



## Nursing, Midwifery and Para Medicine University Student's Attitude towards the Application of Tele Medicine in 2015

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### ABSTRACT

Today, advanced technology particularly information technology has altered the face of life and social context worldwide. These changes have been of a considerable size especially in the realm of medicine. Tele medicine is characterized by the use of technology in communicating medical information and providing services through audio-visual systems while the two sides of the communication are physically apart. Contrary to developed countries, in Iran telemedicine is only restricted to certain areas due to high costs, low speed of data transmission and the high load of data to be transmitted. In the present descriptive, cross-sectional research, 306 students affiliated with the Nursing, Midwifery and Para medicine faculties of Hormozgan University of medical sciences were selected randomly through a stratified sampling method in 2015. The questionnaire used was comprised of two sections one including demographic information and the other including the extent of using technology in 5 domains. Cronbach's alpha was used to test the reliability of the test. The data collected in each group were analyzed through parametric *t* test and ANOVA as well as non-parametric Man-Whitney *U* test and Kruskal-Wallis. Chi-squared test was used as well for qualitative variables along with descriptive statistics via SPSS ver.19.0. A statistically significant correlation was found between sex and contextual factors as well as the beneficiaries' factors ( $p=.026$ ) and also between faculty and application domain ( $p=.08$ ). Moreover, age was significantly correlated with organizational domain, technology, beneficiaries, information and contextual literacy. Place and level of education were correlated with none of these factors. Students of both faculties similarly paid more attention to organizational factors and access to high-speed internet among the technological factors had the most frequent application. These two, therefore, need to be attended carefully by the field specialists.

**Keywords:** Telemedicine, Attitude, Hormozgan University of Medical Sciences

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becoming more and more significant especially in the realm of medicine [1].

### INTRODUCTION

Advanced technology especially IT has changed the face of life today in the whole world and is

Tele medicine involves using technology to communicate medical information and provide medical services. It is also used in consultation, diagnosis, treatment and instructing patients and personnel on data transferred through audiovisual systems. What makes this communication unique is the physical distance

between the patient and the medical staff. Tele medicine can be used in providing clinical-preventive, diagnostic and therapeutic services directly, giving consultation and follow-up, monitoring patients in distant areas, providing rehabilitating services and instructing patients [2]. Contrary to developed countries, In Iran telemedicine is only applicable in certain areas due to the overall high costs, low internet speed, limited band breadth and high loads of data to be transferred [3].

As an investigation in the U.S. showed in 2002, 90% of adult patients were in contact with their doctor. In Germany and France, 52% of German patients and 34% of French patients were in touch with their doctor [18]. However, in Hormozgan University of medical sciences, only 9.2% of doctors experienced providing consultation o patients through telemedicine [19].

A variety of programs can be applied in telemedicine including video conferences, email, smart phones, wireless tools and the like to transfer information [8]. One common application of telemedicine has been known as tele dermatology for diagnosis and treatment of skin problems [10].

There are four factors involved in the success of telemedicine: therapists' motivation, proper infrastructure, consistent investment and technical support [12]. Though healthcare services mediated through novel technologies such as telemedicine services, tele healthcare and mobile healthcare are ever increasing, physical amenities, presence of medical personnel and providing services for deprived areas cannot replace them [11].

Considering the fact that today more and more people are getting involved in this domain and many social activities such as banking and city services and even security issues are performed from distance, the realm of medicine should not fall behind. Accordingly, a new form of doctor-patient communication has developed including websites designed by physicians so as to save both their own and the patients' time [9].

Tele medicine is one such development that has been anticipated to revolutionize healthcare service provision worldwide. It also enjoys certain social and economic benefits which further

necessitates the development of this technology [4].

Successful application of telemedicine is viewed by managers and experts from a wider and more inclusive perspective. Their comments can be effective in pinpointing the strengths and weaknesses, opportunities and threats of the organization [5].

Despite its wide geographical area, Hormozgan province is faced with difficulty in applying telemedicine especially due to its many deprived areas. It is overall hard to get in touch with the specialists [13].

Since it is crucial for the medical domain to use this technology, the present research attempted to explore Nursing, Midwifery and Para medicine students' attitude towards performing telemedicine in Hormozgan University of medical sciences in 2015.

## MATERIALS AND METHODS

As a descriptive and cross sectional study, the present research had all students of the Nursing, Midwifery and paramedicine faculties as its research population. Stratified sampling method was used to select the subjects randomly. Sample size was determined through consulting a statistician and controlling type one error (5%) and test power (80%). The size was eventually decided to be 306. 27.1% of the students were affiliated with the Nursing faculty; 11.1% were affiliated with Midwifery faculty and 61.8% were Paramedicine students. The data gathering instrument was a research-based questionnaire comprised of 33 indicators the reliability and validity of which was already established by Alizade *et al.* (4). In order to match the items with the target population, some of the items were eliminated and the result was a questionnaire with 29 multiple-choice items (5 choices provided: little, a little, moderately, much, very much). The validity of the new questionnaire was confirmed by 3 field specialists. In order to confirm the reliability, 30 questionnaires were distributed among the target population (besides the main sample) and the consistency of the items was tested through Cronbach's alpha and was found to be 80%. The questionnaire was comprised of two sections the first of which contained demographic information (sex, age,

education level, residential area, and faculty). The second section of the instrument was further divided in two parts the first of which contained 12 items which explored the extent to which the respondent used IT (computer, internet, email, etc.). The second part consisted of 17 items which had five descriptors. Descriptor 1 was organizational factors (items 13-16); descriptor 2 pertained to technological factors (items 17-20); descriptor 3 concerned beneficiaries (items 21-23); descriptor 4 dealt with information literacy (items 24-26) and descriptor 5 had to do with contextual factors (items 27-29). Each item was to be rated in a Likert scale ranging from little to very much (scores 1 to 5). The two choices much and very much were taken as positive while the moderate choice was considered as an average rating. The two choices little and a little were taken as negative ratings.

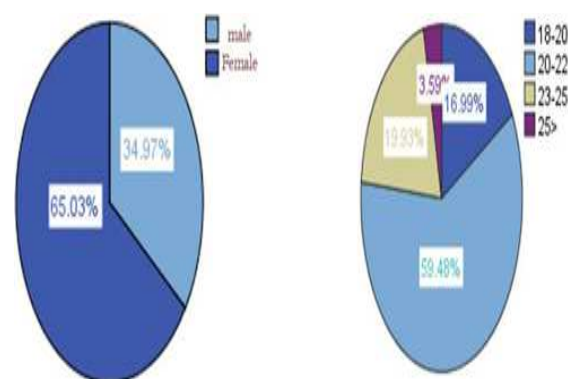
Interval data were tested through t test and ANOVA, while ordinal data were analyzed through Mann-Whitney U test and Kruskal Wallis.

Qualitative data were analyzed through Chi-squared test as well as descriptive statistics such as frequency, mean percentage, variance and standard deviation via SPSS ver.19.0.

**RESULTS**

From among the 306 subjects, 83 (27.1%) were Nursing students; 34 subjects (11.1%) were Midwifery students and 189 (61.8%) were paramedicine students. The results in table 1 indicated that the majority of students in the two faculties were 20-22 years old; they were mostly female and nonnative. Statistically significant divergences were found between the two faculties in terms of age, sex and geographical area.

107 subjects (35%) were male while 199 (65%) were female. As for age, 50 subjects (16.3%) were 18-20 years old while 183 (59.8%) were 20-22 years of age. 62 (20.3%) were 23-25 years old and 11 others (3.6%) were older than 25 years. The mean age was 21 years.



**Figure 1: Distribution of students' age at Nursing, Midwifery and Paramedicine faculties**

The first section of the questionnaire which is indicated in table 1 shows that 64.4% of the Nursing group used the internet and 24.1% used computer systems. 15.7% of the same group used mostly emails. 82.4% of the Midwifery group used the internet and 14.7% used it for chatting about medical issues. 20.6% used medical e-books and similar stuff. 79.9% of the Para medicine group used the internet while 42.3% used computer systems and 18.5% surfed mostly medical websites.

The mean scores of students' rating of each telemedicine domain in each group revealed that the highest mean score of rating in the faculties was that of the technological factors. However, no statistically significant divergence was observed between the groups with this respect (table 3).

Factor	Nursing		Midwifery		Para medicine		p-value	
	n.	%	n.	%	n.	%		
Age	<20	8	9.6	11	32.4	33	17.5	.022
	20-22	49	59	19	55.9	114	60.3	
	23-25	24	28.9	4	11.8	33	17.5	
	>25	2	2.4	0	0	9	4.8	
Sex	Male	41	49.4	0	0	66	34.9	.000
	female	42	50.6	34	100	123	65.1	
Residence	Native	35	42.2	17	50	81	42.9	.713
	nonnative	48	57.8	17	50	108	57.1	
Education level	Associate degree	0	0	0	0	4	2.1	.285
	B.S.	83	100	34	100	185	97.9	

*Probability of significance has been estimated through Chi-squared test*

**Table 2: The extent to which university students used IT in each group**

Computer domain	Nursing						Midwifery						Para medicine						P-value
	-		-/+		+		-		-/+		+		-		-/+		+		
	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%	n.	%	
Computer	30	36.1	33	39.8	20	24.1	10	29.4	21	61.8	3	8.8	38	20.1	71	37.6	80	42.3	0.000
Internet	6	7.2	26	31.3	51	64.4	1	2.9	5	14.7	28	82.4	5	2.6	33	17.5	151	79.9	0.017
Emails	51	61.4	19	22.9	13	15.7	22	64.7	9	26.5	3	8.8	68	36	70	37	51	27	0.000
Medical websites	50	60.2	26	31.3	7	8.4	18	52.9	13	38.2	3	8.8	100	52.9	54	28.6	35	18.5	0.171
Personal weblogs	72	86.7	7	8.4	4	4.8	28	82.4	6	17.6	0	0	151	79.9	26	13.8	12	6.3	0.332
Telephone mediated Q&A	72	86.7	9	10.8	2	2.4	29	85.3	5	14.7	0	0	159	84.1	19	10.1	11	5.8	0.43
Website mediated Q&A	72	86.7	6	7.2	5	6	29	85.3	5	14.7	0	0	158	83.6	22	11.6	9	4.8	0.462
Email mediated Q&A	74	89.2	6	7.2	3	3.6	32	94.1	2	5.9	0	0	160	84.7	22	11.6	7	3.7	0.5
Q&A through chatting	65	78.3	14	16.9	4	4.8	18	52.9	11	32.84	5	14.7	150	79.4	27	14.3	12	6.3	0.018
Electronic medical materials	54	65.1	22	26.5	7	8.4	17	50	10	29.4	7	20.6	110	58.2	48	25.4	31	16.4	0.334
Online seminars	74	89.2	7	8.4	2	2.4	32	94.1	1	2.9	1	2.9	170	89.9	7	3.7	12	6.3	0.274
Reading tele medical books	64	77.1	13	15.7	6	7.2	26	76.5	6	17.6	2	5.9	126	66.7	49	25.9	14	7.4	0.371

*Probability of significance has been estimated through Mann Whitney U test*

**Table 3: Mean scores of Nursing, Midwifery and Para medicine students' rating of telemedicine domains**

Domain	Nursing	Midwifery	Para medicine	p-value
	mean±SD	mean±SD	mean±SD	
Organizational factors	12.2±3.8	13±3.9	13±4.1	.241
Technological factors	13.5±3.4	14.1±3.5	14.4±3.7	.212
Beneficiary factors	9.8±3.1	10.3±2.9	10.3±2.9	.471
Information literacy factors	10.1±2.9	10.8±2.5	10.9±2.9	.163
Contextual factors	10.1±3.3	10.8±3.4	10.9±3.1	.167

*Probability of significance has been estimated through t test*

A comparison of each domain of factors with the demographic information revealed a significant correlation between sex and contextual factors (p=.020) as well as beneficiaries (p=.026). The mean scores of rating of males were higher than females in both domains. A statistically significant correlation was also observed between faculty and domain of use (p=.08). The mean score was higher in the Para medicine faculty. Age also showed to be significantly correlated with the organizational domain (p=.06), technology (p=.02), beneficiaries (p=.07), information literacy (p=.038) and contextual domain (p=.014). The mean age was higher in the age group >25 years. Place and level of education were not correlated with any.

An observation of university students' attitude towards each domain of telemedicine revealed that the highest percentage of positive attitude in the Nursing group belonged to the inclusion of a

prospective plan (59%) among the organizational factors, access to high-speed net (67.5%) among the technological factors, social support (56.6%) from among the beneficiary factors, students' skills (62.7%) in the information literacy factors and enculturation (51.8%) among the contextual factors.

The highest percentage students' positive attitude in the Midwifery group belonged to the inclusion of a prospective plan (55.1) and notification at university (50%) among the organizational factors, access to high-speed net (73.5%) and having the required hardware (50%) from among the technological factors, social support (58.8%) as well as financial/moral support (55.9%) in the beneficiary factors, students' skills (70.6%) among the information literacy factors and enculturation (67.6%) in the contextual factors.

Table 4: Frequency and percentage of students' attitude for each and every telemedicine indicator

Domain	Indicator	Nursing						Midwifery						Para medicine						P-Value
		-		-/+		+		-		-/+		+		-		-/+		+		
		%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	
Organizational	Structural changes	34.9	29	38.6	32	26.5	22	35.2	30	35.1	30	29.4	25	29.1	25	34.6	30	36.6	32	0.60
	Having a detailed plan	28.9	24	36.1	30	34.9	33	20.7	18	38.2	33	41.4	36	23.3	20	23.4	20	53.4	47	0.03
	Notification at university	27.7	23	36.1	30	36.1	30	14.7	12	35.3	30	50.7	43	18.4	15	34.4	30	47.6	40	0.26
	Having a prospective plan	19.3	16	21.7	18	59.4	50	17.6	15	26.9	23	55.9	48	18.5	15	22.4	18	59.3	50	0.98
Factors	Access to high speed internet	7.2	6	25.3	21	67.5	56	8.8	7	17.6	14	73.5	60	7.4	6	16.4	13	76.1	62	0.53
	Having required hardware	20.5	17	30.1	25	49.4	41	17.6	14	26.5	21	55.9	46	16.4	13	24.3	19	59.3	48	0.68
	Designing a facilitative system for doctors' work	22.9	19	31.3	26	45.8	38	32.4	27	17.6	14	50.6	41	16.4	13	24.9	20	58.7	48	0.01
	System localization	31.3	26	27.7	23	41.4	34	26.5	22	38.2	32	35.3	29	28.3	23	31.7	26	40.2	33	0.85
Beneficiary	Empowering the private sector	25.3	21	30.1	25	44.6	37	23.5	19	32.4	27	44.1	36	21.7	18	33.9	28	44.4	36	0.96
	Social support	22.9	19	20.5	17	56.4	46	11.4	9	29.4	24	58.0	47	19.6	16	19.3	15	61.9	50	0.50
	Financial and moral support	26.5	22	26.2	21	47.3	39	23.5	19	20.6	17	55.9	46	15.9	13	26.5	21	57.7	47	0.26
Information literacy	Students' skills	18.1	15	19.3	16	62.7	52	2.9	2	26.5	21	70.6	57	13.2	10	20.1	16	66.7	54	0.28
	Developing email communication	31.3	26	33.7	28	34.9	29	23.5	19	38.2	32	38.1	31	17.3	14	30.7	25	51.9	42	0.04
	Medical staff's skills	24.1	20	26.5	21	49.4	41	8.8	7	32.4	27	58.0	47	14.3	11	24.7	19	60.8	49	0.15
Contextual	Value of economic issues	21.7	18	30.1	25	48.2	40	14.7	12	32.4	27	52.0	42	14.3	11	25.4	20	60.3	49	0.35
	Contextual variations	28.9	24	25.3	21	45.8	38	20.7	17	23.5	19	55.9	46	18.4	15	20.3	16	61.4	50	0.17
	enculturation	22.9	19	25.3	21	51.8	42	14.7	12	17.6	14	67.6	55	14.8	12	18.5	15	66.7	54	0.20

Probability of significance has been estimated through Chi-squared test

In the Para medicine group, the highest percentage of students' positive attitude belonged to having a prospective plan (59.3%) as well as a detailed plan (53.4%) among the organizational factors, access to high-speed net (76.2%), having the required hardware (59.3%) and designing a facilitative system (58.7%) from among the technological factors, social support (61.9%), financial and moral support (57.7%) in the beneficiary factors, students' skills (66.7%) and medical staff's skill (60.7%) in the beneficiary factors, enculturation (66.7%) and contextual variations (61.4%) among the contextual factors (table 4).

### DISCUSSION AND CONCLUSION

Telemedicine is a technology that is capable of revolutionizing healthcare services. However, it appears that its application in Iran has been faced with many challenges. Despite the advancement of information technology, telemedicine is faced with serious challenges. It has only recently entered human life and has not yet had a real chance of adequate instructions on use. Therefore, its true application without proper instructions and preparation is farfetched [14].

The present research aimed to investigate Nursing, Midwifery and Para medicine students'

attitude towards the employment of telemedicine in Hormozgan University of medical sciences. Students at both faculties heeded more to the inclusion of a prospective plan in organizational factors. Having access to high-speed net from among the technological factors was of an utmost importance to them. Among the beneficiary factors, they showed to care more about social support. A similar positive attitude was expressed towards students' skills at using computer and the internet from among the information literacy factors. In the last category of factors i.e. contextual, they had the most positive attitude towards enculturation.

The mean scores of rating of students in each medical domain revealed that the highest score belonged to the technological factors while the lowest mean score was that of the information literacy and contextual factors.

A comparison of students' attitudes across their fields of study revealed that the two groups only diverged significantly in terms of the domain of use (application). With this respect, para medicine students paid more attention the domain of use than Midwifery students. No significant divergence was observed in terms of the other factors.

It was observed in a similar investigation that Medicine and Nursing students paid more attention to notification at university about telemedicine among the organizational factors. They also showed to heed more to access to high-speed net in the technological factors. Nursing students showed to care more about designing a system that facilitates physician's work. In terms of the beneficiary factors, more positive views were expressed by the two groups towards empowering the private sector of employing telemedicine. From among the information literacy factors, the two groups positively rated students' skills at using computer and internet. With regard to the contextual factors, the Medicine group rated economic factors involved in performing the plan higher, while the Nursing group rated enculturation more than the others [3].

A comparison of the present findings to the body of similar research that point out the barriers to telemedicine reveals that there is a host of commonalities among these barriers. The ranking

and prioritization differs though. Such barriers can be removed with a proper planning and enculturation process developed universities by the field specialists. Findings of the related literature are as the following:

The main obstacle to the success of telemedicine was maintained by Grisby to be improper planning and weak design as well as the opposing interests and expectations concerning telemedicine [17].

High cost and impotent infrastructure have been considered as the other probable obstacles to telemedicine [3].

From among the technological factors provided to students to choose from, the majority selected the access to high-speed net as the key factor which was similar to the priority set in the medicine students in a similar research [3].

As observed by Haghghi *et al.*, in Hormozgan University of Medical Sciences, only 9.2% of the specialists experienced tele consultation and 7.1% experienced distant learning. The current bandwidth of the net in the same university was the lowest (128 kpbs) and there was a lack of video conferencing equipment throughout the telemedicine process [13].

To employ telemedicine to cure diseases associated with the nose, ear and throat, there is a need for appropriate equipment and experts to do the examination and treatment. It is, therefore, useful in lowering the costs and facilitating the follow-up visits [2].

In their investigation, Torani *et al.* looked into the capabilities of Iranian specialized hospitals in providing telemedicine consultation. From among the 8 university hospitals, only 2 were capable of providing telemedicine consultations [1].

In Imam Khomeini hospital in Ardabil, Rahimzade *et al.* concluded that the field specialists were not adequately prepared for telemedicine services. There was a need for certain strategies to promote the hospital level and apply this medical system. A comparison of the present findings with those just mentioned indicates that university students as well as the medics need to have sufficient skills and experience in this domain (telemedicine) and,

therefore, need more proper instructions with this respect [7].

In Shahid Beheshti University of medical sciences, the failure of telemedicine in consultations in a satellite hospital despite holding certain preparation courses was acknowledged to be caused by certain obstacles. This was also confirmed in the present study and was deemed to be a function of improper enculturation [15].

In Haghghi *et al.*'s investigation in Hormozgan University of medical sciences, the majority of specialists pointed out initial costs, lack of technical forces, insurance issues and refund as the main obstacles to the success of telemedicine. Similarly, in the present research, Nursing, Midwifery and para medicine students suggested that a prospective plan, high-speed internet, social support, students' skills at using computer and the net and enculturation are essential in employing telemedicine [13].

Tele medicine has the potential for reducing the diagnosis time and improving clinical management, providing healthcare services around the globe and increasing the quality and efficiency of the services. In near future, this dream will come true and revolutionize the realm of medicine.

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