

Effectiveness of Telemedicine Services Integrated Into Physiotherapeutic Health Care System

Multani, N. K.,* Singh, B.** & Garg, S.***

*Principal, MMIPR, Mullana, Ambala (Haryana),

** Lecturer Computer Science, Govt. College of Education, Ladowali Road, Jalandhar,

*** Lecturer, MMIPR, Mullana, Ambala (Haryana)

Abstract

To study was conducted to investigate the effectiveness of telemedicine system for the management of continually growing patient's physiotherapeutic needs while maintaining high quality care and services. The videoconferencing system, telephone, e-mail, videotapes and CDs, VAS were used in the study. Patients of back pain in the remote area were first asserted through videoconferencing. VAS was used to assess the severity of pain; muscle strength was assessed by MMT whereas functional assessment was judged by using Oswestry Disability Index. Treatment consisted of heat therapy, back exercises; ergonomic care was explained through videoconferencing. Reassessment was done after the completion of two weeks and then four weeks of treatment program. Significant improvement was found in relief of pain and improvement in muscle strength as well as functional ability. It was concluded that telemedicine can be used effectively for administering instant care and manage the increasing number of patient's input.

Key Words: Telemedicine, Videoconferencing, E-Mail, Oswestry Disability Index.

Introduction

Change is the only constant in the world, or better said, advancement and evolution is imperative to any field of science and technology. Medical field too has been no exception. With the advent of telemedicine the dramatic changes have been taken place in health environment.

Definition of telemedicine:

The term telemedicine was first coined by Thomas Bud and later on it was redefined by Reid in 1996 as the use of advanced telecommunication technologies to exchange health information to provide healthcare services across geographic, time, social and cultural barriers (Sharma, 2005).

It may be as simple as two health professionals discussing a case over the telephone, or as sophisticated as using internet or satellite or videoconferencing

equipment in order to improve access to healthcare to sites that are at a distance from provider (Brown, 1996).

A brief history of telemedicine:

While the explosion of interest in telemedicine over the past four or five years makes it appear that it is a relatively new use of telecommunications technology, the truth is that telemedicine has been in use in some or other form from last about 40 years. The National Aeronautics and Space Administration (NASA) played an important role in the early development of telemedicine (Bashshur and Lovett, 1977).

Duration	Institution	Telemedicine Program
Early 1960s	NASA	Physiological parameters were telemetered from both the space craft and the space suits when humans began flying in

		space
1964	Nebraska Medical center	A two-way link between the psychiatric center and Norfolk State Hospital, 112 miles away, was established for consultations between specialists and general practitioners
1967	Massachusetts General Hospital/Logan International Airport Medical Station	To provide occupational health services to airport employees and to deliver emergency care and medical attention to travelers.
1971	National Library of Medicine's Lister Hill National Center for Biomedical Communication	26 sites in Alaska were Chosen to see if reliable Communication would improve village health care
1974	NASA	A study was conducted to determine the minimal television system requirements for telediagnosis
1977	Memorial University of Newfoundland	Teleconferencing system began
1984	Australia	The North-West Telemedicine Project
1989	NASA	Conducted the first international telemedicine program – Space Bridge to Armenia/USA
Early 1990s	Wide spectrum of users	A steady increase in number of telemedicine projects throughout the U.S. and internationally
2002	Care Hospital Hyderabad	To provide remote screening facility to villagers who were located far away from Tirupura.

experiments in providing medical care at distant places. The technology has reduced in price and complexity over the past five years. Computer hardware and software have become fast, powerful, easy to use and affordable. Compressible, high-resolution digital images can be enhanced. The availability of and access to health-related information has improved substantially. Telemedicine is utilised by health providers in a growing number of medical specialties, including, but not limited to: radiology, pathology, dermatology, oncology, surgery, cardiology, psychiatry, rehabilitation and neurology.

Nevertheless, the number of patients receiving the services that use the technology of telemedicine remains low in India and when it comes to physiotherapeutic services, this number still lowers down. On the other hand, the number of patients requiring physiotherapeutic services is steadily increasing; particularly in the present era of sedentary life style. Therefore, the present study was conducted to study the effectiveness of telemedicine system for the management of continually growing patient's physiotherapeutic needs while maintaining high quality care and services.

Materials and Methods

STEP I – Selection of Remote Area

A village named Sapehra-Sahabapur was located 15 kms away from M. M. institute of Physiotherapy and Rehabilitation, Mullana.

STEP II – Setting Up of Telemedicine Center

Call center at originating site:

A call center outfitted with videoconferencing equipment was established in village Sapehra-Sahabapur to receive patients of low back pain.

Thus, telemedicine has begun to take hold, almost 40 years after the first

Call center at referral site:

Department of Information and Technology, M.M. Engineering College, Mullana, outfitted with videoconferencing equipment provided access to physiotherapeutic services.

STEP III – Selection of Subjects

- Patients of low back pain in the village Sapehra-Sahabapur were first asserted through videoconferencing. Thirty patients ranging in age from 30 to 50 years were recruited for the study.
- Any systemic disease
- Osteoporosis
- Any fracture
- Any deformity or contracture cases
- Radiating pain
- Exaggerated lordosis

STEP IV – Evaluation of Patients

VAS was used to assess the severity of pain; muscle strength was assessed by MMT whereas functional assessment was judged by using Oswestry Disability Index.

STEP V – Execution of Treatment Plan

Treatment plan consisted of hot water fermentation, ergonomic care and back exercises based on McKenzie approach was executed from referral site in following sequence:

Day 1: patients were asked to apply hot water fermentation for three days.

Day 4: Isometric exercise for lumbar extensors was explained

Day 5: Isotonic exercise for lumbar extensors in graded form were explained

Day 12: Rotational spinal exercise for upper as well as lower back was added

Day 15: Isometric exercise for lumbar flexors was explained

Day 17: Isotonic exercise for lumbar flexors in graded form were explained

Day 30: Re-evaluation was done

STEP VI – Data Analysis

Statistical analysis was carried out by using SPSS for Windows Version 7.5.1. t-test was used to judge the significance of difference between the base line score and score at the end of the treatment program. Statistical significance was set at 0.05.

Results

Table-1 displays the demographic data of patients. Mean age was 42.09 and most of them were involved in the occupations encouraging more of flexion attitude of trunk. Table-2 presents pre treatment and post treatment scores of VAS, MMT & ODI with t = 10.34, 5.81 and 4.809 respectively. This suggests that difference between pre treatment and post treatment values was statistically significant.

Table 1. Demography of Patients

No of Patients	30 (M=9, F=21)
Mean Age (Years)	42.09
Occupation	18-Housewives, 5-Shopkeepers, 4-Gardeners, 2-Tailors, 1-Teacher
Leisure Activities	20-Indoor activities, 4-Sports, 6-Both

Table 2. Comparison of pre treatment and post treatment scores of VAS, MMT & ODI

Parameters	Pre Treatment Score			Post Treatment Score			T-Value	D.F.	95% confidence interval of the Difference	
	Mean	SD	SE	Mean	SD	SE			29	Lower
VAS	6.0	3.02	0.55	4.1	3.52	0.64	10.34*	29	-0.6	3.86
MMT	3.33	0.47	0.09	4.4	3.63	0.66	5.81*	29	-0.89	3.03
ODI	4.25	1.08	0.20	3.37	2.71	0.49	4.81*	29	-1.08	2.84

* $p < 0.05$

Discussion

Statistically significant improvement found in pain, muscle strength and functional capacity in the patients of low back pain has demonstrated the potential of telemedicine to revolutionize the delivery of physiotherapeutic services to the benefit of patients living in periphery. Nevertheless, the effectiveness of the telecommunication depends upon the efficiency of a physiotherapist for the effective explanation of the procedure for assessment as well as therapeutic intervention.

At the same time, the present study has also documented the efficacy of treatment program consisting of heat, ergonomic care and McKenzie approach.

Demographic data of patients suggests that most of them were involved in the occupations requiring either repeated movements of forward flexion or prolonged flexion posture of trunk that results into

- Elongation of posterior structures
- Excessive compression over the anterior surfaces of vertebral bodies
- Protective spasm of extensors
- Flattening of lordosis

Therefore, it is reasonable to assume that extension exercises done in graded form can alleviate low back pain

and increase the muscle strength, particularly when they are carried out after the reduction of muscle spasm with the help of heat application.

Due to the shortage of time, clinical consultation in physiotherapy O.P.D. does not deal with the issue of health education, which is an important part of the physiotherapist's role in health care, especially in case of low back pain, where poor posture, wrong working habits, etc. are the precipitating factors. The result of present study has demonstrated that with the advent of telemedicine, new vistas have opened for improving the community health and physiotherapist-patient relationship. These findings are still more important in our country because the proportion of physiotherapists in the total population of India is very much negligible, (18200 qualified physiotherapists for a population of 1060000000). Hence, to provide physiotherapeutic services up to the root level of India, it is **need of the hour** to develop and execute more and more programs of telephysiotherapy.

However, while conducting the present study we faced certain troubles such as:

- Lack of consistent coverage
- Computer illiteracy
- Payment policy
- Difficulty in locating tenderness points

- Inability to execute specialized techniques like traction, mobilisation, manual therapy, etc.

This suggests that higher information content is required for the development of the new concept of telephysiotherapy. In cyber surgeries, a qualified surgeon, with the help of Commutation and Robotic technology can effectively operate upon a patient from around the globe. In teleradiology, the radiological images such as X-rays, CTs and MRIs can be transmitted from one location to another through digital computer assisted transmission. However, the present study has documented that such advancements have not happened in telephysiotherapy.

Thus, in this era of fast changing technology if there was a field, which has sadly not reaped the benefits of this fast changing technology of Information and Communication even a certain extent, it would surely be the field of physiotherapy. Hence, it is imperative to take up a challenge of developing the concept of telephysiotherapy for the management of

continually growing patient's physiotherapeutic needs while maintaining high quality care and services.

Conclusion

Telephysiotherapy saves time of patient as well as of therapist, provides instant care and manages well with the increasing number of patient's input though it is still in a budding stage.

References

- Sharma N S: 2005. Role of telemedicine in management of Trauma patients, Souvenir, National Conference on Modern Trends in Information and Communication Technology, , M.M.Education Trust, Mullana.
- Brown N: 1996. Telemedicine Coming of Age, <http://www.yahoo.com>
- Bashshur R, Lovett J. 1977. Assessment of telemedicine: Results of the initial experience. *Aviation Space and Environmental Medicine*, **48(1)**: 65-70.
- Fairbank, J. C., J, Couper, J. B. Davies and J. P. O'Brien 1980. The Oswestry low back pain disability questionnaire, *Physiotherapy* **66**: 271-273.