Original Article

The Level of Awareness of Rehabilitation Professionals Employed in Rehabilitation Academic Centers Regarding Tele-Rehabilitation Technology

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Objectives: The aim of this research was to assess the level of awareness of rehabilitation professionals employed in academic rehabilitation centers in Tehran with reference to Tele-rehabilitation technology.

Methods: In this study, a descriptive cross-sectional research method was used. The research was implemented by using a researcher-designed questionnaire which was developed by the integration and cultural adaptation of different tools collected in the field of tele-health implementation feasibility. The content and face validity of the questionnaire was determined and approved by Lawsche's method. The reliability of the questionnaire was assessed by test-retest correlation coefficient determinations. After considering the inclusion and exclusion criteria, informed consent was obtained, and the questionnaires were distributed among the study sample, which comprised of 141 rehabilitation professionals.

Results: The findings show that a desirable level of awareness does not exist among rehabilitation professionals with regards to this technology. Based upon the results, only 8% of the participants had basic knowledge of this technology required in case of implementation.

Discussion: Since rehabilitation professionals' awareness and knowledge can be a major key to a better implementation and application of this technology, it seems that there is a need for some developmental and training programs, such as informative educational workshops and seminars, to help them improve their level of knowledge and awareness.

Keywords: Tele-rehabilitation, awareness, knowledge, implementation, rehabilitation academic centers

Submitted: 12 March 2015
Accepted: 10 June 2015

Introduction

Recently, new technologies have had a great impact on different aspects of life. One of the most influential of these technologies is information and communication technology (ICT) which has affected different occupations and work areas such as E-government, remote-learning, E-business (1).These improvements in technology have changed lots of occupations and work conditions all over the world including health care (2). Using information and communication technologies in different aspects of health care such as medical education and medical centers, has improved the quality of health care services to a great extent (3). Today, Telehealth which can be defined as providing remote health care services by the use of information and communication technologies, has revolutionized health care organizations (4).These remote health care services can range from remote patient care to remote health care education and counseling. WHO has emphasized the benefits of Tele-health and regarded it as one of the essential strategies to improve the quality of health care services (5).

Tele-health consists of other specialized domains such as Telemedicine, E-health, Tele-matics and Tele-rehabilitation (6). Tele-rehabilitation which is a relatively new emerging area, is the application of information and communication technologies to provide remote rehabilitation services and has been established by the National Institute of Disability and Rehabilitation in United Sates in 1997.At the beginning, application of this technology faced some barriers and challenges due to specific therapeutic requirements of rehabilitation, such as having physical

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contact with the patient. However, technological breakthroughs have eliminated most of these challenges and it is on its way to develop into new contexts (7). Tele-rehabilitation includes different specialized domains such as Tele-assessment, Tele-treatment, Tele-monitoring, Tele-consultation, Tele-support, Tele-conferencing, Tele-education, Tele-Therapy, Tele-coaching, and Tele-play (8) which meet the therapeutic needs of different rehabilitation areas including physical therapy, occupational therapy, speech therapy, audiometry, rehabilitation medicine, rehabilitation nursing, rehabilitation engineering, assistive technology, education, rehabilitation psychology and nutrition (9). The technologies that are applied can differ considerably, from an email to robots and virtual reality (7).They can be classified as the "store and forward mode" in which information is recorded and stored to be used at a later time, "real time interactions" which include live therapeutic interactions between the therapist and the patient, and "hybrid mode", which is a combination of the two modes mentioned earlier (10). Tele-rehabilitation can be of many benefits to health care providers and users, of which elimination of distance, time, geographical barriers, as well as provision of expert help, service accessibility and availability and economical advantages can be named (10).

Implementation and application of this technology requires careful attention given to its possible challenges and encouraging factors. Lack of access to specialized services and experts in small and isolated areas, geographical limitations and the existence of rather desirable IT infrastructures for the primary implementation of this technology can be named as some potentially encouraging factors, whereas limiting social, cultural , financial, technological, managerial and legal factors along with the absence of specific authorization in this area, costs and privacy or information security issues, can be considered as some of the possible challenges (11). Kodukula in his study on "Critical success factors in implementation of remote medical systems" concluded that the most important factor for the successful implementation of telemedicine systems is to increase awareness about this technology (12). Thus, the importance of providing an appropriate level of awareness about this technology among rehabilitation experts can be one of the most important pre-conditions of its implementation (13).

On one hand, since this technology is relatively new and emerging in the country, it sounds critical to assess knowledge and awareness of rehabilitation professionals who will be the ones to apply this technology when implemented, and who can be expected to have the most updated and reliable knowledge about this technology and its requirements in the rehabilitation domain. Also, the rehabilitation professionals' awareness and knowledge in this regard can be an important facilitator for the better implementation and application of this technology (14). So, considering all the benefits that this technology has to offer, and the key role of professionals' knowledge and awareness about this issue, this study aims to assess rehabilitation professionals' awareness and knowledge on implementation and application of Tele-rehabilitation technology in rehabilitation academic centers of Tehran city.

Methods

Among all 150 faculty and non-faculty members of different rehabilitation disciplines at Tehran, Iran and Shahid Beheshti Universities of Medical Sciences, as well as the University of Social Welfare and Rehabilitation Sciences who were recruited for this study, 141 participated. Stratified sampling was used in this study. The Universities were considered as the main classes and the experts' positions as a faculty or a non-faculty member constituted the sub-classes. The samples from each class and sub-class were selected by simple random sampling. Data was collected by means of a researcher-designed questionnaire. To begin, the first draft of the questionnaire was developed by integration and cultural adaptation of different tools collected in the field of telehealth feasibility studies, by the research team. The face and content validity of the questionnaire was evaluated by a panel of 16 rehabilitation faculty members in the University of Social Welfare and Rehabilitation Sciences, using the Lawsche's method, which was determined by a CVI of 49% in the first round and 76% in the second round when corrections were made accordingly. The reliability was assessed by determining cronbach's alpha, which was shown to be 0.81. Finally, a valid and reliable researcher designed questionnaire was developed.

The questionnaire consisted of 19 questions each with two alternatives choices: "Yes, I know" with a score of 1 and "No, I don't know" with a score of 0. The maximum attainable score of the questionnaire

was 19 and the minimum was 0, the higher score reflecting higher knowledge and awareness. In order to categorize the overall level of each participant's knowledge and awareness 2 cut-off points were defined with regard to the total score achieved: leading to one of the following categories of awareness: poor, moderate and high. The questionnaire items were categorized in 4 different groups to assess professionals' level of knowledge and awareness about: 1- rules and regulations, 2- local and foreign experiences, 3- infrastructures and 4-benefits and barriers, regarding the implementation and application of Tele-rehabilitation technology.

Results

Table (1) shows the distribution of the rehabilitation experts' overall knowledge and awareness about Tele-rehabilitation technology in terms of their demographic characteristics. Overall, 92% of the participants had a poor level, 8% had a moderate level and none had a high level of knowledge and awareness about Tele-rehabilitation technology. It can be seen that the majority of participants in both groups of faculty members (85.8%) and non-faculty members (98.7%) had a poor level of knowledge and awareness about this technology. Faculty members were in a better status than non-faculty members.

Table 1. Distribution of the rehabilitation experts' overall knowledge and awareness about Tele-rehabilitation technology in terms of demographic characteristics

Level of knowledge and awareness Demographic characteristics		high %	moderate %	poor %
Groups	Faculty members	0	14.3	85.8
	Non-faculty members	0	1.3	98.7
Age (years)	<30	0	0	100
	30-40	0	1.8	98.2
	40-50	0	7.9	92.1
	>50	0	16.7	83.3
Sex	Male	0	9.2	90.8
	Female	0	5.3	94.7
Educational Status	Bachelor's degree	0	0	100
	Master's degree	0	3.5	96.5
	PHD/Doctorate degree	0	13.3	86.7
University of Employment	-University of Social Welfare & Rehabilitation Sciences	0	4.3	95.7
	-Tehran University of Medical Sciences	0	0	100
	-Shahid Beheshti University of Medical Sciences	0	28.6	71.4
	-Iran University of Medical Sciences	0	10	90
Working Experience (years)	<5	0	0	100
	5-10	0	0	100
	10-15	0	9.5	90.5
	15-20	0	12.5	87.5
	>20	0	14.3	85.7

In terms of sex, the majority of both male (90.8%) and female (94.7%) participants had a poor level of knowledge and awareness about Tele-rehabilitation technology. Men were slightly more knowledgeable than women. In terms of age, all participants under 30 years of age, 98.2% of participants with 30 to 40 years of age, 92.1% of the participants with 40 to 50 years of age and 83.3% of participants above 50 years of age had a poor level of knowledge and awareness. As can be seen, the level of knowledge and awareness about this technology increased with increasing age. In terms of the University of Employment, the lowest level of awareness belonged to Tehran University of Medical Sciences in which 100 % of the participants had a poor level of knowledge and awareness, whereas Shahid Beheshti University of Medical Sciences gained the highest percent of moderate level of awareness (28.6%). As said before, overall no participants had a high level of knowledge and awareness.

In terms of the educational status, all the participants with a bachelor's degree had a poor level of knowledge and awareness about this technology, and the highest percent of moderate level of awareness (13.3%) belonged to participants with a PhD degree. In terms of working experience, all the participants with less than 5 years of experience and 5 to 10 years of experience (100%), had a poor level of awareness and the highest percent of moderate level of awareness (14.3%) belonged to the participants

with more than 20 years of working experience. As can be seen, an increasing trend of knowledge and awareness about this technology appeared with increasing years of working experience.

Table (2) shows the distribution of the rehabilitation experts' overall knowledge and awareness about Tele-rehabilitation technology, in terms of their specialty. Based on the results of table (2), the highest percent of 'high level of awareness' belonged to nurses (20%) and rehabilitation counselors (16.7%) whereas the highest percent of poor level of awareness belonged to occupational therapists (97.6%) and speech therapists (66.7%). Also, physical therapists (8.3%), audiologists (9.1%) and optometrists (12.5%) seemed to have almost similar percent of 'high level of awareness' about this technology

Table 2. The distribution of the rehabilitation experts' overall knowledge and awareness about Tele-rehabilitation technology, in terms of their specialty

Level of knowledge and awareness Specialty	High %	Moderate %	Poor %
Occupational Therapists	8.8	23.5	67.6
Physical Therapists	8.3	33.3	54.3
Audiologists	9.1	27.3	63.6
Optometrists	12.5	25	62.5
Speech Therapists	0	33.3	66.7
Rehabilitation Consultants	50	50	0
Ergonomists	50	50	0
Orthotics	0	62.5	37.5
Nurses	20	20	60
Others	0	47.7	58.3

Discussion

The results indicated that overall 92% of the participants had a poor level of knowledge and awareness and none (0%) had a high level of knowledge and awareness about Tele-rehabilitation technology. In a study which was conducted by Alipour on the "Feasibility of telemedicine implementation in the Hormozgan University of Medical Sciences, it was concluded that only 30.5% of general practitioners in the university were familiar with telemedicine technology (15). Also, Darghahi conducted a study about "The role of organizational culture in application of telemedicine technology in health care centers affiliated to Tehran University of Medical sciences" in which it was demonstrated that 81% of general practitioners were familiar with the technology (16). One possible reason can be the stronger focus and attention of the health-care community on providing knowledge and information about modern technologies associated with medicine as opposed to the much weaker effort that has been made about rehabilitation or other para- medical sciences. This poor level of knowledge and awareness among rehabilitation professionals may also root in the fact that Tele-rehabilitation is a newly emerging field compared with telemedicine or telehealth, especially in Iran. Also, it should be considered that the evaluation tools used in these studies are all different ones which may have affected the results. However, regardless of all possible reasons, the difference in results is remarkable and worthy of attention.

As mentioned in the results section, faculty members showed a higher level of knowledge and awareness about Tele-rehabilitation technology than non-faculty members. The possible reason is the faculty members' more extensive academic activities which has led to their better familiarity with the progress of technology and scientific developments of the day in their field of expertise. Male participants had a higher level of knowledge and awareness about this technology than females. It can be argued that culturally in our country, men have more access to and benefit more from information resources than women. According to a study which was conducted by Norouzi on "Gender differences in the occupational structure" it was concluded that in our country Iran, the existence of obstacles for women in the accessibility to information acts as an invisible barrier toward their equality with men in this regard (17).

We showed in the present study that in terms of age, increasing age lead to a gradual decline in the number of participants with poor levels of awareness and a gradual increase in the number of participants with moderate levels of knowledge and awareness. It may be that with increasing age in the therapeutic community, scientific experience also increases which can in turn lead to higher and better knowledge and awareness of modern scientific developments. As previously said, the lowest level

of knowledge and awareness about this technology belonged to participants with a bachelor's degree and the highest level belonged to participants with a PhD. degree. It is predictable that when the level of education increases, awareness in that field of knowledge increases as well. Khoramniya in his study on " Implementation and application of tele-medical consultation in hospitals affiliated to Iran University of Medical Sciences" also showed that participants with a higher educational status were more knowledgeable and informed about tele-medical consultation (18).

In terms of working experience, as the results showed, with increasing working experience an increasing trend appeared in "moderate" levels of awareness while a decreasing trend was noted in the poor level of knowledge and awareness. It is possible that people with less working experience are less familiar with new products in the rehabilitation domain and consequently have a lower level of awareness about Tele-rehabilitation technology. This research had a limitation. The tool used for assessing the level of awareness and knowledge of participants was a self-report questionnaire. Therefore, the results of this study are limited to the subjective understanding of a respondent about his/her own level of knowledge and awareness regarding the subject. Since people differ in terms of standards as well as self-esteem, thus the definition of "I know" and "I don't know" may vary from person to person, which will in turn affect the overall results. In other words, people can claim to be knowledgeable about a subject only having small amounts of information, while others may consider themselves as informed only if they have comprehensive and detailed information regarding the subject.

Ethical Consideration - All Ethical issues (such as informed consent, conflict of interest, plagiarism, misconduct, co-authorship, double submission, etc.) have been considered carefully.

Acknowledgement

The authors acknowledge and appreciate the cooperation of the rehabilitation experts who participated in this study.

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