitation Center for Addiction Therapy, in terms of infrastructure and requirements for the establishment of telemedicine, was also identified using the field method. Field research tools, include Interview, observation and standardized questionnaire of Ghasemi Ravari et al. (2006).

The interview was done with the senior executive manager, head, financial manager and IT engineer, as well as with doctors, counselors and nurses.

In this research, the researcher used the questionnaire to assess the current status of the rehabilitation center for addiction treatment.

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The questionnaire consisted of 6 components and 37 questions. The questions of the demographic information component included gender information, education level and field of study. The component of the technical infrastructure includes 10 questions, the component of the technical staff's awareness including 5 questions, the component of the administrative culture of the center, including 8 questions from the head and senior executive manager of the center and the barrier component of the implementation of telemedicine, including 10 questions from the head and managers and Doctors and counselors and nurses of the center. Also, the component of telemedicine applications included 4 questions from all of them.

3. Results

The results of the interview with the IT department, which is responsible for accessing the telemedicine technology infrastructure, showed that all clinical and non-clinical units of the center have access to high-speed broadband and the possibility of communication between systems of different sectors is provided. Users outside the hospital also had access to the internal hospital network. It is also possible to use videoconferencing and the use of upper and lower case letters to encrypt access to telemedicine network systems. The fiber communication system is equipped with copper cables, as well as small electromagnetic waves and high resolution monitors.

The results of determining the level of awareness of the technology unit in relation to telemedicine technology indicated their familiarity with telemedicine technology, technical infrastructure, implementation methods, and methods for maintaining security in the remote medical network.

Research findings about the administrative culture of that center, showed that the center did not have a strategic plan that includes telemedicine and the management board did not support the telemedicine, but the center had the support of the senior executive manager for telemedicine. There is no other supporter of the telemedicine at the center and there is no plan for the implementation of telemedicine. The important problems in providing care, from the head of the center point of view, were included the achievement of continuous care and permanent counseling.

Based on the findings from an interview with the head of the center, he did not comment on providing counseling and care through telemedicine technology, but the senior executive manager, in addition to providing medical education and admission to patients through telemedicine

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technology, considered counseling and providing care to addicts as a priority in the application of telemedicine technology.

The results of the interviews and the questionnaire analysis of **28** physicians, counselors and nurses of the addiction treatment center according to Table 1, show that lack of technical staff, insurance and repayment problems, initial costs and lack of medical staff, current costs and training, and the resistance of the medical staff, in order of priority, are the main obstacles to the implementation of telemedicine, and the barriers of time constraints, employees' attitudes, licensing and permission issues, privacy issues, and competition are less important.

Table 1. Barriers to the implementation of telemedicine technology

Barriers		**Essential**	**Slight**	**Not an obstacle**
		Number (Percent)	**Number (Percent)**	**Number (Percent)**
Technical	Lack of technical staff	27 (96.4%)	1 (3.5%)	0 (0)
Financial	Initial Costs	24 (85.7%)	3 (10.7%)	1 (3.5%)
	Insurance and repayment problems	25 (89.2%)	3 (10.7%)	0 (0)
	Current costs	23 (82.1%)	4 (14.2%)	1 (3.5%)
	Lack of medical staff	24 (85.7%)	3 (10.7%)	1 (3.5%)
	The resistance of the medical staff	22 (78.5%)	5(17.8%)	1 (3.5%)
Personnel	Training	23 (82.1%)	4(14.2%)	1 (3.5%)
	Staff perspective	19 (67.8%)	9 (32.1%)	0 (0)
Rules	Time limitation	21 (75%)	7 (25%)	0 (0)
	Privacy issues	17 (60%)	9 (32.1%)	2 (7.1%)
	Competition	17 (60%)	9(32.1%)	2 (7.1%)

Source: The author.

Note that all the numbers were collected from the questionnaires of doctors, counselors, nurses, managers and the head of the Rehabilitation center.

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4. Discussions

The purpose of this study was to conduct a feasibility study on a rehabilitation and addiction treatment center in Tehran in terms of telemedicine system deployment. According to the results of the study, all the technical infrastructure needed to implement telemedicine at the center of the study included the availability of all clinical and non-clinical units of the center to high-speed Internet and the possibility of communication between different systems, the access of external users to the Internet The center network, as well as the use of videoconferencing and the use of large and small folders for encryption was provided to access remote medical and therapeutic network systems.

The hospital's telecommunication system was equipped with fiber optic, copper cable, as well as small electromagnetic waves and high resolution monitors.

In this regard, the results of this study were compared to Ghasemi Ravari et al. (2016). The study aimed to investigate the infrastructure needed for telemedicine implementation in hospitals affiliated to Zabol University of Medical Sciences, showed that their hospitals had no telecommunication system equipped with fiber optic and small electromagnetic waves, and it was also a video conferencing equipment. Consequently, this study is not consistent with Ghasemi's study.

But the results of this study were consistent with the results of study by Ghaed Amini et al. (Ghaed amini R, Fayazi A, Azizian F, Tofighi Sh, 2010). Their study was conducted to investigate the telemedicine infrastructure in Ayatollah Kashani Hospital in Shahrekord, indicating the appropriateness of the technology and information technology infrastructure in accordance with the regional standards.

The results of the present study about the level of awareness of the IT department officials, indicate that the awareness of them about familiarity with telemedicine technology, technical infrastructure, implementation methodology and methods for establishing security in the telemedicine network, was good. Therefore, in this sense, the results of this study were consistent with Ghasemi Ravari et al. (2016) and Ghaed amini et al. (2010).

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The findings of the present study on administrative culture showed that the Strategic Plan of the Addiction Treatment Center did not include Telemedicine and the Board of head, did not support Telemedicine.

But the center had the support of the senior executive manager of telemedicine. There was no support therapist at the center, and there was no plan for the implementation of telemedicine. The critical issues to provide care, from the perspective of the head of the center, were to achieve continuous care and permanent counseling.

Therefore, developing a strategic plan considering the dimensions of telemedicine for the study center is one of the proposals of this paper researcher.

Based on the findings of this study, the lack of technical staff, initial and current costs, insurance and reimbursement problems, lack of medical staff, staff training and attitudes, licensing issues, time constraints and the strength of the medical staff are among the main causes and obstacles of implementation of telemedicine services at this center.

Therefore, the results of this study are consistent with the research by Ghasemi Ravari et al. (2016) who identified the lack of technical staff, initial costs, insurance, and reimbursement as major obstacles.

But they saw the lack of medical staff and the resistance of medical staff and training as barriers. So, in this sence, present study, is not consistent with theirs.

The result of a study by Masjedi MR, Fadaeezadeh L, Sadat Hoseini M & Ebrahimi Khomami SMR, (2013), entitled "Telemedicine Basic experience in Shahid Beheshti University of Medical Sciences", that aimed at evaluating the telemedicine consultation system, showed that lack of awareness and acceptance of doctors and personnel from telemedicine and the lack of facilities for diagnostic and therapeutic measures in counseling centers as well as the lack of all specialties in the telemedicine counseling network, have been the most important problems in the success of this system. Therefore, the results of my study are based on the results of their study in terms of lack of awareness and admission of physicians and the also lack of required expertise, but in terms of not providing the necessary equipment is mismatched.

Fatehi F (2014), in a qualitative study titled "Success Factors and Challenges for Setting Up the Clinic of Diabetes and Endocrine Disorders in the University Hospital of Princess Alexandra,

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Australia", also found out that convincing physicians and treatment centers in distant areas to refer their patients to a telemedicine clinic, was difficult.

The result of study of Mirhoseini SM, Ziadlou D, Nasiri N, & Saberinia A (2012), as a survey of knowledge and attitude of the personnel of health care centers in Kerman University of Medical Sciences about telemedicine, indicated that it would be necessary to implement a telemedicine project in this province. Initially, trainings were needed to familiarize healthcare providers with telemedicine services.

According to the head of the studied rehabilitation center, the provision of training and admission of addicts through telemedicine technology was one of the priorities of the use of telemedicine technology. The head of the studied center did not comment on providing counseling, providing care through remote medical technology. But the senior executive manager, in addition to providing medical education and admission to patients through telemedicine technology, considered conducting counseling and providing care to patients as a priority in the use of telemedicine technology.

Using the results of the present study, to establish a telemedicine system at the Center for Rehabilitation and Addiction Therapy in Tehran, considering that the center's head didn't have any opinion to provide consultation and provide care using telemedicine technology, It is suggested that in the meetings of the managers board, the subject of telemedicine and its applications for addressing the problems of the center and providing care services to addicts, should be addressed and the strategic plan of the center should be developed according to the dimensions of telemedicine.

To increase the productivity of existing human resources, it is necessary to conduct training programs for the employees of the center. Since the insurance and method of paying for telemedicine care costs are among the barriers to the establishment of telemedicine, it is suggested that coordination be made with the insurer. To prevent the medical staff from resisting the introduction of new telemedicine technology and getting more familiar with them and creating their own collaboration and cooperation, training programs should be developed.

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Appendix

The Questionnaire to investigate the infrastructure needed to implement telemedicine technology

(The Tables Source: Ghasemi Ravari et al (2016))

A) Demographic Information

Gender: Man ☐ Woman ☐

Education level: Diploma ☐ Associate degree ☐ Bachelor's degree ☐ Master's degree ☐ PhD ☐

Job: IT Engineer ☐ Doctor ☐ Consultant ☐ Nurse ☐ Head ☐ Senior executive manager ☐ Financial Director ☐

The Questions for IT Staff

B) Technical infrastructure of telemedicine technology

No.	Technical Infrastructures	Yes	No	No idea
1	High Speed Internet Access			
2	All units access to the Internet			
3	Possibility to communicate between systems of different sectors			
4	External users access to the internet within the hospital network			
5	Use video conferencing			
6	Use uppercase and lowercase encodings to access telemedicine network systems			
7	Hospital Telecommunications System Equipped with Fiber Optic			
8	Hospital Telecommunications System Equipped with copper cable			
9	Hospital Telecommunication System Equipped with small electromagnetic waves			
10	Hospital equipped with high resolution monitors			

C) Awareness of the IT department staff of telemedicine technology

No.	Questions	Yes	No	No idea
11	Are you familiar with telemedicine technology?			
12	Do you know the technical infrastructure of telemedicine technology?			
13	Do you know the methods of telemedicine implementation?			
14	Do you know the methods of securing the telemedicine network?			

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15	Are you familiar with telemedicine technology networks?			

The Questions for the head of the center

D) Rehabilitation center administrative culture

No.	Questions	Yes	No	No idea
16	Do you have a strategic plan that includes telemedicine?			
17	Do the management board support telemedicine?			
18	Does the Senior Executive manager support Telemedicine?			
19	Is there a support therapist of Telemedicine?			
20	Are you currently providing telemedicine services?			
21	If not, do you plan to implement telemedicine? (If negative answer to question 20)			
22	In your opinion, is access to continuous treatment a major problem?			
23	In your opinion, is access to continuous counseling a major problem?			

The Questions for the Managers, the Head, Doctors, Consultants and nurses

E) Obstacles to the implementation of telemedicine technology

No.	Questions	Essential	Slight	Not an obstacle
24	Lack of technical staff			
25	Initial Costs			
26	Insurance and reimbursement problems			
27	Current costs			
28	Training			
29	Attitude of employees			
30	Licensing and permission issues			
31	Resistance to medical staff			
32	Confidentiality and privacy issues			
33	Competition			

F) Applications of Telemedicine Technology

No.	Questions	Yes	No	No idea
34	Do you agree with the consultation via telemedicine technology?			
35	Do you agree to provide training through telemedicine technology?			
36	Do you agree with the admission of addictions through telemedicine?			

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37	Do you agree with the treatment of addicts through telemedicine?			

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