PERCEPTIONS OF POST-GRADUATE MEDICAL STUDENTS, REGARDING EFFECTIVENESS OF TELEMEDICINE (TM) AS AN INSTRUCTIONAL TOOL

Muhammad Musharaf Baig, Tanwir Khaliq*, C. Aqeel Safdar**

Rawalpindi Medical College Rawalpindi, *Pakistan Institute of Medical Sciences Islamabad, **Military Hospital Rawalpindi

ABSTRACT

Objective: To determine post-graduate medical students' perceptions regarding effectiveness of telemedicine as an instructional tool.

Study Design: It was a pragmatic, sequential mixed method study.

Methodology: The data collection was by distribution of questionnaire to groups present both at Holy Family Hospital Rawalpindi and NORI hospital Islamabad. Variables of interest were PERCEPTIONS of medical students and EFFECTIVENESS of telemedicine(TM) as an instructional tool. Ethical committee approval was taken before the study.

Results: Out of 384 post-graduate students (PGS), 360 filled the questionnaire performa (response rate 93.75%), age range was 25 to 34 years. Responding to different questions; 95.56% respondents agreed / strongly agreed that TM was a good mode of information transfer (MIT). Another 72.2% respondents understood well the information given through this MIT; 64.4% participants were satisfied with the technical quality of services provided. Some 71.11% preferred TM over lectures and demonstrations, and 85.56% participants agreed / strongly agreed that TM should be accessible to all doctors working in various setups, throughout the country.

Responding to the open ended questions; 61.95% participants stated that TM was more effective due to multidisciplinary approach. Regarding the main strengths of TM, 30.83% voted for its multidisciplinary approach and 21% for its interactive nature. Considering the weaknesses of TM 40.83% pointed towards technical problems and 23.89% noted that this MIT lacked face to face exposure

Conclusion: The perceptions of overwhelming number of participants were in favor of telemedicine as an instructional tool.

Keywords: Instructional tool, Mixed method study, Perceptions, Postgraduate medical students, Telemedicine.

INTRODUCTION

Telemedicine is the use of electronic communication to exchange medical information from one site to another, to improve patient's health status and for continuing medical education of the health personnel. TM encompasses[1]:

- Continuous medical education (CME) for doctors present at distant or remote areas.
- Consumer medical and health information.
- Specialist referral services.
- Patient consultations.

Correspondence: Dr Muhammad Musharaf Baig, Head of ENT Dept, Benazir Bhutto Hospital Rwp.
Email: alibaig_2008@yahoo.com
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Video-conferencing (VC) is defined as a real-time, live and interactive program, in which one group of participants are at one location and the other group / groups of participants are at the other, one or more locations[2]. Four technical solutions, for data transmission during a VC are possible: satellite communication, internet protocol (IP)-based communication, Integrated Services Digital Network (ISDN), and third generation (3G) mobile phones[3]. IN 1962 Dr Michael Ellis De-Bakey pioneered the field of TM with the first VC for demonstration of open-heart surgery, to be transmitted overseas by satellite.

VC is widely used for educational purposes, by surgeons throughout the world[4]. In remote areas, VC has proven to be an effective educational tool. For instance, the "virtual classroom", at the university hospitals in Tromso and Oslo, 900 miles apart; included daily sessions

with VC, of seminars, courses and lectures[5]. Telementoring, defined as a real-time interactive teaching of surgical techniques by an expert surgeon to students, not at the same site, was first performed in 1962 by De-Bakey and in 1997 by Schulam et al[6,7]. Beneficial results of TM have been reported from both the developing and developed countries[8]. A successful educational VC project for the training of pediatricians has recently been reported from Africa, where the shortage of pediatric surgeons was acute[9]. A recent study identified three major barriers to adoption of TM in emergency and critical care units. They include: regulatory, financial & personal / cultural barriers[8].

This is the era of communication explosion, and TM is one of the most significant and within no time, will be the most important MIT for intra-hospital, inter-hospital and inter-institution; both at national and international levels. Therefore the perceptions and opinion of postgraduate medical students (doctors), at our institutions must be known; so that improvements can be made at both the recipient and deliverer ends. The delivery of TM technology at our institutions should also be improved to match international standards. Regarding the significance of this study:

- This aspect of TM i.e. perceptions of postgraduate medical students, regarding the effectiveness of TM as an instructional tool; has not been studied so far, and limited literature is available in journals and internet, in this context.
- As TM is recent and most promising MIT, it requires further research both nationally & internationally.
- This study may revolutionize the use of TM in our country, by knowing the importance and the weightage given by the post-graduate medical students to this recent MIT.

METHODOLOGY

This was a mixed method, pragmatic, sequential study incorporating both the quantitative and qualitative components. The method of data collection and administration tools were questions. Data was analyzed both quantitatively and qualitatively. Participants were divided into two groups:

One group was present at the state of the art TM center, surgical unit-2, Holy Family Hospital Rawalpindi.

Second group was present at the TM centre at NORI hospital Islamabad. These groups consisted of:

- Facilitator / presenter
- Post-graduate medical students

Each group consisted of about eight to ten participants per session on each side (about 15 to twenty on both sides). These SGDs (small group discussions) were planned every Friday. They were followed for six months. Twenty four such meetings were conducted over six month's period. Total sample size was 384 (PGS)Post-graduate medical students It was non-probability convenience sampling technique; depending upon the availability of the doctors and trainees at the study sites.

The facilitator was either a senior surgeon or a senior oncologist. The purpose of these meetings was to discuss the management of patients with tumor / malignancy. Data was collected by the distribution of questionnaire including both closed and open ended questions. Interviews of some facilitators / presenters were also taken, to have an insight into facilitators' perspective. As the research was restricted to PGS perceptions only; data collected by interviews from facilitators, was used to see their perspective and to compare it with PGS perceptions.

Variables of interest were PERCEPTIONS of medical students and EFFECTIVENESS of telemedicine as an instructional tool. The results were analyzed by statistical analysis using version SPSS 17, for quantitative data; and content analysis of qualitative segment. The analysis of qualitative and quantitative variables was integrated in the final interpretation phase to

draw conclusion. Ethical committee approval was taken before the study, and all other related ethical issues were also taken into account[10].

RESULTS

Out of the 384 post-graduate students (PGS), age range 25 to 34 years, who were given questionnaire Performa, 360 PGS filled and returned the questionnaire (response rate 93.75%); there were 184(51.1%) female doctors and 176(48.8%) male doctors. The responses to closed ended questions are depicted in table-1.

Content analysis of open ended questions resulted in emergence of following responses of the participants to different questions (only important responses are given):

1. Some of the common responses for comparing the effectiveness of case discussion, by TM and face to face, with participants were:
   - 61.95% (n=223) stated that multidisciplinary approach was quite easily employed in learning through TM.
   - 14.17% (n=51) opined that TM gave wider scope for discussion.
   - 11.94% (n=43) stated that face to face discussion was better.
2. Responses for comparing learning by TM and learning by lecture were:
   - 58.89% (n=212) stated that TM was a better mode of learning.
   - 14.44% (n=52) stated that both modes were effective and should go side by side.
3. Responses for the things participants liked most in telemedicine were:
   - 30.83% (n=111) opined that the main strength of the TM was multidisciplinary involvement e.g. pathology, radiology and oncology etc.
   - 20.83% (n=75) stated that in TM, interaction, communication and exchange of information at long distances, between parties were very effective.
   - 10.83% (n=39) stated that through TM we could compare the experience of different centers nationally or internationally regarding a problem or disease.
4. The things participants consider weaknesses of TM. The responses included:
   - 40.83% (n=147) stated that in TM technical problems especially electricity, picture, voice quality and availability of technical experts in remote areas were the main problems.
   - 23.89% (n=86) opined that in TM there was no person to person exposure, which was very important for the effective communication.
5. On responding to give any other comments.
   - 52.78% (n=190) stated that TM should be available throughout the country. All tertiary care hospitals should be connected to district head quarter (DHQ's)and tehsil head quarter (THQ's) through TM.
   - 18.89% (n=68) said that TM was good for medical education and benefit of the patient.
   - 15% (n=54) said that TM should be made more cost effective.

DISCUSSION

Telemedicine (TM) is a rapidly developing application of clinical medicine where medical information is transferred through Internet or other networks for the purpose of consultations, examinations and sometimes remote medical / surgical procedures.

The results of this study gave very interesting insight into the perceptions of PGS for efficacy and impact of TM for the patients' treatment and continuing medical education of doctors. In this study 95.56% participants favored TM as a good MIT. This response was in accordance to the study conducted by Ricci et al[11]. In this study, 72.22% participants agreed that instructions and guidelines given through TM are well taken by them and their colleagues.

Responding to the question regarding the quality of communication, patient versus presenter and facilitator versus participant, 62.2%agreed that it was good in TM. This is in congruence with the study conducted in

Taiwan[12], where interactive nature of this modality of communication was appreciated by 71.11% were more satisfied with TM session than with other MIT's as lecture and demonstration.

Table-: The response of post-graduate students (PGS), to the closed ended questions.

Feedback items	Strongly Agree (n %)	Agree (n %)	Undecided (n %)	Disagree (n %)	Strongly Disagree (n %)
Does this telemedicine(TM) session give you good understanding of telemedicine, and how it works?	76 (21.11)	260 (72.22)	20 (5.56)	04 (1.11)	00 (0.0)
Are you comfortable with TM equipment and procedure?	68 (18.89)	260 (72.22)	24 (6.67)	08 (2.22)	00 (0.0)
Do you think that this TM session is feasible in terms of scheduling, physical arrangements and location?	52 (14.44)	228 (63.33)	60 (16.68)	20 (5.56)	00 (0.0)
Do you think that instruction or guidelines given through TM is well taken by you and your colleagues?	36 (10)	260 (72.22)	44 (12.22)	16 (4.44)	04 (1.11)
Was the education environment during the session, conducive to learning?	80 (22.22)	224 (62.22)	32 (8.89)	24 (6.67)	00 (0.0)
Was the technical quality of service i.e. voice and picture quality, good during the TM session.	64 (17.78)	232 (64.44)	32 (8.89)	28 (7.78)	04 (1.11)
Was the quality of communication with patients / presenter,facilitator / participants during the session was good (if applicable).	60 (16.67)	224 (62.22)	52 (14.44)	20 (5.56)	04 (1.11)
Did the presenter protected the patient's privacy & maintained the confidentiality of patient's medical information (if applicable).	56 (15.56)	224 (62.22)	52 (14.44)	24 (6.67)	04 (1.11)
Do you think that TM augments the learning, if used with other modes of information transfer?	112 (31.11)	216 (60)	28 (7.78)	04 (1.11)	00 (0.0)
Do you think that TM learning is cost effective for our country?	112 (31.11)	156 (43.33)	64 (17.78)	20 (5.56)	08 (2.22)
Do you think TM learning gives opportunity for administration of uniform quality learning throughout the country?	80 (22.22)	216 (60)	40 (11.11)	24 (6.67)	00 (0.0)
Should this MIT be accessible to all the doctors working in primary, secondary and tertiary care services?	144 (40)	164 (45.56)	28 (7.78)	24 (6.67)	00 (0.0)
Are you satisfied with the Telemedicine session?	64 (17.78)	260 (72.22)	20 (5.56)	16 (4.44)	00 (0.0)
Would you recommend telemedicine learning to your colleagues / peers?	140 (38.89)	212 (58.89)	08 (2.22)	00 (0.0)	00 (0.0)

majority of the participants (65%). To the query about the ethical concerns, especially confidentiality of patients' medical information; 62.22% agreed, that this was maintained, during TM sessions, by taking informed consent. Some Another 74.44% thought this MIT cost effective for our country; this response corresponded to a study conducted in rural communities of USA[13]. In response to the question that whether this MIT should be accessible to all doctors working in

primary, secondary and tertiary care services; 85.56% participants gave the positive response. This view was also strengthened by another study[14], where it was concluded that this MIT was also useful in distant and underserved areas.

In response to the open ended questions, when PGS were asked to compare the discussion through TM with face to face discussion amongst participants; 61.95% stated that multidisciplinary approach was more easily employed in TM and 14.7% opined that TM gave wider scope for discussion. This perception is in contrast to the view found in another study where no difference was found in these two modes of MIT's[15]. Comparing learning by TM with learning by lectures; 58.89% PGS stated that TM was a better mode of learning, while 14.44% stated that both MITs should go side by side. This was in contrast to the study conducted by Markova, where he found no difference in knowledge gained by the two strategies[16]. For 18.89% participants the diagnosis and management of the patient were facilitated by this MIT; this perception is also supported by another study on multidisciplinary approach in oncological discussions[14].

Considering different weaknesses of TM; 40.83% participants stated that in TM technical problems especially electricity, picture, voice quality and availability of technical experts in remote areas were the main hindrances. For 23.89% face to face exposure, very important for effective communication, was lacking in TM. Interviews were taken from some facilitators/presenters, who conducted TM sessions. They were highly in favor of TM as an instructional tool and they acknowledged that this MIT had also enhanced their knowledge and vision of the subject.

The overall perceptions of the participants of the study were overwhelmingly in favor of TM as an effective instructional tool. However cost and technical support limitations are hindrances towards this MIT. In the light of observations accrued from this study, it is recommended that Universities and Higher education commission should ensure curricular reforms in collaboration with PM&DC, for the inclusion of telemedicine as integral instructional tool. Thus centers of excellence of telemedicine should be established, in medical colleges and in other teaching institutions throughout the country, for post-graduate students and for the benefit of patients in far-flung areas where expert consultations are required especially at the BHU, THQ and DHQ level hospitals.

The study helped in identifying the perceptions of post-graduate medical students regarding effectiveness of telemedicine as an instructional tool. The limitations of this study included a small sample size, short duration of study and moreover this study was limited to two institutions only, thus the results cannot be generalized. However, the authors believe that the impact of the study is huge and will help in identifying the basis of establishment of telemedicine as an instructional tool, and as a mode of remote consultation in our country; for the benefit of post-graduate medical students and for the benefit of patients respectively.

CONCLUSION

In this study, the perceptions of the overwhelming number of participants were in favor of telemedicine as an effective instructional tool; these perceptions were almost in accordance to the international studies, where majority of participants acknowledged the importance and effectiveness of this instructional tool; accepting at the same time cost restrictions and technical limitations of this mode of information transfer.

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