Analysis of Healthcare Professional's Knowledge and Attitude towards Telemedicine in Vijayawada, Andhra Pradesh

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Introduction: In India modern service delivery technologies like telemedicine are emerging promptly in healthcare sector. Successful implementation and utilization of novel technology hinges on several significant aspects together with knowledge, and attitude regarding technology and its user operating environment.

Aim: Primary objective of this study was to determine the knowledge and attitude of health professionals towards telemedicine in Vijayawada division of Andhra Pradesh state of India.

Methods: A randomized survey was conducted among healthcare professionals. A total of 123 respondents from medical and para-medical departments have participated in the study. A well-defined questionnaire was utilized to determine the knowledge and attitude of respondents about telemedicine. Data is entered and analysed using MS Excel 365 and SPSS 20. Pearson Correlation test was used to test the correlation between knowledge and attitude and Chi-Square test to assess the significant differences amongst gender and respondent's knowledge, and

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between gender and attitude of respondents about telemedicine. < 0.05 was considered as significant P-value.

Results: 52.57% respondents had good knowledge level, of which 54.34% were males, there was no significant difference between respondent's gender and their level knowledge with respect to telemedicine. Regarding attitude towards telemedicine 57.45% respondents had positive attitude towards telemedicine. Also, there was no significant difference between gender and attitude of respondents towards telemedicine. The Pearson Correlation value 0.699 indicates that a positive correlation exists between Knowledge and Attitude.

Conclusion: Outcomes of the analysis indicate that though the respondent's knowledge about telemedicine is average. Majority of respondents had positive attitude about telemedicine. COVID 19 has brought more light on telemedicine, and at this period it is very important to consider creating awareness and training the users as abundant knowledge and optimistic attitude towards the technology are significant factors to for any healthcare professional to implement and practice telemedicine.

1. INTRODUCTION

Since last two decades advancements in Information Technology (IT) has gained wide acceptance in the healthcare industry. From electronic health records to telemedicine, various healthcare facilities have proven to develop and enhance their administrative and operative competences concerning a worldwide setting, home-based care, public health centers and large chain corporate hospitals. It is practical that the developed countries have effectively integrated IT innovations healthcare sector thus enhancing care provided [1]. However, a confined acceptance and application of IT developments is noticed in developing countries in their healthcare stream [2].

In today's era of COVID-19 pandemic, ***telemedicine*** has emerged as ***saviour***, IT advancement tool to avoid the spread of infection and protect front line workers and patients. World Health Organization has defined telemedicine as, "the delivery of healthcare services, where distance is an important factor, by all healthcare professionals for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of people and their communities." [3,4]

It is obvious from the previous work that the success of novel technology hinges on several factors together with the knowledge, attitude, skills, and operating environment of the related users [5]. This is applied with telemedicine also where it is essential to educate and train the users with the latest model and evaluate as to what extent they are well prepared to utilize and implement telemedicine services [6].

COVID-19 pandemic has bought light on telemedicine in healthcare services as it offers access to healthcare anytime, anywhere. To prepare for a tragic event like COVID-19 pandemic that puts health care workers at risk. Healthcare providers are implementing telemedicine where physicians or doctors be able to remain to take care of patients through remote telemedicine visits [7]. These appointments can be operated with both healthcare professional and patient anywhere, completely reducing travel, exposure and facilitating continual care for intended patients [8]. Pandemics and disasters create unique challenges to healthcare provision. However, telemedicine will not solve them all, But it is well suited for scenarios in which infrastructure remains intact and clinicians are available to see patients [9].

2. OBJECTIVES

The primary objective of this study was to determine respondents' knowledge and attitude towards telemedicine post covid-19 pandemic. And To observe major threats and significant barriers of telemedicine in the view of respondents located in Vijayawada division of Krishna district located in Andhra Pradesh state of India.

3. METHODOLOGY

3.1 Area of Study and Sampling

A cross sectional study among random group of members was conducted in Vijayawada division

in the Krishna district located in Andhra Pradesh state of India. Among four revenue divisions in Krishna district Vijayawada is one and under its supervision there are 15 mandals. It has one municipal corporation and one municipality. As per the reports of Census India (2011), Vijayawada is having 1,034,358 total population; out of which male were 518590, and female 515,768. The current metro area population of Vijayawada in 2020 was 2,040,000, a 3.29% increase from 2019.

The random sample was taken in Vijayawada for the study. The Google form link having the questionnaire to determine the respondents Knowledge, and Attitude was circulated through various digital mediums. Finally, A total of 123 responses from various parts of Vijayawada were collected and used for the study.

3.2 Tool

Authors designed the questionnaire after literature review concerning telemedicine and how knowledge, attitude are key factors affecting telemedicine. Content validation was done where experts evaluated the questionnaire in three aspects essentiality, relevancy, and clarity.

Three experts including a medical professional and two educationist who are willing to help in questionnaire model regarding telemedicine were requested to examine the statement in questionnaire to make sure that the questionnaire is reliable.

All the evaluators independently assessed the clarity, relevance, and essentiality of all statements in the questionnaire using a three-pointer Likert scale where the score of each being:

Degree of Relevancy Scale (1=Not Relevant, 2= Somewhat Relevant, 3= Very Relevant), Degree of Clarity Scale (1= Not Clear, 2= Question need revision, 3= Very Clear), Degree of Essentiality Scale (1= Not Essential, 2=Useful but not essential, 3= Essential). Content Validity Index (CVI) was applied to assess the validity of the statements.

According to the CVI index, a rating of two or three indicates the content is valid. To define the face validity of the questionnaire, a questionnaire evaluation form was formed in which the evaluators assess each statement in terms of the clarity of the wording; probability that the focus

group will understand the question and how to answer that particular question.

CVR(Critical) for a panel size (N) of 3 was 1.667 and CVI for essentiality was 0.707, CVI for relevancy was 0.707 whereas CVI for clarity was 0.846. However, CVI for essentiality and relevancy was 0.707 this was because in analysing knowledge of the respondent in section two as per the evaluators statement two of this section is not considered as not relevant and not essential for this study purpose. A structured and self-administered questionnaire to determine Knowledge, and Attitude among healthcare professionals was used for the survey which consists of 7 sections: 1) Demographics; 2) Knowledge about telemedicine; 3) Awareness before COVID 19 pandemic; 4) Barriers of telemedicine in view of respondents (Q15-Q16); 5) Attitude towards telemedicine; 6) Telemedicine Implementation levels in India and Vijayawada; 7) Acceptance of telemedicine.

In first section, respondents were asked to give information about their age, gender, educational status, and their work profile (medical and para-medical), and their place of residence in Vijayawada. Section two has of 6 questions to access the respondent's level of knowledge about telemedicine statement one in this section is answered either 'Yes', 'No', or 'Maybe'. A score of '2' was given for No, '0' for Maybe, and '0' if Yes. And a score of maximum 2 and a minimum 0 was given for statement one. Statement two in this section is answered either '1980's', '1970's', '1960's' or 'Don't know' a score of '2', '1', '1', and '0' respectively. And one can score a maximum of 2 for this statement. Statement three in this section is answered either 'Video telephony of patient with a doctor to manage blood pressure medicines' or 'Wireless radio transmission of patient vitals to doctor from a remote place' or 'Newspaper advertisement about Hepatitis B vaccine' and a sore of '0', '0', and '2' was given respectively and A score of maximum 2 and a minimum 0 was given for third question. Statement four in this section is answered either 'Ministry of Health and family welfare', 'Ministry of communications and information technology', 'Indian Medical Council', 'All the above' and a score of '1', '1', '1', and '3' was assigned respectively and A score of maximum 3 and a minimum 0 was given for fourth question. Statement five in this section is answered in either 'Registered medical practitioner', 'Caregiver', 'Health worker', 'All the above' and a score of '3', '0', '0', and '1' was

given respectively and A score of maximum 3 and a minimum 0 was given for fifth question. Finally statement six in this section is answered either 'Real time assessment', 'Store and forward', 'Remote monitoring', 'All the above' and a score of '1', '1', '1', and '3' was given respectively and a score of maximum 3 and a minimum 0 was given for this question.

Third section has three sub-statements to assess the respondents awareness with respect to telemedicine before and after COVID 19. For this statement respondent can answer either 'Yes', 'Maybe' or 'No'. Score '1' if 'No', '2' if 'Maybe' and '3' was given if answered 'Yes'. A score of maximum 9 and a minimum 3 was given in this section.

Fourth section has questions related to the perceived barriers of telemedicine in view of respondents and these questions have multiple answers and was used to draw conclusions related to significant barriers and threats in practicing and using telemedicine in view of respondents.

Section five consisted six statements designed to determine the attitude of the respondents about telemedicine. Responses were scored on basis of (three-pointer) Likert scale, which ranging from "1" was given if the response is less appropriate and score of "3" was given if the response is most appropriate, and frequencies for the same are calculated.

Section six has of two questions to evaluate the Implementation level of telemedicine in India and Vijayawada in view of respondents. Responses in this section was graded on a four-pointer scale ranging from 1-4 i.e. '1' being 'Don't Know', score '2' being 'Low', '3' being 'Medium' and '4' score was allotted for 'High'. A score of maximum 8 and a minimum 2 was given in this section.

Section seven has two statements to determine the respondent's acceptance level of with respect to telemedicine. For this statement respondent can answer either 'Yes', 'Maybe' or 'No'. Score '1' if 'No', '2' if 'Maybe' and '3' was given if answered 'Yes'. A score of maximum 6 and a minimum 2 was given in this section.

3.3 Data Organization and Analysis

The raw data is coded, and Further the raw scores for the Knowledge and Attitude were converted to percentage and frequency distribution tables were created. Demographic characters with respect to gender are calculated. Similarly, knowledge and attitude tables with respect to gender are calculated and the percentage of the number of respondents having good knowledge and attitude were calculated. If the percentages were less than 50% its considered as low knowledge and attitude levels if the percentage was between 50 – 70 % then it was taken as average whereas if the percentage was greater than 70 then its was considered as high levels of knowledge and attitude among the respondents. The quantitative data obtained from the respondents was entered to MS Excel 365 further analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0 and the descriptive statistics related to demographic characteristics, and for Knowledge and Attitude was calculated for the overall sample and the sub samples. For all the statistical tests performed 0.05 was set as significance level (α). Pearson correlation coefficient was applied to determine the relationship between knowledge and attitudes questions.

4. RESULTS

A total of 123 respondents were approached and included in the study. Out of which female respondents were 69 (56.10%) and male respondents are 54 (43.90%), and the age group of the respondents was categorized into four groups with 50 (40.65%) respondents in 25-35 age group. Similarly, 45 (36.59%) respondents were in between age 36-45 and 23 (18.70%) respondents were in 46-55 age group while only 5 (4.07%) respondents were above age 55. Many respondents were bachelor's degree holders (77 (62.60%)) followed by master's degree holders (37(30.08%)). Most of the study participants were doctors with (49 (39.08%)) followed by nurses (35 (28.46%)). Sociodemographic characteristics with respect to gender are presented Table 1.

From the study Health professionals' level of knowledge about telemedicine was observed and about 52.57% of the respondents poses good knowledge regarding telemedicine, out of which 54.34% were males, there was no significant difference between respondent's gender and their level knowledge with respect to telemedicine. Amongst the respondents who had good knowledge of telemedicine, 28.62% of respondents were in the age group of 25-35, and 18.03% were bachelor's degree holders. 29.29% of respondents were doctors/ physicians having

good knowledge (Table 2 for details). In this table the values are proportionate with frequency and level of knowledge among respondents. For Example, Though the frequency of respondents was relatively very low for PhD holders. The proportion of respondents having PhD who are shown to have good knowledge of telemedicine was better when compared to other educational backgrounds. Similarly, though the frequency of respondents was significantly low for age group above 55. The proportion of respondents having good knowledge of telemedicine above age 55 was comparatively high than other educational backgrounds. (Table 2).

Table 1. Demographics with respect to gender

Gender	Female	Frequency (%)	Male	Frequency (%)	Total	Total Frequecy (%)	P- Value
Frequency	**69**	**56.10**	**54**	**43.90**	**123**	**100**	
Age							0.075822
25-35	32	64.00	18	36.00	50	40.65	X^2= 6.88
36-45	27	60.00	18	40.00	45	36.59	
46-55	9	39.13	14	60.87	23	18.70	
Above 55	1	20.00	4	80.00	5	4.07	
Education							
Diploma	2	50.00	2	50.00	4	3.25	0.283
Bachelors	47	61.04	30	38.96	77	62.60	X^2=3.8076
Masters	19	51.35	18	48.65	37	30.08	
PhD	1	20.00	4	80.00	5	4.07	
Work Profile							
Doctor/ Physician	24	48.98	25	51.02	49	39.84	0.103765
Nurse	20	57.14	15	42.86	35	28.46	X^2=7.6864
Midwifery	11	91.67	1	8.33	12	9.76	
Health Admin.	2	66.67	1	33.33	3	2.44	
Others*	12	50.00	12	50.00	24	19.51	

* Pharmacist, Bio Medical technician, Surgical businessmen

Table 2. Percentage Healthcare professionals with good knowledge about telemedicine

Socio-demographics	Percentage (%)
Gender	
Female	45.66
Male	54.34
Age	
25-35	28.62
36-45	24.87
46-55	17.73
Above 55	28.78
Educational Status	
Diploma	17.36
Bachelors	18.03
Masters	28.52
PhD	36.1
Work Profile	
Doctor/Physician	29.29
Nurse	15.64
Midwifery	5.01
Hospital Adminstrator	31.15
Others*	18.91

* Pharmacist, Bio Medical technician,Surgical businessmen

Table 3. Attitude of healthcare professionals about telemedicine with respect to gender

	Agree Female (%)	Male (%)	Total Frequency	Total Frequency (%)	Neutral Female (%)	Male (%)	Total Frequency	Total Frequency (%)	Disagree Female (%)	Male (%)	Total Frequency	Total Frequency (%)	P- Value
Telemedicine will enhance communication among healthcare providers and helps them in making more appropriate clinical decisions.	41(51.89)	38(48.10)	79	64.22	24(63.16)	14(36.84)	38	30.89	4(66.66)	2(33.34)	6	4.88	0.447804 X^2=1.6068
Telemedicine services will increase patient satisfaction.	21(51.22)	20(48.78)	41	33.34	43(61.43)	27(38.57)	70	56.91	5(41.66)	7(58.34)	12	9.75	0.329791 X^2=2.2186
Clinicians feel comfortable communicating with patients remotely (or when using telemedicine service).	36(52.94)	32(47.06)	68	55.28	32(65.30)	17(34.70)	49	39.83	1(16.67)	5(83.33)	6	4.87	0.056415 X^2=5.75
Implementation of telemedicine will improve patient's access to medical professionals and services acrossIndia.	51(59.31)	35(40.69)	86	69.91	15(53.58)	13(46.42)	28	22.76	3(33.33)	6(66.67)	9	7.31	0.312718 X^2=2.3249
Telemedicine will help clinicians and patients accomplish their tasks quickly	39(56.53)	30(43.47)	69	56.09	26(60.46)	17(39.54)	43	34.95	4(36.37)	7(63.63)	11	8.94	0.353907 X^2=2.0774
Telemedicine can reduce the number of usual follow-up visits to healthcare providers	49(60.50)	32(39.50)	81	65.85	18(48.64)	19(51.36)	37	30.08	2(40)	3(60)	5	4.06	0.368739 X^2=1.9953

These findings revealed that health care professionals had positive attitude about telemedicine. (Table 3). Amongst the total of 123 healthcare professionals, 57.45% respondents had positive attitude towards telemedicine. 79 (64.22%) respondents agreed that telemedicine will enhance communication among healthcare providers and helps them in making more appropriate clinical decisions, whereas 86 (69.91%) respondents agreed that implementation of telemedicine will improve patient's access to medical professionals and services across India. 69 (56.09%) of respondents seemed to know the benefit of telemedicine in accomplishing the tasks quickly, and 81 (65.85%) of them felt that telemedicine has the ability to reduce the number of usual follow-up meets to healthcare providers. Health professionals' attitude toward telemedicine with respect to gender are shown in Table 3 and it showed that there was no significant difference between gender and attitude of respondents towards telemedicine. The Pearson Correlation value 0.699 indicates that a positive correlation exists between Knowledge and Attitude.

5. DISCUSSION

Utilization of information and communication technology in healthcare sector is affected through several issues. Out of which, human-associated factors like users' knowledge, attitude, and acceptance of technology have great significance [10]. Several studies including a study conducted in Michigan State University, USA, states that to describe how telemedicine was seen and anticipated by health professionals, perception and attitude was an essential research question [11,6,12-14]. COVID 19 pandemic has brought more light on such modern service delivery tools especially in healthcare sector and telemedicine has a major impact. To cater with these problems, focused strategies must be considered to facilitate the implementation and utilization of the technology [15].

Objective of this report was to access the knowledge and attitude levels of health professionals in Vijayawada division of Krishna district located in Andhra Pradesh state of India. The findings imply that majority of study subjects i.e., 52.57% had good knowledge about telemedicine, this was due to the recent emergence of telemedicine in view of COVID 19 pandemic. However, this number was less when compared to the knowledge of health

professional's (84%) from European regions [16]. The majority of respondents in this study showed a positive attitude toward telemedicine, but on the other hand respondents had concerns on its complexity and felt that telemedicine has significant barriers that affect them from practicing telemedicine 93.8% felt that there was an increased frequency of medical errors, and 64% healthcare professionals perceive that patient privacy and information confidentiality also are barriers that effect telemedicine [17,18]. All These findings imply that a lot of work is required to be done to educate healthcare professionals about telemedicine to set the basis for sustainable adoption and successful implementation of such modern service delivery technology in India [19].

The percentage of healthcare professionals (52.57%) in this study who had good knowledge of telemedicine was high when compared to the percentage of respondents of a similar study conducted in Pondicherry, 2016 was about 41% [13] and vaguely higher than the percentage of knowledge of medicine students (43%) pursuing final year in a medical college in Sir Lanka [20]. These slightly higher levels of knowledge in this study was because this study was conducted after COVID 19 pandemic.

In a similar study conducted in North West Ethiopia in 2018 (before COVID 19 pandemic) showed that the good knowledge of the healthcare professionals about telemedicine was 37.6% and 64.0% respondents' attitude towards telemedicine was good [6].

Similarly, a study conducted in 2016 among healthcare professional faculty in teaching hospitals of Puducherry Region of India showed that 41% had good knowledge and 39% had good attitude towards telemedicine though 56% of the respondents were unskilled [13].

5.1 Barriers of Telemedicine in View of Respondents

Based on two statements in section four related to perceived barriers of telemedicine among respondents (healthcare professionals) are majority of the respondents (93.8%) felt that there was a chance of increased frequency medical errors. While 64% felt that patient privacy and information confidentiality was not maintained while practicing telemedicine. And 35% felt that legal compliance acts as a barrier

and relatively very few of them felt that technology and cost of the treatment affect telemedicine practicing and implementation.

When the respondents were asked what are the issues that they often experience while practicing telemedicine in their locality, majority said there were network connectivity issues, and this is followed by physicians and patients' compatibility with technology followed by patients lack of awareness and knowledge with respect to telemedicine, electricity issues and patient compliance with treatment provided.

6. CONCLUSION

Telemedicine is a modern service delivery method in healthcare provision, due to this practicing telemedicine and its implementation by healthcare providers hasn't been much adequate and effective. On the other hand, the respondents of this study proved to have an optimistic attitude toward telemedicine. Based on outcomes of this study, there is a scope for telemedicine to be entirely integrated with healthcare sector in Vijayawada division of Krishna district located in Andhra Pradesh state of India, by providing necessary education and appropriate training for the health care professionals as this will boost their knowledge which will proportionally enhance their level of acceptance with respect to telemedicine. Therefore, before the implementing of this technology, it is extremely crucial to consider cultivating awareness by determining its benefits and competencies and inculcate conceptual learning among users which helps to build up their knowledge of the technology because abundant knowledge and optimistic attitude towards the technology are significant factors to for any healthcare professional to implement and practice telemedicine.

7. LIMITATIONS

The main limitation of in this study was that sample was collected randomly and sample size was very small, as it was circulated to random working medical, and para medical professionals and this survey took place with the health professionals working only in Vijayawada division of Krishna district located in Andhra Pradesh state of India. Hence, results cannot be attained to the entire healthcare professional's population. The study would be more effective if it was conducted in the entire state to access the

knowledge and attitude as the sample size would be high and more conclusions could have been drawn for the study.

CONSENT

ETHICAL APPROVAL

Not applicable

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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