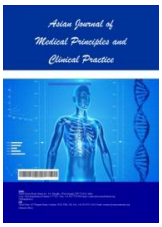

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A Cross Sectional Study to Assess the Impact of Telemedicine on Health Care Services in Primary Health Centre, North India

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Authors' contributions

This work was carried out in collaboration among all authors. Author AS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript and finalized the manuscript. Authors NT and NP managed the analyses and the literature searches of the study. All authors read and approved the final manuscript.

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ABSTRACT

Aims: 1) To assess the impact of telemedicine on health care services in the primary health center. 2) To determine patient satisfaction and barriers to telemedicine among the study subjects.
Study Design: A cross sectional study.
Place and Duration of Study: Urban Health And Training Centre, Delhi National Capital Region from July 2017 to June 2019
Methodology: All the patients attending telemedicine unit after taking their consent were interviewed using a questionnaire that was designed with questions about patient appointments, perceived advantages, disadvantages and barriers to telemedicine along with telehealth satisfaction questionnaire.
Results: A total of 390 patients were surveyed. There were 157 male and 233 female respondents with the mean age of 36.18 (±11.26) years In all, 72 % of the study subjects had not previously heard of telemedicine. The most common reasons for willingness to use telemedicine were

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specialist consultation and commonest barrier to use telemedicine was not user friendly software and not in direct contact with doctor. Of those surveyed, only 20% were willing to use telemedicine, 33% would sometimes be willing, 28% were unsure, and 19% were not willing. There was significant relationship between willingness with age and gender

Conclusion: There were constraints in using telemedicine because of software usage and awareness regarding it.

Keywords: Telemedicine; Urban; impact; barrier; advantages.

1. INTRODUCTION

Telemedicine means 'healing from a distance'. It is the use of telecommunication and information technology to provide clinical health care from a distance. World health organization has adopted the following description of telemedicine: 'the delivery of health care services, where distance is a critical factor, by all healthcare professionals using information and communication technologies 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 individuals and their communities' [1]. American Telemedicine Association defined it as the "the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status" [2]. It is used to manage patients in remote locations with limited access to healthcare services. It is an effective way to reduce time and money. However, now a days it is becoming a tool for convenience in healthcare for patients who do not want to waste their time in the waiting room of the doctor's clinic or visiting to consultants or health care centers far off from their area of residence [3]. Its usage has both, advantages and disadvantages. Referrals from primary health centers to tertiary hospitals joins waiting lists as outpatients for hospital admission and hospital treatment which can be saved by teleconsultation by specialists from higher centres. A major disadvantage includes expenditure of time and money both [4]. In terms of connection time from both the sides and money in view of setup of telemedicine unit and running that unit in a remote area. Its impact & evaluations can be done various measures: effectiveness (e.g., diagnostic accuracy), efficiency (e.g., cost), and engagement (e.g., patient satisfaction) [5,6,7,8]. In our urban health centre telemedicine unit was established in april 2017, so to assess the impact on patients and health care services this study was planned.

2. MATERIALS AND METHODS

A cross sectional study was planned to assess the impact of telemedicine unit in the health care delivering services catered by medical college in Delhi national capital region. Telemedicine unit was installed in urban health and training centre in april 2017. A pilot study was planned from april 2017-may 2017 to assess the validity and reliability of the questions designed in our questionnaire to be used along with a validated questionnaire used [9]. Through personal interview questions about patient appointments, perceived advantages, disadvantages and barriers to telemedicine were asked from the study subjects attending telemedicine medicine from july 2017 – june 2019.

2.1 Sample Size

All the patients attending telemedicine unit during july 2017 – june 2019 were included in the study .Around 667 patients were referred to telemedicine from out patient department, 232 study subjects attended it for the second time and 45 refused to take part in the study ,so final study subjects came out to be 390.

2.2 Study Population

2.2.1 Inclusion criteria

New patients attending telemedicine unit.

2.2.2 Exclusion criteria

- Those who did not gave consent.
- Patients attending telemedicine for the second time.
- Incomplete telemedicine consultations.

2.3 Data Collection

The aim of the study had been explained to all the study participants and their consent had been taken before the interview. In case of pediatric consultation, consent had been taken by

accompanying person or the guardian. Information thus collected was kept strictly confidential.

2.4 Study Tool

A semistructured questionnare including centre records, patient prescriptions along with validated pretested questionnaire (Telehealth Satisfaction Questionnaire) [9] to assess the satisfaction, benefits and barriers to telemedicine was used.

2.5 Analysis of Data

The information collected was converted into computer based spreadsheet using SPSS 21 software. Descriptive statistic such as mean standard deviation, percentage were used to describe the data collected in the present study. Statistical analysis was done using chi-square test wherever applicable.

3. RESULTS AND DISCUSSION

A total of 390 patients were surveyed from July 2017 to June 2019. There were 157 male and 233 female respondents with the mean age of 36.18 (±11.26) years, with range of 21-66 years. Maximum number of participants around 84% belonged to hindu religion. Only 75% were literate that too males exceeding females. Around 64% were unemployed or home makers, Elementary Occupation, Plant and Machine Operators & Assemblers, Craft And Related Trade Work. Maximum number of participants belonged to lower middle/upper middle socioeconomic status. In all, 72% of the study subjects had not previously heard of telemedicine. Since we had started the telemedicine unit, a continuous rise of telemedicine referrals was observed as shown in Fig. 2 as compared with the previous two years using the center records. Though the number of patients referred to higher center remained almost the same. As seen in Table 1, the maximum number of participants referred for telemedicine consultation is for the department of pediatrics or medicine both for pediatric and adults. When we sub analyzed the clinical data ,it revealed only 39.1%, the telemedicine consultation influenced in making a definite diagnosis and nearly 58.3%, the consultation contributed to clinical management and treatment as seen in Table 2. The commonest reason for willingness to use telemedicine were specialist consultation followed by counseling and obtaining second opinion .The commonest barrier to use telemedicine was not user friendly software and not in direct contact with doctor or the consultant. Of those surveyed, only 22% were satisfied by the telemedicine consultation and almost same number of study subjects were not satisfied at all. There is statistically significant association between satisfaction level among gender as represented in Table 3.

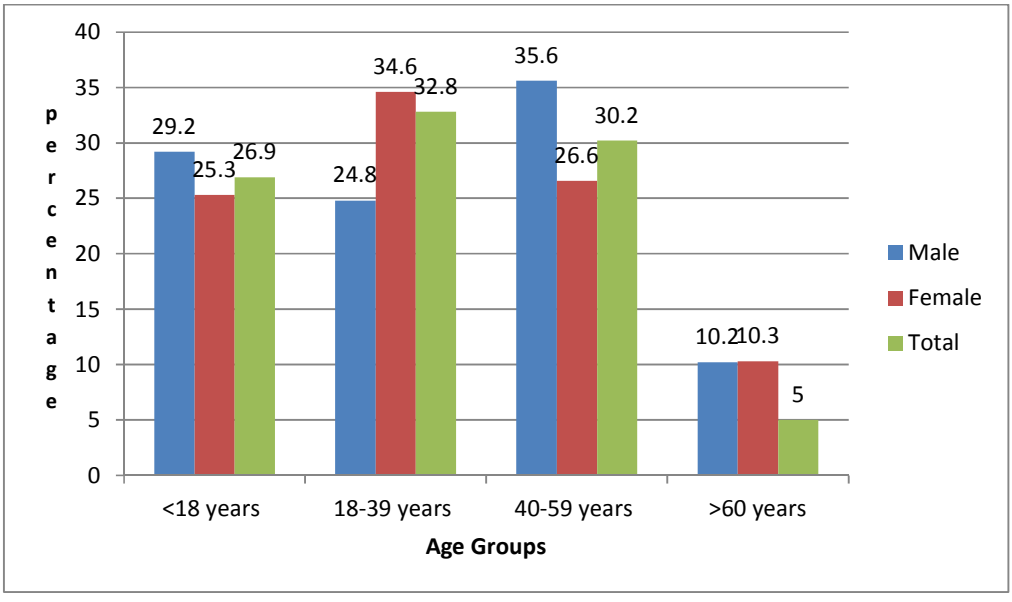

Fig. 1. A Figure representing distribution of study subjects according to various age groups (N=390)

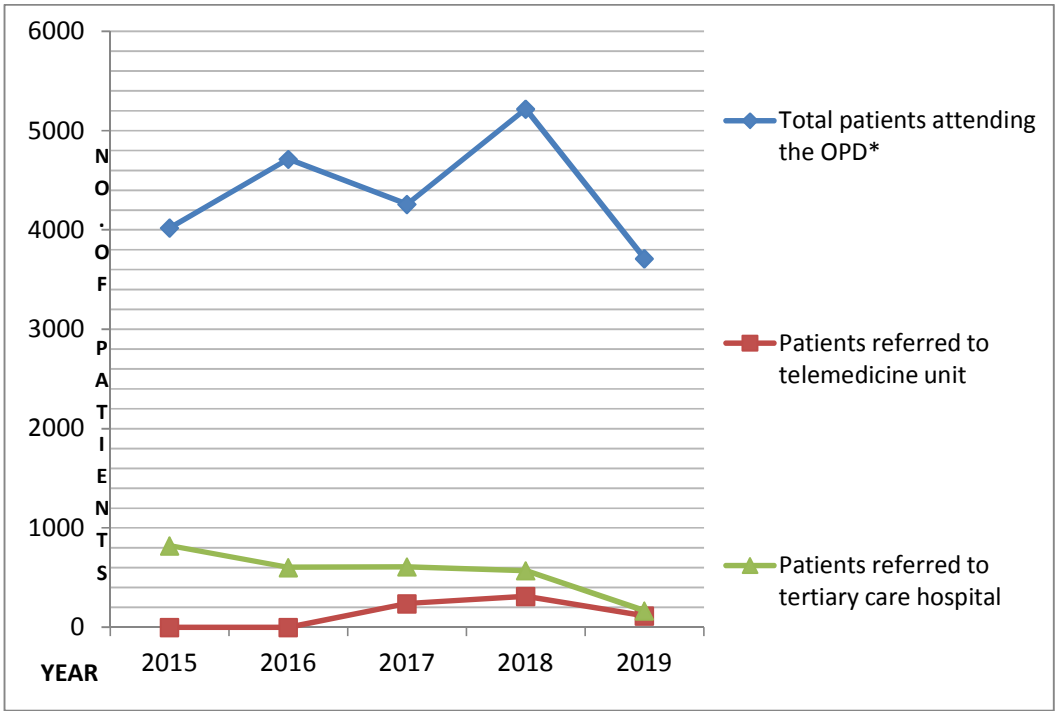

Fig. 2. Figure representing trends in number of patients before and after the installation of telemedicine unit

**Patients were counted till June 2019 only*

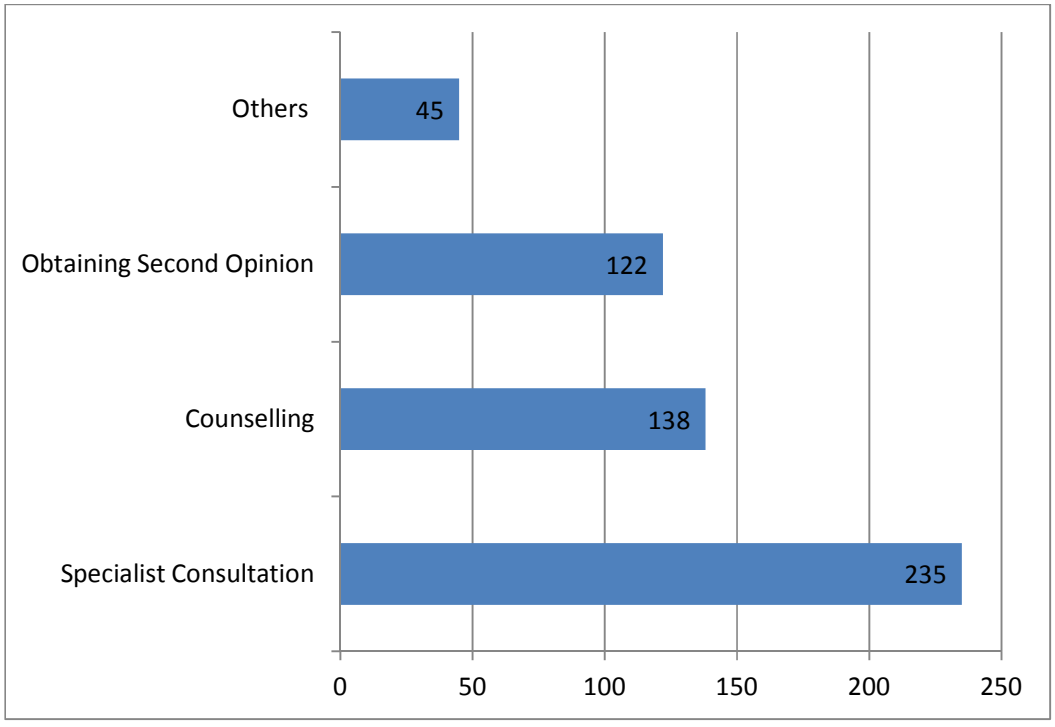

Fig. 3. Figure representing benefits of using telemedicine among the study subjects (Multi response)

Table 1. Table representing department wise distribution of patients referred through Telemedicine unit for consultation (N=390)

	Male (n=157)		Female (n=233)		Total
	<18 years	>18 years	<18 years	>18 years	
Medicine /Pediatrics	23(48.9)	66(60.0)	38(64.4)	59(33.9)	186(47.6)
Orthopaedics	1(2.1)	5(4.5)	1(1.7)	45(25.8)	52(13.3)
Surgery	2(4.2)	7(6.3)	3(5.1)	24(13.8)	36(9.2)
Dermatology	8(17.0)	7(6.3)	8(13.5)	12(6.8)	35(8.9)
Opthalmology	7(14.8)	10(90.0)	6(10.1)	13(7.4)	36(9.2)
Others	6(12.7)	15(13.6)	3(5.1)	21(12.1)	45(11.5)
Total	47(12.1)	110(28.2)	59(15.1)	174(44.6)	390

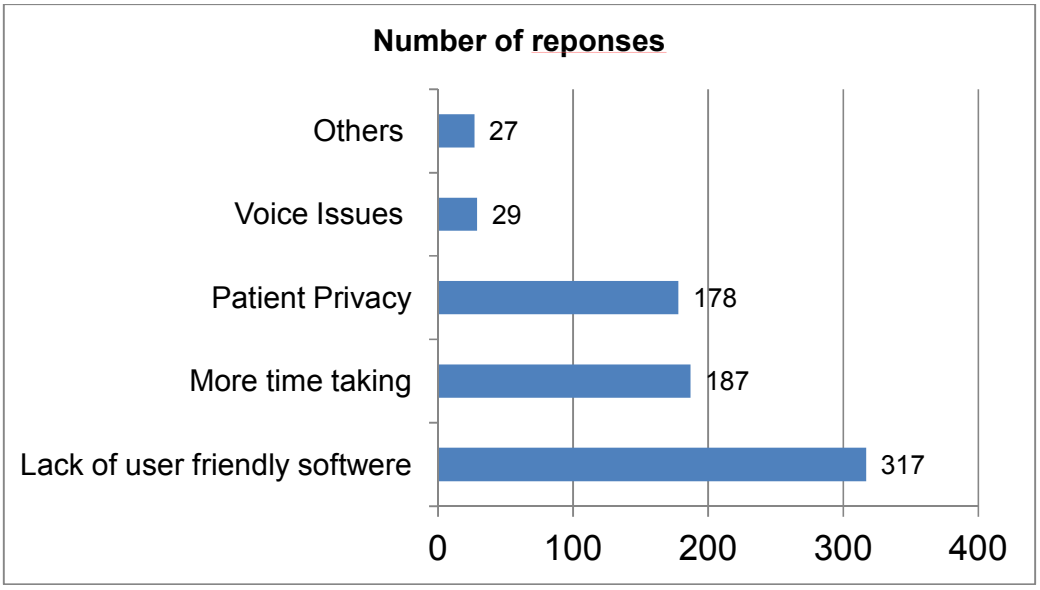

Fig. 4. Figure representing barriers to use telemedicine among the study subjects (Multi response)

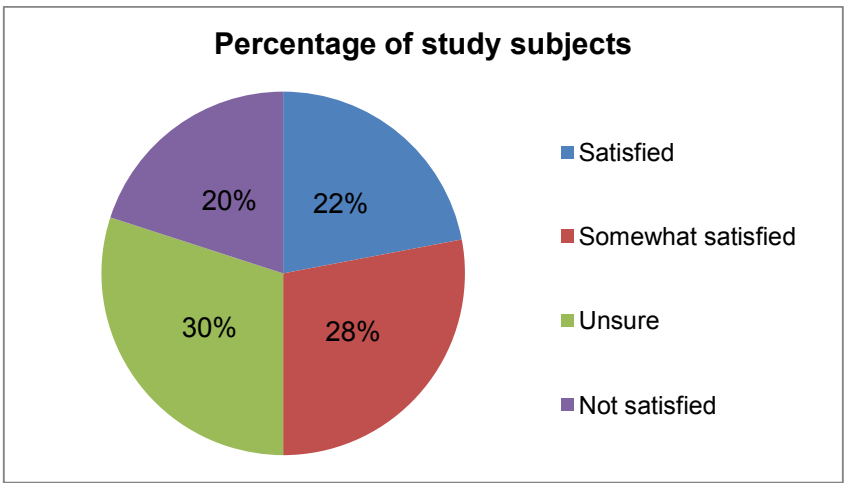

Fig. 5. Figure representing responses on Likert's scale for satisfaction after using telemedicine

Table 2. Table representing study results with subanalysis by clinical data

Diagnosis	Proportion with diagnostic concordance (N=338)	Proportion with treatment concordance (N=319)
Medicine /Pediatrics	112/155(72.2)	67/148(45.2)
Orthopaedics	12/32(37.5)	10/35(28.5)
Surgery	37/50(74.0)	13/50(26.0)
Dermatology	18/33(54.5)	13/31(41.9)
Opthalmology	12/30(40.0)	12/25(48)
Others	15/38(39.4)	18/30(60)
Total	206/338(60.9)	133/319(41.6)

Table 3. Table representing association of satisfaction level with gender among the study subjects

	Males (N=137)	Females (N=193)	Total(N=390)
Satisfied	48(55.8)	38(44.1)	86(22.1)
Somewhat Satisfied	39(35.7)	70(64.2)	109(27.9)
Unsure	33(28.2)	84(71.8)	117(30)
Not Satisfied	37(47.4)	41(52.5)	78(20)
P<0.05			

4. DISCUSSION

Telemedicine is running in our center since May 2017. Since then we encountered some benefits as well as blockages/disadvantages to run it also. The maximum number of participants were from the age group 18-39 years similar to the study done by Ghia [10] and Meher [11]. Only 28% of the study had previously heard of telemedicine unlikely in the developed countries [12]. Most probably this trend is linked to literacy level among the study subjects and a part is played by developing nation too. The maximum consultation is being done by the department of medicine and pediatrics, this holds true in primary health centre because mostly patients come with symptoms only that does not require emergency similar to study done in Bihar [13]. In about 39.1%, the telemedicine consultation influenced in making a definite diagnosis and nearly 58.3%, the consultation contributed to clinical management in contrast to the study done by Steinman [12]. This difference might be due to the location of our unit being in a primary health set up. The commonest reasons by our study participants for willingness to use telemedicine were specialist consultation similar to study done in year 2009 and 2013 [10,11,14]. A not user friendly software and not in direct contact with doctor came out to be the commonest barrier same as findings [11,15,16] of Apollo Tele Health Services. Of those surveyed, only 22% were satisfied by the telemedicine consultation in contrast to the findings of Acharya [15,17]. This might due to difference in education level and socioeconomic status of the study subjects.

5. CONCLUSION

There were constraints in using telemedicine because of software usage and awareness regarding it. The most common referral is in medicine department though telemedicine only 22% were satisfied to use telemedicine. Commonest reasons for willingness to use telemedicine were specialist consultation. Commonest barrier to use telemedicine was not user friendly software. For 132 patients (39.1%) the telemedicine consultation influenced in making a definite diagnosis, for 186 patients (58.3%), the consultation contributed to clinical management**.**

6. LIMITATION OF THE STUDY

There were few limitations of the study .Firstly economic aspect had not been covered. Relatively higher non response rate being using it for the second time and due to time constraints. Lastly we haven't covered doctor satisfaction which should also be taken into been into account.

7. RECOMMENDATIONS

Telemedicine can optimize the use of insights and skills of specialists remotely in regions where they are scarce but awareness regarding its use and time management is also an big issue. So

changes should be done to decrease the waiting time. Secondly doctors perspective should also be taken into account. Awareness sessions should be planned beforehand the consultation especially when the patient needs to talk to consultant in privacy.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal."

ETHICAL APPROVAL

"All authors hereby declare that the study has been approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki."

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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