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ORIGINAL PAPER

Determining the Awareness and Attitude of Employees in Deputy of Health of Isfahan University of Medical Science toward Telemedicine and its Advantages

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ABSTRACT

Introduction: The useful capabilities of information and communication technologies for improving health services are becoming widely known. However many of the managers and policymakers of health systems are not yet familiar with these technologies, their dimensions and applications and the advantages of these new technologies for creating added value in health systems. Therefore the goal of this study is to determine the awareness and attitude of employees working for Deputy of Health of Isfahan University of Medical Science regarding telemedicine and its advantages. **Method:** This study uses a descriptive – analytical method with sectional information gathering. The investigated population consisted of all managers and experts employed by Deputy of health of Isfahan University of Medical Science. The sample size was determined based on inclusion criteria to be 60 people. The data gathering tool was a questionnaire designed by the researcher in order to determine the awareness and attitude of the subjects. In order to determine the validity and reliability of the questionnaire content validity method and Cronbach's alpha were used. The information was analyzed using descriptive (frequency, average) and analytical (Spearman correlation test and independent t-test) statistics with the help of SPSS19 software. **Findings:** Research findings showed that the awareness and attitude of managers and experts toward telemedicine was mediocre. Spearman correlation test showed that there is a correlation between the educational degree and awareness of the subject, however the correlation coefficient was lower than 0.5 which shows a weak correlation (0.451). On the other hand, the calculated P-value of 0.008 showed that there is a meaningful relation between the education and awareness of managers regarding telemedicine. **Conclusion:** Due to importance of awareness and attitude in acceptance of new technologies, one can say that currently there is not enough readiness for planning and implementation of telemedicine projects in the Deputy of health. Therefore changes in the organizational culture, organizational structures and infrastructure, current plans and educating the employees in order to improve their awareness and attitude is of great importance.

Key words: Awareness, Attitude, Telemedicine, Managers, Isfahan University of Medical Science.

1. INTRODUCTION

Creation of new technologies has caused various changes in every branch of science and industry. Medical science is not an exception and new technologies have affected both the advancement of the medicine and the way medical services are distributed (1). This has caused a new area of health care in which medical practitioners, hospitals, health centers and financial and medical insurance experts cooperate together in a visual environment in order to improve fairness in distribution of medical services and the quality of these services as well as reducing the costs of services. The use of information technologies in the medical and health care fields shows great potential for improving the quality and effectiveness of work done by medical organizations (2).

Every day, new potentials of information technologies for improving medical and health services are being discovered.

Today health care providers are faced with a new technology called telemedicine which creates new channels for medical related cooperation, education and consultation (3). This technology is the confluence of medicine, information technology and long distance communications and is an important part of developments that promise to improve the health care providing systems and the availability of medical and health services. Telemedicine is a tool that makes it possible to provide medical and health services for people in distant areas (4). Therefore advantages and effects of telemedicine that improve the quality of services, reduce the costs and makes it possible to provide specialized and sup specialized services for people in remote areas automatically gains the attention of managers and policymakers of health and medicine areas and encourage them to use these new technologies.

However many managers and policymakers in health and

medicine are not fully familiar with the dimensions, affected areas, advantages and added values caused by these new technologies and therefore don't consider telemedicine in strategic plans for health and medical systems. On the other hand general and specialized medical practitioners working for medical science universities will be the executors of telemedicine projects in most areas, especially large provinces, and therefore their opinion, as the ones with a more comprehensive outlook, regarding the reason behind social and organizational rejection of telemedicine is of great importance.

Today many countries such as England, Finland, Canada, United States, and Australia have implemented successful projects in order to integrate telemedicine and other advance technologies in a wide range of medical areas including diagnosis, treatment, prevention, health education and medical research and have attempted strategic telemedicine programs in recent years (5). However and despite the importance of the subjects no comprehensive study regarding the potential of telemedicine in Iran has been conducted. Among related studies one can mention a study by Hayavi et.al that conducted a feasibility study for telemedicine in University of Hormozgan. Their findings showed that despite favorable cultural situation, lack of proper infrastructures and expert knowledge makes it impossible to provide telemedicine services (6). Dargahi in his study titled "An investigation about attitude of clinical physicians in the implementation of telemedicine technology in TUMS hospitals" showed that organizational structure plays an important part in successful implementation of telemedicine technologies in investigated hospitals and that current organizational culture has the capacity for accepting strategic changes and successful implementation of telemedicine programs (7).

Despite lack or comprehensive studies regarding telemedicine in Iran, more international studies have investigated this subject. Results of a study by Sorensen titled "Attitudes toward telehealth use among rural residents: a Danish survey" showed that the attitude toward new technologies were generally negative in these areas which presented challenges for introducing telemedicine services in these areas (8). Also the results of a study by Meher et.al on the awareness and attitudes of Indian medical practitioners and patients regarding telemedicine showed the necessity of educational programs in order to change the attitude of both patients and doctors and implement telemedicine (9).

Acceptance is of great importance in implementation of telemedicine in Iran. Isfahan province as one of the largest provinces with many rural areas is a great target for telemedicine projects. Isfahan province has a population of 4 million and 5 hundred thousand, 30% of which live in rural areas. Due to large size of the province, many rural areas are very distant from urban locations and population centers. This along with dispersion of population has caused many challenges for providing these rural areas with health services especially specialized services leading to inequalities in accessing health services especially for people living in rural areas.

Due to these facts and given the advantages, goals and effects of telemedicine technologies, using such technologies can help improve health services and reduce their cost and makes specialized medical services available to distant rural areas. Knowing these advantages will automatically lead to

adaptation of telemedicine by managers and policy makers of health and medical service. Therefore the current study aims to determine the awareness and attitude of employees working for Deputy of Health of Isfahan University of Medical Science regarding telemedicine and its advantages in order to facilitate the implementation of telemedicine technologies in Isfahan province.

2. MATERIALS AND METHODS

This is a descriptive study with sectional information gathering. The information was gathered by direct visits to research targets. The statistical population consisted of all managers and experts employed in Deputy of Health of Isfahan University of Medical Science and Center of Health for Isfahan Province (a total of 120 people). All certified experts and managers were selected as research samples. The selection of Deputy of Health of Isfahan University of Medical Science was due to the fact that most of the main policymakers and managers of health and medical systems in Isfahan province are employed by this Deputy and all provincial medical and health networks in charge of providing health services for people living in remote and rural areas work under the supervision of this Deputy. In other words this deputy of Isfahan University of Medical Science is in charge of providing health services for people living in rural and distant areas that need to travel great distances to reach central urban areas with specialized medical services. Also most of strategic and macro policies and plans for health and medicine in Isfahan province are carried out by this deputy. The inclusion method for this study included experts with bachelor degree and at least 20 years work experience, with Masters' degree and at least 15 years of work experience or with PhD degree and at least 15 years work experience in health and medicine areas. Based on these criteria a sample of 60 people was selected. Then the awareness and attitude of the selected individuals regarding telemedicine was investigated. The data gathering tool was a questionnaire created by the researcher. This questionnaire consisted of two sections. The first section contained multiple choice, vacancy or true or false questions which investigated the awareness of the individuals about telemedicine. The second section was designed to investigate the attitude of individuals towards telemedicine and consisted of seven attitude measuring terms. Likert scale was used in this section meaning that each question had five possible answers which varied from "fully agree" to "fully disagree".

In order to investigate the validity of the questionnaire, after localization, the questionnaire was presented to a number of faculty members of Isfahan University of Medical Science and Amir Kabir University of Tehran. Then their opinions were gathered and appropriate changes were made to the original questionnaire. The reliability of the questionnaire was investigated using Cronbach's alpha which was calculated to be 0.71 confirming the suitability of the questionnaire for research purposes. In order to evaluate the gathered information descriptive (average, frequency, standard deviation) and analytical (Spearman correlation test and independent t-test) were employed with the help of SPSS19 software.

3. FINDINGS

60 employees from Deputy of Health of Isfahan University of Medical Science and Center of Health for Isfahan Province participated in this study. Among these participants, 21 were male (35%) and 39 were female (65%). At the first stage, the participants filled the questionnaire designed to evaluate the awareness and attitude of participants regarding telemedicine. The analysis of the results is presented in table 1. According to the results presented in table 1, participants had total awareness scores from 10 to 18. Since the maximum awareness score is 18 and the minimum score is zero, these results show that 51.6% of participants (31 people) had correctly answered 50 to 70% of the questions and had an awareness score between 10 and 12 and 48.4% of the participants had correctly answered to more than 70% of the questions and had awareness scores between 13 and 18. Based on a scale defined for the purpose of this study, the awareness of the participants was divided into three groups of poor, mediocre and good. Findings show that no participant was placed in the poor awareness group while 51.7% of the participants belonged to the mediocre and 48.4% of them belonged to the good awareness group. Also the frequency distribution of the awareness scores shows that most participants had mediocre awareness scores.

Rank	Score	Score percent	Frequency	Percent	Cumulative percent
1	10	55.55	7	11.7	11.7
2	11	61.11	8	13.3	25
3	12	66.66	16	26.6	51.6
4	13	72.22	7	11.7	63.3
5	14	77.77	6	10	73.3
6	15	83.33	6	10	83.3
7	16	88.88	1	1.7	85
8	17	94.44	5	8.3	93.3
9	18	100	4	6.7	100
Total	60	100			

Table 1. Frequency distribution chart of the awareness score of the experts and managers regarding telemedicine

The relation between the awareness score of the participants and their education was investigated using Spearman correlation test. The results showed that there is a correlation between the educational degree and awareness of the subject; however the correlation coefficient was lower than 0.5 which shows a weak correlation (0.451). On the other hand, the calculated P-value of 0.008 showed that there is a meaningful relation between the education and awareness of managers regarding telemedicine.

Rank	Average attitude score	Frequency	Percent
1	2.5	1	1.7
2	2.75	2	3.3
3	3	1	1.7
4	3.25	2	3.3
5	3.5	5	8.3
6	3.75	6	10
7	4	11	18.3
8	4.25	13	21.7
9	4.5	6	10
10	4.75	8	13.3
11	5	5	8.3

Table 2. Frequency distribution and attitude score of managers and experts regarding the advantages of telemedicine

For investigating the attitude of managers and experts regarding telemedicine, a score between 1 and 2.99 showed an unfavorable attitude, score between 3 and 3.99 showed a semi favorable attitude while a score between 4 and 5 showed a favorable attitude. The most frequency belonged to those with favorable attitude (63.3%) while the lowest frequency (5%) belonged to people with unfavorable attitude (table 2).

The average awareness and attitude scores of the managers and experts regarding telemedicine divided by education level were also calculated (table 3). As can be seen in table 3, with the increase in the education level of the managers and experts, the average scores of attitude and awareness also increases, for example the average awareness score and scores for attitude toward the role of information technology for improving health services and attitude toward the advantages of telemedicine for participants with PhD education are 15.75, 2.89 and 3.44 respectively.

	Bachelor degree	Masters' degree	PhD
Average awareness score	12.9	13.5	15.75
Effect of information technology on health care quality	2.77	2.75	2.89
Advantages of telemedicine	3.02	3.03	3.44

Table 3. The average awareness and attitude scores of participants divided by education level

The results of the data analysis showed that there is no meaningful relation between the education and attitude scores of experts of Deputy of Health of Isfahan University of Medical Science (P-value = 0.25 and $\rho_{\text{Spearman}} = 0.2$). Also the results of independent t-test showed no meaningful relation between the gender of the participants and their attitude and awareness scores (P-value > 0.05). Finally the relation between awareness and attitude scores was investigated using Spearman correlation test. The results showed a strong correlation between awareness and attitude scores ($\rho_{\text{Spearman}} = 0.016$)

4. DISCUSSION

Telemedicine and use of information and communication technologies in health and medicine areas play an important role in improving the quality of health services and reducing the costs. These technologies can also reduce the physical gaps (caused by distance and time) present in the traditional health systems and provide a novel health care system (10). Telemedicine can also reduce problems such as inequality in distribution of medical services, lack of access to proper health services and help provide proper services at any given time and location. Therefore and due to the role of this technology in health and medicine, the current study aimed to investigate the awareness and attitude of employees of deputy of health of Isfahan University of Medical Science regarding telemedicine. A total of 21 male and 39 female employees participated in this study, 48.4% of which had good awareness score regarding telemedicine. Also frequency distribution of awareness scores showed that most of participants had mediocre awareness scores. These results are different from ones reported by Monsudi et.al (11), Banjoko et.al (12) and Shittu et.al (13) regarding the awareness and performance of health center employees regarding telemedicine that showed while most of the employees had suitable awareness regarding tele-

medicine, few of them were aware about its availability in the hospitals. On the other hand Isabalija et.al reported that the awareness of employees in hospitals in Uganda regarding telemedicine was poor which means that the employees were reluctant in accepting telemedicine. Therefore they concluded that in order to implement telemedicine, awareness and attitude of hospital employees need to be changed (14).

In United States, 35 official interviews were conducted with researchers and medical practitioners active in telemedicine. Although the respondents were among the supporters of telemedicine, the results showed that implementation of telemedicine in health providing organizations is impossible due to structural and cultural characteristics of these organizations. On the other hand, researchers and health and medicine managers of South Korea that follow a organizational culture of lack of uncertainty and high aversion to ambiguity believe that successful implementation of telemarketing in these organizations is possible (15). Also the results showed that the highest frequency of attitude scores belonged to favorable attitude.

In a study, Hanson et.al investigated the attitude of health care providers toward telemedicine. The findings of their study showed that the attitude of health providers that had used telemedicine for the first time wasn't significantly different from the attitude of those that hadn't used telemedicine before. However significant changes in attitude were observed after participating in a telemedicine project. The reason behind these results is that health providers that haven't used telemedicine before might be overly cautious about the technology, process and capabilities of telemedicine and their opinions might be based on what they have heard or read about telemedicine. The theory of planned behavior model of technology adoption and diffusion of innovation theory also play an important role in acceptance of telemedicine (16).

In a study by Dargahi et.al about attitude of clinical physicians in the implementation of telemedicine technology in Tehran University of Medical Science hospitals, the results showed that acceptance of strategic changes is closely related to changes in organizational culture. Therefore education in order to create a suitable environment for change can greatly affect changes in awareness and attitude in organizations (7).

In another study Grubaugh et.al investigated the attitude in urban and rural hospitals regarding first aid with the help of telemedicine and showed that these hospitals have the capability to offer medical and psychological telemedicine services. Trust, accessibility of the services and convenience were the most important factors in using telemedicine (17). However a study by Sorensen didn't show a positive attitude toward telemedicine in rural areas and concluded that introducing telemedicine in rural areas of Denmark is faced with a great challenge (8).

By considering the studies by Grubaugh and Sorensen, one can understand the advantages of telemedicine in health system that include lower costs, better accessibility, better equality in service distribution, correct distribution of services and the ability of providing health services at any given time and place. Therefore given the fact that Isfahan province expands from the borders of eastern provinces to that of western ones and the population dispersion of the province, telemedicine is one of the best solutions for solving problems

in Isfahan province's health system. However given the current facilities and attitude toward telemedicine, suitable education and cultural changes need to be performed.

In an another study by Meher, the results showed that medical practitioners were more willing to use telemedicine services and in order to improve the acceptance of telemedicine, educational programs and access to more remote areas are necessary. On the other hand 80% of the Indian patients were unaware of telemedicine services which are especially important due to scope and population of India (9).

According to the results of the current study and that of previous ones, low awareness and resulting unfavorable attitude toward telemedicine can be due to inability of employees in using telemedicine, lack of proper education, lack of proper policies and resistance to change, inadequate infrastructure and lack of proper support for telemedicine projects (18).

In order to increase the awareness and improve the attitude of organizations toward telemedicine, it is necessary to design suitable educational and informative programs. Gathering the necessary financial support for telemedicine in order to have access to reliable equipment, having suitable locations and infrastructures and development of the necessary laws and policies are among other necessary steps in improving the awareness and attitude of people and employees toward telemedicine and eventual implementation of telemedicine in hospitals and health care centers (16, 19).

Also other than awareness and attitude, organizational culture which is the way of thinking in an organization and organizational structure greatly affects the implementation and utilization of telemedicine in Iran. Therefore changes in the organizational culture can be useful in implementing successful telemedicine projects. Among these changes, changes in organizational culture and structure of hospitals and general and specialized medical practitioners are the most important steps (7).

On the other hand it is necessary for managers and policy makers to understand the challenges and problems of a successful implementation of telemedicine before committing to costly investments because a failed telemedicine project can lead to wasted time, efforts and resources. This understanding can reduce dangerous investment behavior. Therefore and given the semi favorable organizational situation for implementation of telemedicine and participation of medical strategic planning in the current study, necessary steps need to be taken in order to improve the readiness of managers and experts for implementation of telemedicine in order to reduce the risks of the projects and improve the chances of success (20, 21). Also evaluation of the readiness can help in better determining the most opportune time for telemedicine projects and identification of interested parties and target factors (22).

5. CONCLUSION

In this study in order to determine the readiness of policymakers and key experts, their awareness and attitude toward telemedicine and its advantages were investigated. The reason for the importance of readiness is that the first step for implementation of any novel technology is to increase the knowledge of people and provide suitable education. If enough awareness and a positive and favorable attitude exist, one can say that it is possible to implement telemedicine proj-

ects. However the results showed that the awareness of managers and experts in health and medicine wasn't satisfactory and more than half of the participants had mediocre awareness scores. The attitude of managers and experts regarding the advantages of telemedicine was also semi favorable. Thus given the importance of awareness and attitude in implementation of new technologies it is possible to conclude that the situation is not ready for implementation of telemedicine programs. Therefore changes in organizational culture and structure, infrastructures, future plans and educating the employees in order to improve their abilities and acceptance of new technologies is an important first step in implementation of telemedicine in Isfahan province.

CONFLICT OF INTEREST: NONE DECLARED.

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