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Perceptions of telemedicine among healthcare professionals in rural tertiary care hospitals of rural Sindh, Pakistan: a qualitative study

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Background: Telemedicine has proven to be a boon in the field of medical sciences, as it provides a platform for all health-care personnel to assist patients remotely through digital technology advancements. It brings hope to the lower middle-income regions of the world. Thus, the study was conducted to explore the perceptions regarding telemedicine among healthcare professionals (HCP) in rural Sindh, Pakistan.

Methodology: Overall, 19 in-depth interviews were conducted and this comprised of HCP working in the Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences (PAQSJIMS) and Peoples University of Medical and Health Sciences for Women (PUMHSW) being involved in providing online consultations and practicing telemedicine. The interviews were conducted and audio recorded in Sindhi and Urdu and were later transcribed in to English, coded for themes and sub-themes, and were analyzed using content analysis.

Results: The opportunities perceived with the use of telemedicine services were reducing nosocomial infections, facilitating the healthcare in remote areas, handling telemedicine tools, application of telemedicine services on the ground and reducing stress. However, inadequate awareness regarding telemedicine, difficulty in physical examination, the need for training, lack of compliance, and concerns regarding accuracy in diagnosis and treatment were identified as the perceived barriers to the use of telemedicine services.

Conclusion: HCP had perception toward telemedicine as have numerous opportunities favoring implementation as well as various barriers are needed to overcome to promote the usage of telemedicine. Increased awareness, training programs, and technological advancements are key to overcome these challenges.

Keywords: digital health, digitalization, healthcare, lower middle-income countries, rural healthcare

Introduction

The branch of medicine in which delivery of health care services is assisted by using Information and Communication Technologies (ICT) and other electronic media is referred to as 'Telemedicine'. WHO defines telemedicine wider in scope as the use of means of communication for the delivery of services, like diagnosis, assessment, therapy, and medical research, all to ease the community who is at remote location and to improve the health care system[1]. Telemedicine has offered a beam of comfort in the area of medical sciences, as it provides a platform where all health-related personnel can assist patients at distance, by making use of the advancements in digital technologies[2,3]. Telemedicine brings hope to the wealth-deprived areas of the world, especially the rural areas[4,5]. Data studies reports of exceptional benefits of telemedicine services and platforms as thousands of doctors are registered with them, providing consultations to a great number

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of populations. One such study reports, 'every minute, five patients search for expert medical consultation on Marham'[6,7].

During the COVID-19 pandemic, a new ray of boosted usage of telemedicine had become evident in Pakistan[8]. Already working virtual healthcare programs got robust with the emergence of new electronic platforms as, 'Aman Foundation', 'Ring', and a 'Doctor', being aimed to prosper the health of the maximum number of citizens without depleting healthcare resources[9,10]. Recent studies infer the optimistic impact of telemedicine in Sindh, Pakistan with the encouraging hope of broadening this system. Far-off areas of Sindh and Baluchistan were communicated with the best available human resources and were provided treatment through telecommunication services. To provide child emergency health care services across the Sindh, system had been initiated to facilitate the communication of rural areas of Sindh with the major healthcare centers of Karachi, Hyderabad, Nawabshah, Larkana, and Sukkur[11].

Taking into account the above findings and analyzing other surveys, Pakistan, especially the rural areas of Sindh, still lagging to use the telemedicine to the full potential[12]. Certain factors are there, that need to be properly addressed and be worked upon to resolve the issues that prevent the effective use of telemedicine facilities in underserved areas of Sindh[10,11]. Therefore this study aims to explore the view of healthcare professionals (HCP) regarding the benefits, challenges, and prospects of telemedicine to address the gap that hinders its effective use in the rural areas of Pakistan.

HIGHLIGHTS

- While telemedicine is not a novel concept, its advancement within the interior of Sindh is lacking in commendable progress.
- It instills hope in economically challenged regions around the world, particularly in lower middle-income areas. Therefore, the study aimed to investigate the viewpoints of healthcare professionals in rural Sindh, Pakistan, regarding telemedicine.
- This has the potential to unlock new opportunities for exploring the untapped possibilities of e-Health services, ultimately benefiting millions of lives.

Methodology

Study design

Qualitative study design and narrative research approach was used to interview the participants. This work has been reported in line with the COREQ guidelines[13].

Study setting

The study was conducted at Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat (PAQSJIIMS) and People's University of Medical and Health Sciences for Women, Nawabshah (PUMHSW). PAQSJIIMS and PUMHSW are tertiary care hospitals located in the sub-urban areas of Sindh, Pakistan and are major centers providing specialized healthcare to rural population of Sindh.

Ethical considerations

Ethical review committee at PAQSJIMS, Gambat approved the research study with reference no: PAQSJIIMS/GMC/1382. Informed consent was obtained from the individual participants by reassurance of usage of data for research purposes only, participants were informed about the purpose of the study, and confidentiality and anonymity of personal information was assured. The anonymity of participants in the manuscript is assured with sequential presentation from P1 to P12.

Interview guide development and validation

An interview guide comprising of questions regarding the usage, benefits, challenges, and prospects of telemedicine was developed to conduct the interviews by following the qualitative interview guidelines by Turner and Daniel[14] (Supplementary File, Supplemental Digital Content 1, http://links.lww.com/MS9/A349). The experienced clinical researchers and HCPs validated the relevancy of the interview guide. Furthermore, a local interview guide was developed in local languages, Urdu and Sindhi and was validated by argumentative and cumulative methods[15]. A pilot study was conducted on the two participants of the population under study to assess as the interview guide covers all the aspects of research. The results from pilot study were not included in final analysis. In the analysis phase, two researchers performed the open coding individually and then compared their findings. After iterative discussions, thematic sets were reconciled consensually. However, the level of agreement was not calculated statistically.

Sample size and data collection

The nonprobability, purposive sampling technique was utilized for data collection to include participants from different medical specialties and varied healthcare experience for a period of 6 months from 1 January 2021 to 30 June 2021. The principle of saturation was utilized to determine the sample size. In-depth interviews were conducted by two interviewers, a male and a female, expert in both languages Urdu and Sindhi, according to interview guide to collect qualitative data from the HCPs as physicians, specialists, surgeons, residents, dentists, and house officers working at PAQSJIMS and PUMHSW being engaged in providing nonsurgical services/online consultations and practicing telemedicine. The permission was acquired from hospital administration and the meetings were fixed with participants beforehand. All the interviews were conducted in Sindhi and Urdu language for comfort and better understanding of the interviewees. Each interview ranged for a duration of 20–25 min. All the interviews were audio recorded and were saved in a computer to avoid mixing and loss of data. The transcripts of each interview were shared with the interviewees for review and a few changes were made as per their suggestions. The field notes were formed during interviews to discuss with the authors for alterations in interview guide. Later on, all interviews were translated into English by a linguist before data analysis. No repeat interviews were conducted as all required data was recorded in first attempt. The interviews were conducted until thematic saturation was achieved and additional interviews were unlikely to yield new insights relevant to research question. To verify the saturation two additional interviews were conducted.

Data analysis

All the acquired data was compiled and the COREQ checklist was used to report the findings. The content analysis was done by reading and re-reading it and noting the initial ideas. Initial codes for data were generated by three authors in which the features were systematically coded followed by searching for themes by collating codes into potential themes, gathering all data relevant to each potential theme. At this stage, a long list of codes was generated. Then all the themes were reviewed and refined. A thematic flow chart was formed. Subsequently, all the themes were defined and named and after continuous revision of data the final thematic map was created and a final report production of the analysis was produced. Relevant quotations conforming to themes were identified and included.

Results

A total of 12 in-depth interviews were conducted, with response rate of 100%. Of the 12 participants, 8(66%) were males and 4 (34%) were females. For age, 3 (25%) were less than 35 years of age, 7 (58.3%) aged between 35 and 50 years and 2 (16.7%) were more than 50 years of age. Regarding medical specialty, participants belonged to medicine and allied 3 (25%), surgical and allied 3 (25%), gynecology and obstetrics 2 (16.7%), pediatrics 2 (16.7%), dermatology 1 (8.3%), and psychiatry 1(8.3%) (Table 1).

Two major themes were highlighted after transcribing and coding the interviews. First, is perceived opportunities and second, is perceived barriers regarding telemedicine.

Perceived opportunities

The participants identified various ways in which telemedicine can bring opportunities in healthcare. Their perceived opportunities are explained below with the help of sub-themes (Table 2).

1. Role of Telemedicine in Reducing Nosocomial Infection: Majority of the HCPs were of the opinion that the introduction of telemedicine can decreases the chances of nosocomial infection, as reduces the duration of stay of patient in hospital.

> *'After taking expert opinion through telemedicine, we start treatment immediately. As he recovers, we permit him to go home'. P10*

> *'Yes, telemedicine reduced the chances of nosocomial infection. For example, if a patient visits a hospital just for basic medical advice, there may be chances of getting infected himself and his family from T. B, pneumonia, and COVID, etc.' P1*

2. Facilitating the Healthcare in Remote areas: Participants discussed role of telemedicine in healthcare in various capacities.

> *'Telemedicine is very relaxing as compared to the physical system' P1*

Furthermore, the participants discussed how this type of facility can help patients living in remote areas.

> *'Telemedicine can be the best possible way for remote patients, and also patients from families who have got strong cultural norms and avoid getting their females consulted by a male doctor. So, telemedicine can help to treat that population as well. Multiple areas of the health can be explored. Patients can be diagnosed and managed. Also, if he has to be admitted for the surgery or any other procedure, he can be assessed before getting admitted' P5.*

3. Handling Telemedicine Tools: The participants were asked about tools required to operate telemedicine. Most respondents were familiar of these tools.

> *'I have used video and audio teleconferencing through skype or specific software available in hospital. My duty was to deal with health issues of local people living in far-flung areas and I have given advices according to my knowledge'. P6*

The participants discussed advanced technologies to facilitate patients for different cases.

> *'We have a Facebook group of telemedicine named 'TELE-POLYCLINIC', in which more than five thousand doctors are involved from all over Pakistan, in which we guide people regarding medical problems. In developed countries, robotic surgeries, online consultation, online workshops, online minimal procedures are very common as compare to Pakistan. Telemedicine tools have a very essential role to guide the student, people who are the asset of the future'. P2*

4. Application of telemedicine services on ground: HCPs were asked about the usage of telemedicine in their regular practice. Majority, shared their experience of the telemedicine in their practice.

> *'Almost all the doctors have been using Telemedicine somehow. These services have effectively and dramatically become a part of our lives, as they're in easy access to the patients. I have been registered and giving consultation to patients on Sehat-e-Kahani and Marham for a year. They're quite easy to be used, there's a need of just filling of a performa, and the doctor gets connected with the patients. All doctors have been using digital gadgets*

Table 1

Sociodemographic characteristics of participants

Characteristics	N (%)
Sex	
Male	08 (66)
Female	04 (34)
Age	
Less than 35 years	03 (25)
35–49 years	07 (58.3)
More than 50 years	02 (16.7)
Specialties	
Medicine and allied	03 (25)
Surgical and allied	03 (25)
Gynecology and obstetrics	02 (16.7)
Pediatrics	02 (16.7)
Psychiatry	01 (8.3)
Dermatology	01 (8.3)

Table 2

Perceived opportunities of telemedicine by participants

Sub-themes for perceived opportunities	Participant's comments
Role of telemedicine in reducing nosocomial infection	*'After taking expert opinion through telemedicine, we start treatment immediately. As he recovers, we permit him to go home'. P10*
	'Yes, telemedicine reduced the chances of nosocomial infection. For example, if a patient visits a hospital just for basic medical advice, there may be chances of getting infected himself and his family from T. B, pneumonia, and COVID, etc.' P1
	'If telemedicine is used extensively, then we can achieve success in; regular follow-ups of patients. Compliance of the patients can be improved. Also, we have got a major population of Pakistan dependent on others. So, telemedicine can improve the health condition of that dependent population as well. Unnecessary transportation can be declined'. P8
Facilitating the healthcare in remote areas	*'Telemedicine is very relaxing as compared to the physical system'P1*
	'Telemedicine can be the best possible way for remote patients, and also patients from families who have got strong cultural norms and avoid getting their females consulted by a male doctor. So, telemedicine can help to treat that population as well. Multiple areas of the health can be explored. Patients can be diagnosed and managed. Also, if he has to be admitted for the surgery or any other procedure, he can be assessed before getting admitted' P5.
	'Telemedicine is very useful for chronic and elderly patients. Telemedicine is good for those services in which examination is not necessary. It is a good platform to discuss easily with colleagues'. P3
	'It's very effective in the rural area to avail. For example, If I suggest a patient who is from Larkana for Cardiac Surgery, I know there is NICVD in Larkana, but I suggest the same patient visit Gambat Heart Center than there is a wastage of patient's time, there may be an effect on patient's health and his expenses also increases. Telemedicine helps in availing local facilities which are in range. It becomes very easy to discuss cases with other colleagues' P6
Handling telemedicine tools	*'I have used video and audio teleconferencing through skype or specific software available in hospital. My duty was to deal with health issues of local people living in far-flung areas and I have given advices according to my knowledge'. P6*
	'We have been giving consultation to our family and friends through phone calls and now providing the same services to patients by making use of special platforms'. P8
	'They have got high-resolution camera systems and a properly managed data entry system. We just need to let experts know the MR number of the patient and expert would get the complete data of the patients, the condition of the patient used to be assessed with the help of these high-resolution cameras and video systems'. P12
	'We have a Facebook group of telemedicine named 'TELE-POLYCLINIC', in which more than five thousand doctors are involved from all over Pakistan, in which we guide people regarding medical problems. In developed countries, robotic surgeries, online consultation, online workshops, online minimal procedures are very common as compare to Pakistan. Telemedicine tools have a very essential role to guide the student, people who are the asset of the future'. P2
Application of telemedicine services on ground	*'Almost all the doctors have been using Telemedicine somehow. These services have effectively and dramatically become a part of our lives, as they're in easy access to the patients. I have been registered and giving consultation to patients on Sehat-e-Kahani and Marham for a year. They're quite easy to be used, there's a need of just filling of a performa, and the doctor gets connected with the patients. All doctors have been using digital gadgets somehow to guide the patients, so in this way, a huge percentage of the doctors have got an awareness of e-Health'. P5*
	'If patients have a good internet connection, then it is not so difficult to communicate through telemedicine service. I am frequently using telemedicine for the last 2 y of the COVID-19 pandemic. But I am using telemedicine from last 5-6 y occasionally'. P1
Lessening stress with the use of telemedicine services	*'The family gets mentally panic that our patient is in hospital, so telemedicine has reduced that panic and haphazard situation as well'. P9*
	'It relieves the anxiety and stress, as chances of reassurance of the treatment get higher with the use of telemedicine, so it declines the stress'. P8

somehow to guide the patients, so in this way, a huge percentage of the doctors have got an awareness of e-Health'. P5

'If patients have a good internet connection, then it is not so difficult to communicate through telemedicine service. I am frequently using telemedicine for the last 2 years of the COVID-19 pandemic. But I am using telemedicine from last 5-6 years occasionally'. P1

5. Lessening stress with the use of telemedicine services: A few participants shared their thoughts on stress management through telemedicine.

'The family gets mentally panic that our patient is in hospital, so telemedicine has reduced that panic and haphazard situation as well'. P9

'It relieves the anxiety and stress, as chances of reassurance of the treatment get higher with the use of telemedicine, so it declines the stress'. P8

Perceived barriers

The second theme emerged from the study analysis was the perceived barriers in usage of telemedicine by HCPs (Table 3).

1. Inadequate Awareness Regarding Telemedicine: The participants agreed that there should be more awareness about telemedicine especially for resource poor areas. As this study is based on rural areas, the respondents answered questions in that context.

'We haven't received such training programs working effectively over here. There must be an arrangement of proper training programs so that the population of rural areas gets the awareness of telemedicine. Providing awareness to doctors of the interior Sindh isn't that difficult, as they all

Table 3

Perceived barriers of telemedicine by participants

Sub-themes for perceived barriers	Participant's comments
Inadequate awareness regarding telemedicine	*'We haven't received such training programs working effectively over here. There must be an arrangement of proper training programs so that the population of rural areas gets the awareness of telemedicine. Providing awareness to doctors of the interior Sindh isn't that difficult, as they all have got the basic knowledge and just need some additional knowledge to polish their existing skills. Proper counseling should be done and the awareness should be provided to rural population that telemedicine is a bounty for them'. P3*
	'Lack of awareness and lack of easy availability of internet connection and electronic gadgets are among the most important factors that hinder the common application of telemedicine in rural areas'. P9
Difficulty in physical examination	*'One negative impact of telemedicine is that we can't examine the patients. Usually, in healthcare system we have a proper protocol for assessing the patients by taking history and examination. So, one major drawback of telemedicine is that patients can't be examined. Apart from that, there aren't any remarkable negative impacts of telemedicine'. P7*
	'One major drawback of telemedicine is that, without proper examination, the chances of misdiagnosis get higher'. P12
	'In telemedicine, we can give an opinion regarding a patient's condition, but physically we can properly check and examine them, there is a quality difference in both. 100 percent accuracy will be given when you can fully examine and then we can give treatment, through telemedicine patients cannot be treated properly. Physical presence of patients are better as we can examine them, and after that, if we want to discuss with other colleagues then we can easily discuss as a differential diagnosis is already made by examining physically and by sign and symptoms. On the other hand, through telemedicine it is very difficult to discuss as we have not performed examination of patient'. P10
Need of trainings	*'For effective telemedicine services, there is a need for trained people. If you have untrained people in a big setup, then this can become a disaster'. P10*
	'There is a need of training sessions regarding the latest technologies and research for the healthcare professional at the level of BHU, RHC, and taluka hospitals'. P2
	'Till now, I've been using it on a trial basis. But, yes, I'm willing to attend proper training programs in the future'. P6
Lack of compliance	*'We can't replace Telemedicine through the conventional or physical method'. P7*
	'Also, during online consultation, a doctor should wear an apron and have got the proper professional background. This all helps to get patients' confidence and trust and enables them to tell their data properly'. P5
	'One more barrier over here is that of the communication, as not every patient is educated enough to tell properly their symptoms or lab findings'. P3
Concerns regarding accuracy in diagnosis and treatment:	*'Clinics are never run online. To have proper assessment in-person visits are better than telemedicine because through these digital platforms you can't examine the patients. If you ask me to compare the efficacy of telemedicine and in-person treatment, then I would say that traditional consultations are more effective'. P4*
	'Accuracy depends on the way how your system works, when we have done it that was through a proper channel. i.e., prescription of medicine is given through message that was typed by a doctor. If that was done verbally then chances of error may increase'. P8
	'There is no difference in physical or video-based diagnosis of dermatological diseases. In other medical specialties, there is a need for examination, lab reports for diagnosis but in dermatology, 100% diagnosis is made by just looking at the lesion'. P12

have got the basic knowledge and just need some additional knowledge to polish their existing skills. Proper counseling should be done and the awareness should be provided to rural population that telemedicine is a bounty for them'. P3

'Lack of awareness and lack of easy availability of internet connection and electronic gadgets are among the most important factors that hinder the common application of telemedicine in rural areas'. P9

2. Difficulty in Physical Examination: A barrier discussed mostly by surgeons was inability to physically examine the patient.

'One negative impact of telemedicine is that we can't examine the patients. Usually, in healthcare system we have a proper protocol for assessing the patients by taking history and examination. So, one major drawback of telemedicine is that patients can't be examined. Apart from that, there aren't any remarkable negative impacts of telemedicine'. P7

'One major drawback of telemedicine is that, without proper examination, the chances of misdiagnosis get higher'. P12

3. Need of Trainings: The human resource would play an important role for utilization of telemedicine to its full potential. The training of HCPs in advanced technologies is required for smooth operation of the services.

'For effective telemedicine services, there is a need for trained people. If you have untrained people in a big setup, then this can become a disaster'. P10

Some participants showed interest to get trained in telemedicine, to learn more about it and manage accordingly.

'Till now, I've been using it on a trial basis. But, yes, I'm willing to attend proper training programs in the future'. P6

4. Lack of Compliance: It was brought to attention through interviews that one of the challenges is even if the telemedicine is of much importance, there is no guarantee that the professionals and patients will use it effectively and replace the traditional methods.

'We can't replace Telemedicine through the conventional or physical method'. P7

'Also, during online consultation, a doctor should wear an apron and have got the proper professional background. This all helps to get patients' confidence and trust and enables them to tell their data properly'. P5

5. Concerns regarding accuracy in diagnosis and treatment: HCPs had concerned that telemedicine can have an effect on efficacy and accuracy of diagnosis and treatment, that can prove a challenge in healthcare.

'Clinics are never run online. To have proper assessment in-person visits are better than telemedicine because through these digital platforms you can't examine the patients. If you ask me to compare the efficacy of telemedicine and in-person treatment, then I would say that traditional consultations are more effective'. P4

'Accuracy depends on the way how your system works, when we have done it that was through a proper channel. i.e., prescription of medicine is given through message that was typed by a doctor. If that was done verbally then chances of error may increase'. P8

Discussion

This study was conducted to explore the opinions of HCPs toward the use of telemedicine and the services provided by the digital health care system in the rural areas of Sindh. The interviews conducted with different HCPs from various field gave qualitative insights into the matter and generated rich results. Developed countries are using telemedicine services to maximum potential and are already thriving. However, Pakistan, is still lacking to fully explore telemedicine as HCPs and general population do not have access to advanced services provided through the e-health system[16,17].

The study found multiple opportunities in which telemedicine could assist HCPs. Studies suggested that telemedicine is an innovation of modern era that had got potential of providing healthcare to a greater geographical area more cost-effectively[18,19]. It is justifiable to consider it an innovative way that can bridge the gap between scarce medical resources and the growing burden on healthcare. Telemedicine is a flourishing area, that has got the capability of serving the population of distant arears and enabling them to get expert medical advice without overcrowding burdening the healthcare centers[20,21].

HCPs discussed about the technologies being adopted for medical services in COVID-19 pandemic. Similarly, the swiftest and safest services were provided by telemedicine services during mass or contagious outbreaks[18]. During the COVID-19 pandemic, telemedicine enabled millions of patients to monitor diseases as chronic kidney disease, diabetes mellitus, rheumatoid arthritis, malignancies, and other multiple chronic health disorders. The use of telemedicine for the management of patients during mass gatherings had been supported by majority of HCPs, globally as well as in this study[22,23].

The participants highlighted barriers as low level of awareness, difficulty in physical examination, inadequate training and lack of compliance were hindering the performance of telemedicine in rural Sindh. In Pakistan, basic medical advice, mental health consultation, family planning counseling over the phone had become available 24/7 by introduction of telemedicine services as Aman Foundation. Applications of e-health platforms are encouraged to flourish by wide usage of telehealth services in the fields of general medicine, general surgery, dermatology, orthopedic, cardiology, pulmonology, gynecology, and ENT[22,24].

Telemedicine consultation platforms extended beyond diagnosing and assessing patients with ailments. They also empowered numerous female doctors to sustain their clinical engagements remotely through online patient consultations. This opportunity proved quite helpful for those who had to pause their clinical practices due to domestic tasks and infant care commitments[25].

HCPs shared experiences of working in COVID-19 with the aspect of telemedicine. The COVID-19 pandemic and lockdown situation also enabled Pakistan to adopt digital health services as other countries. Pakistan was the first country to launch free telehealth services through WhatsApp. Through the efforts of Digital Pakistan and the Ministry of National Health Services, these initiatives allowed people to get consultations from domestic and overseas doctors regarding their COVID-19 related health concerns. Many other COVID-19 emergency response telemedicine services were initiated as 'Yaran-e-Watan', to connect overseas Pakistani HCPs to consult patients in Pakistan. Other virtual consulting platforms currently working in the country are: 'Sehat-Kahani', 'Oladoc', 'Marham', 'ring a doctor', and 'eDoctor', enabling patients to reach expert medical advice through telephone calls, SMS, e-mail, mobile apps, and official websites[26,27]. Overall, various opportunities as well as barriers had been discussed by participants, that can be addressed by making more use of the available resources. Furthermore, there is a need to raise awareness regarding telemedicine, as well as trainings should be provided to promote the telemedicine usage[28].

Although interventions telemedicine services during the COVID-19 pandemic, in urban areas of Pakistan had been quite promising. However, the use of telemedicine in rural areas is facing many hurdles, where telemedicine is still underdeveloped. Even though, telemedicine had been introduced decades ago in Pakistan, its growth is still slow. The reason of sluggish progress of telemedicine in rural areas of Sindh can be attributed to lack of advanced telecommunication services, unavailability of advanced communication devices, software and servers, low levels of education, and awareness of modern telemedicine tools.

Limitations

Limitations includes the chances of selection bias of participants attributing to availability and willingness of participants and qualitative nature of study. The biased response to the questions for social acceptability could be another limitation.

Conclusion

Telemedicine though is not a new entity, but its progress in the interior of the Sindh is not worth appreciating. Certain factors as low level of awareness, difficulty in physical examination, inadequate training, and lack of compliance hinders the growth of telemedicine in rural Sindh as well as in other rural areas of Pakistan. Training the HCP in various aspects as awareness of advancements in telecommunication and appropriate application

of latest technology in healthcare, acquiring communication skills for better understanding and provision of education and treatment to the patients, privacy and security related aspects of electronic health records, and legal and ethical aspects of telemedicine. HCPs providing the telemedicine services should follow the established healthcare guidelines and be aware of the limitations of remote consultation and should assure patient safety as requiring in-patient visits for physical examination and delivery treatment. This would help in opening of new doors for the exploration of untapped potential of e-Health services through which millions of lives can be benefited. The data collected through this study can be used in future, to identify the gaps in and the current state of e-Health services in rural Sindh, Pakistan and raises the demand of further studies at a vast level. Thus, the comparison among the variance in perception of telemedicine in different financial and social settings be conducted for equitable distribution of healthcare services.

Ethical approval

Ethical approval for this study was provided by the Ethical Committee of Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences (PAQSJIMS), Gambat, Pakistan on 06/09/2021.

Consent

Written informed consent was obtained from the participants for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

M.A.Q., H.K.S., and G.K.: conceived the idea and designed the study; H.K.S., G.K., and P.M.: collected the data; N.A.S., R.K., P.M., G.K., H.K.S., and W.T.: analyzed and interpreted the data; H.K.S., B.K., W.T., S.M., M.J.T., and A.A.: did write up of the manuscript; and finally, A.A., W.T., M.J.T., B.K., O.N.S., and M.A.Q.: reviewed the manuscript for intellectual content critically. All authors approved the final version of the manuscript.

Conflicts of interest disclosure

All the authors had no disclosure of conflict.

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Data availability statement

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