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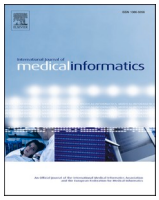

Beyond COVID-19: Prospect of telemedicine for obstetrics patients in Pakistan

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ABSTRACT

Objective: To explore obstetrics patients' experiences with telemedicine during COVID-19 and assess their intent for its future use.
Design: An exploratory design was applied considering that telemedicine was a new phenomenon in Pakistan particularly for antenatal care services during COVID-19.
Method: Primary data was collected through a telephonic survey of 132 respondents randomly selected from the pool of obstetrics patients who used telemedicine services of Shifa International Hospital (SIH) in Islamabad, Pakistan during the pandemic. We changed the survey tool of Medical Group Management Association to the study purpose. Required information included the respondents' socioeconomic and antenatal characteristics and their telemedicine use experience on four parameters, namely, Appointment, Staff Attitude, Communication, and Telemedicine Services. Patients were inquired about their intent to use telemedicine beyond COVID-19 and the reasons supporting their answer. The data was analyzed descriptively and through *t*-test mean comparisons and binary logistic regression.
Results: Majority (54%) intend to use telemedicine in future. Average age of respondents was 30 years with gravidity 2.36, parity 1.40 and gestational amenorrhea 27.3 weeks. The respondents average schooling was 9.5 years, marriage duration was 4.5 years and monthly household income was PKR ~83,000. However, the overall experience of those who were confident in future use of telemedicine was 0.677 points higher and significantly different than those who were not inclined to use it in future. Of those lacking interest in future use of telemedicine, nearly two-third felt in-person visit was more satisfying, 11% needed physical examination, ~6% experienced long waiting time, 5% each had inadequate access to ICT and online payment facilities, and 6% faced other issues such as excess payments. The binary logistic regression analysis (R2 37.3%) held Medical Consultations and Communications as the most important determinants and could predict nearly two-fifth of variation in respondents' intent for future use of telemedicine.
Conclusion: Uptake of telemedicine for obstetrics patients is one of the positive externalities of COVID-19 and may appear as a cost-effective and culturally acceptable way to ensure universal coverage of antenatal care in Pakistan. However, telemedicine's future beyond COVID-19 for obstetrics hinges upon improving users' experience primarily through consultant and staff trainings and provision of effective communication e.g., in regional languages. Besides, offering physical examination facility and ability to use mobile wallet payment solutions may motivate future use of telemedicine in obstetrics.

1. Introduction

The COVID-19 has triggered major transformations in our social, economic, and institutional functioning, offering both benefits and burdens. While lockdowns have isolated us at homes, many feel more connected to remote people and services such as easy access to health [1] and education. Surge in the use of information and communication technologies' (ICT) for the provision of remote medical care (often called telemedicine or e-health) had been so powerful and profound during COVID-19 that it is rightly termed as the "new virtual medical

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world order" [2].

Telemedicine (TM) can potentially improve patient outcomes such as improved and affordable access to medical care and information [3,4]. It had been at the disposal of health care providers and patients much before the onset of COVID-19, albeit at varying degrees of concentrations in different fields of medical care [5–8] and different regions of the world [9–11]. Even for less favorable fields such as obstetrics, researchers argued that both low-[12] and high-risk pregnancies [4,13] can benefit from tele-consultations and monitoring no less than the in-person visits and could get advice of individual as well as team of consultants.

The pandemic has pushed the TM use even in societies that were to experience these developments in future decades if these were on their normal course of technological adaptation. While there is some optimism with future ICT use in health care provision [14] in such societies, the abnormal course of technology adaptation triggered by COVID-19 raises concerns over its continuity once the pandemic is over [12,15–17]. These concerns grow manifold considering the developing countries' socioeconomic conditions, state of digital literacy, ICT awareness and infrastructure and general medical and antenatal care behaviors.

This study addresses some of these concerns by assessing the TM use experience of antenatal care seekers who used Shifa International Hospital's (SIH) TM facility during COVID-19 situation and inquired their intent to use it in future. These findings will offer much needed insights on TM's post-COVID-19 use in the developing world where its uptake has been phenomenal. These will be particularly useful for health services planners and policymakers in Pakistan where millions still lack their access to quality antenatal health care [18] and TM has emerged as a new hope for them.

2. Methodology

The exploratory research design was chosen for this study considering that TM was a new phenomenon in Pakistan and more so for antenatal care services during COVID-19. Before the pandemic, only two hospitals namely Aga Khan University Hospital (in Karachi) and SIH in Islamabad offered telemedicine consultation – that too to their patients from Afghanistan and Tajikistan [19].

The required primary data was collected from 132 antenatal care seekers who were randomly selected from a total population of 678 antenatal care seekers. They were the one who used Shifa International Hospital (SIH) TM facility since its start in March 2019 till July 2020 (when we drew sample). We figured out the sample size through WHO's Finite Population Correction (FPC) Sampling Calculator set at: 95% confidence interval, ±5% margin of error, 50% baseline levels of the indicators, 1.5 design effect, and 40% expected response rate. The actual response rate was 99% due the first and fifth authors' rapport with participants as they personally administered the survey.

The Data was obtained through a telephonic survey based on a structured survey questionnaire adopted from MGMA [20] and amended to the study needs. Of a total 22 questions, most were close-ended and gathered information at nominal, ordinal and ratio levels. A couple of questions, especially those inquiring reasons for specific response, were also open-ended.

The questionnaire content included: information on the intent of the survey, a verbal consent clause; section on Demographics (i.e., age, parity, socioeconomic status, and education); in-depth questioning on four dimensions of telemedicine services, namely, Appointment (8 question), Staff Attitude (4 questions), Medical Consultation i.e., antenatal consultation with doctors through online video calls (11 questions), Communication (8 questions); and a question inquiring future use of telemedicine (see Table 2 for questions).

The respondents' characteristics and satisfaction with TM were analyzed through the measures of central tendency and dispersion. Statistical means of those intending to use TM in future or not are compared through *t*-test. Determinant of future use of TM are assessed through binary logistic regression.

3. Results

3.1. Profile of the respondent

Since we administered this survey among the obstetrics patients, all our respondents were female in their reproductive age. Table 1 cross-tabulates the demographic details of the respondents with reference to their intent for future telemedicine use. An average respondent was 30 years old, having gravida of 2.36, parity of 1.40 and gestational amenorrhea of 27.3 weeks. The socioeconomic characteristics include average schooling of 9.5 years, average marriage duration of ~4.5 years and average monthly household income of Pakistani Rupees (PKR) ~83,000. The minimum number of TM sessions per patient were 2, maximum 3 and average 2.1.

None of the profile variables show statistically significant difference between those intending to use TM in future and those who do not. This suggest that given the profile homogeneity of the groups, the non-profile variables, i.e., different dimensions of their earlier TM use experience may explain the observed differences in their intent to use it in future.

3.2. Reasons for TM use

Fig. 1A presents bi-variate analysis of the reasons to use TM at the first place and the intent to use TM in future. Routine antenatal care has been the majority's reason (~80%) for using TM and does not vary much among those intending to use it in future and those who do not. Similarly, ~15% of both who intend to use TM in future and those who lack such intent sought medical care through TM to discuss their laboratory reports. Of the remaining who intend to use TM in future, all were seeking advice on pregnancy management while 'other reasons' also represented small percentage of the study participants.

Fig. 1B is a detailed inquiry into the 'Reasons for No Intent' to use TM in Future. Majority of them (57%) did not feel satisfied with TM compared to in-person visit, some 8% lacked stable internet facility, more than 4% had privacy concerns. Some 30% reported a mix of other reasons which include those dissatisfied as they needed physical assessment, ICT problems during the TM sessions, payment difficulties, more waiting time, not helpful in emergency situations and staff response.

3.3. Telemedicine use experience

Table 2 shows the difference on the four dimensions of telemedicine use experience between those who were confident in using it in future and those who lacked such intent. Those confident in the future use of TM rated their experience higher on all dimensions than those who were

Table 1
Profile of the respondents.

Demographic Variables	Confident in future use of TM (Mean)					
	Yes (N = 61)		No (N = 71)		All (N = 132)	
	Mean	SD	Mean	SD	Mean	SD
Respondents' Age	29.73	4.63	29.70	4.85	29.72	4.71
Gravida	2.45	1.27	2.25	1.42	2.36	1.34
Parity	1.35	1.23	1.46	1.47	1.40	1.34
Gestational Amenorrhea	27.92	8.34	26.62	8.56	27.32	8.44
Schooling	10.18	5.58	8.90	5.40	9.59	5.51
Marriage Duration	4.62	3.99	4.55	3.21	4.59	3.60
Household Monthly Income (PKR*)	82,493	46,206	82,738	51,350	82,606	48,462

*Pakistani Rupee.

Table 2
Mean difference in telemedicine experience of future users and non-users.

Description	Confident in future use of TM (Mean)		Mean Diff	Sig.
	Yes	No		
Appointment:	**3.431**	**2.661**	**−0.765**	**0.000**
Ease of making telephonic appointments	4.254	3.656	−0.598	0.001
Appointment made within a reasonable time	3.915	3.197	−0.719	0.000
Getting health care as soon as patients wanted it	3.408	2.475	−0.933	0.001
Getting after-hours care when patients needed it	2.859	2.164	−0.695	0.020
The efficiency of the check-in process	3.549	2.885	−0.664	0.002
Less waiting time	3.423	2.393	−1.029	0.000
Keeping patients informed on appointment delays	3.352	2.508	−0.844	0.001
Ease of getting a referral when needed	2.690	2.016	−0.674	0.032
Staff Attitudes:	**3.915**	**3.577**	**−0.337**	**0.021**
The courtesy of the person who attended your call	4.239	3.738	−0.502	0.001
The care and concern of medical assistants	4.169	3.754	−0.415	0.009
The friendliness and courtesy of receptionist	3.972	3.557	−0.415	0.018
Helpfulness of staff on billing and/or insurance	3.282	3.262	−0.019	0.939
Medical Consultation (Telemedicine Services):	**4.130**	**3.298**	**−0.832**	**0.000**
Patients felt easy in talking to health-care provider	4.380	3.607	−0.774	0.000
Patients could hear health-care provider clearly	4.296	3.492	−0.804	0.000
HC provider understood patient's health-issue	4.324	3.623	−0.701	0.000
It was like consultant and patient met in person	4.197	3.295	−0.902	0.000
Communication with HC provider was comfortable	4.310	3.574	−0.736	0.000
HC via TM was consistent	4.113	3.131	−0.982	0.000
HC via TM was better than in person visit	4.000	3.098	−0.902	0.000
TM saved patients' travelling time to hospital	4.000	3.131	−0.869	0.000
Patient received adequate attention	4.070	3.148	−0.923	0.000
HC provider & patient met more freq. via TM	3.732	3.148	−0.585	0.003
TM was an acceptable way to receive HC	4.014	3.033	−0.981	0.000
Communication:	**3.533**	**2.763**	**−0.769**	**0.000**
Patient phone calls were answered promptly	3.887	3.164	−0.723	0.000
Patient received advice during office hours	3.507	2.902	−0.605	0.008
Patient received explanation of TM procedure	3.254	2.295	−0.958	0.001
Test results received in a reasonable time	3.310	3.016	−0.294	0.253
Effectiveness of health info. materials	3.972	3.131	−0.841	0.000
Call back to patient was on time	3.732	2.82	−0.913	0.000
Patients' ability to contact us after hours	2.915	2.148	−0.768	0.005
Patients' ability to get prescription refills by phone	3.662	2.770	−0.892	0.000
Overall	**3.752**	**3.075**	**−0.677**	**0.000**

unconfident. Overall, the former group recorded 0.677 points higher on their experience with TM than the later. Aggregated at the level of dimensions, highest such difference appears for Telemedicine Services, followed by *Communication*, *Appointments* and *Staff* in that order (Table 2).

When seen at question level, mean difference (between those intending and not intending to use TM in future) are statistically not significant only for two questions: "Helpfulness of staff on billing and/or insurance" under *Staff* dimension; and *"Test results received in a reasonable time"* under *Communication* dimension. For the remaining questions under all four dimensions, those intending to use TM in future have registered significantly higher score to their telemedicine experience (Table 2) than those who lacked such intent.

While Tables 1 and 2 collectively suggest that the future TM use depends on the first experience of users, improvement in telemedicine facility may enable hospitals to enhance the user experience and thereby boosting the uptake of TM in Pakistan. But what aspects need focus for improvement? Below section explores the determinants of patients' future use of telemedicine through binary logistic regression.

3.4. Determinants of future use of telemedicine

Table 3 provide the results of binary logistic regression, having outcome variable showing intent of future use of telemedicine (0 = No and 1 = Yes) and four independent variables, namely the user's experience with: Appointments, Staff, Medical Consultations and Communication, each of which is average of corresponding questions and the error term. Since the profile variables namely, the health and socio-economic characteristics, do not statistically differ between those intending to use TM in future and those who lack such intent, we exclude these variables from this analysis.

Out of four independent variables, only two appear as statistically significant determinants of the participants intent to use TM in future. Medical Consultations, i.e., antenatal care seekers' online video conversation and exchange with a doctor appears as the major determinant of future TM use. Every 1 unit increase in satisfaction with Medical Consultations, increase patient's likelihood of future TM use by 2.9 times. The other important determinant for future TM use is Communication such that 1 unit increase in satisfaction with Communication increases patients' likelihood of future use TM by ~2 times.

Statistical parameters of the model could predict nearly two-fifth of the variation (R2 = 37.3%) in the participants' intent to use TM in future. For cross-sectional data, this value shows good explanatory power of the model as it could correctly classify respondents in more than 72% of the cases. The low p-values (0.001) of Omnibus Test of Model Coefficients and high p-value (0.303) of Hosmer and Lemeshow test suggest that overall, the model is a good fit.

4. Discussions

This study assessed the future TM use through a case study of the users' experiences with SIH's TM facility in Pakistan, inquired their intent to use it in future and factors explaining such intents. Results show no statistically significant differences in the respondent's profile including age, schooling, and household incomes based on their intent to use TM in future. Those intending to use TM in future show higher satisfaction with their earlier TM use on all dimension of the user experience. Results of the binary logistics regression suggest 'Medical Consultation' and 'Communication' dimensions of the users' experience as important determinants of their future TM use but does not hold 'Appointment' and 'Staff Attitude' dimensions as much relevant.

Literature generally supports profile variables' indifference [21,22], though some studies found younger women preferring TM more than the aged [21]. Statistically higher mean satisfaction scores on all dimensions of TM experience of those intending to use it in future also have broad-based support in the published studies [3,23–25]. The finding that Medical Consultation and Communication are more important determinants of future TM use than 'Appointment' and 'Staff Attitude' is valid but some studies report the latter two dimensions also as important determinants of future use of TM [26–28]. Concerns of privacy, data protection and patient-doctor relationship during TM were same as other subspecialities. Additional concerns include lack of trust in TM in obstetrics emergencies, as found in another study [29], and dissatisfaction with physical examination and fetal well-being.

Keeping in perspective the encouraging results of this cross-sectional study and insights from the relevant literature, it is tempting to argue that TM will remain a slightly more developed niche solution of health care in Pakistan beyond COVID-19. However, enhancing the user

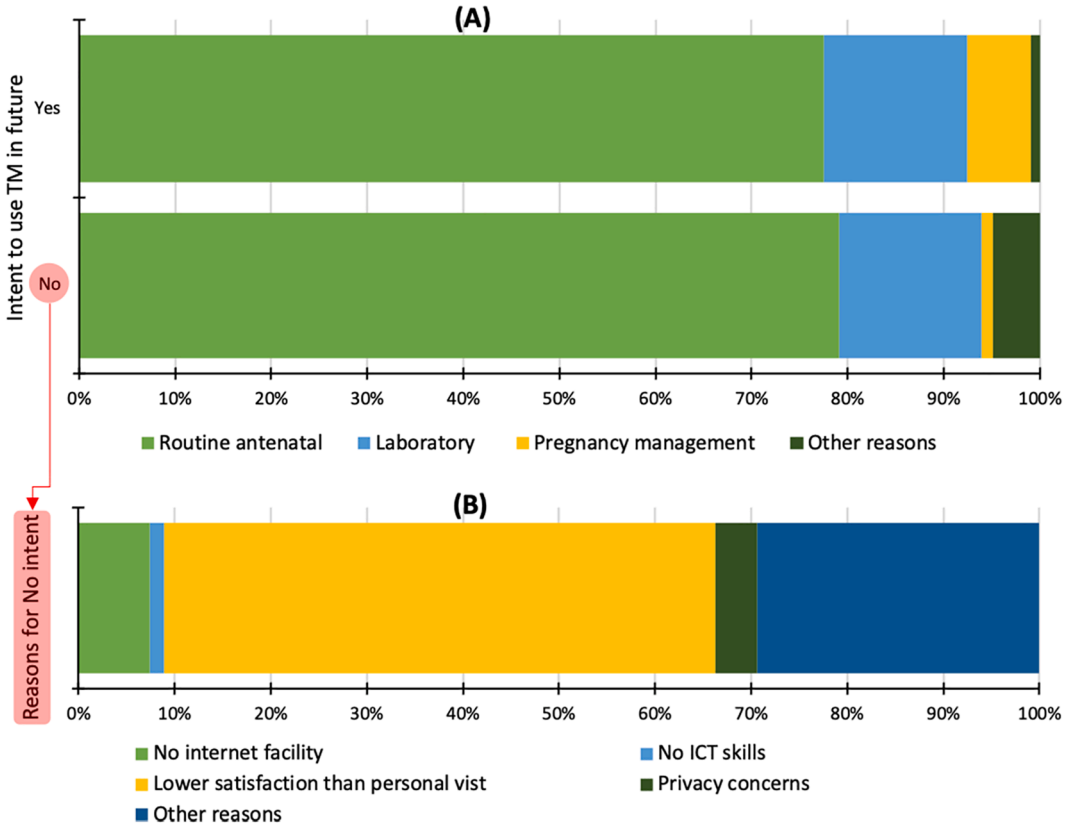

Fig. 1. Reasons for (A) using TM at first place and (B) no intent to use it in Future.

Table 3
Binary logistic regression analysis of future use of TM.

Independent Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Appointment	0.323	0.288	1.260	1	0.262	1.381	0.786	2.427
Staff Attitude	-0.317	0.319	0.984	1	0.321	0.729	0.390	1.362
Medical Consultations	1.065	0.343	9.652	1	0.002	2.900	1.482	5.678
Communication	0.705	0.369	3.654	1	0.049	2.025	0.982	4.173
Constant	−5.882	1.367	18.518	1	0.000	0.003		

Dependent Variable = Confident in Future Use of Telemedicine (0 = Not, 1 = Yes).
Percentage accuracy in classification (PAC) = 72.7%.
Omnibus Tests of Model Coefficients = X^2 (4, N = 132) = 43.23, $p < 0.001$.
Nagelkerke R Square = 37.3%.
Hosmer and Lemeshow Test = X2 (8, N = 132) = 9.482, $p = 0.303$.

experience with TM require investments in consultant and staff trainings in remote health care, familiarity with regional languages and ability to communicate with people of varying dialects and accents.

In Pakistani context, TM offers many advantages for rural women's antenatal care needs who face a unique set of difficulties, among others, the restrictions on their mobility and necessary male company while visiting health care services [30]. From this perspective, TM certainly has revolutionary potential to make health care accessible in areas underserved by the conventional urban-biased medical care systems [31,32]. This however, depends on improving access and quality of ICT in rural and remote areas [19,33–36], investments in basic digital literacy and other regulatory changes [16].

5. Conclusions

TM will remain a niche solution in Pakistan beyond COVID-19 even for antenatal health care provision but would require improving users' experience particularly with Medical Consultations and Communication. However, enabling TM to cater the antenatal and general healthcare needs of poor, culturally restricted, rural, and remote women hinges upon the cooperation of various public and private actors. Hospitals need investments in consultant and staff trainings and improving communication e.g., in regional languages, set up accessible physical examination points and introduce mobile wallet payment options. Public-private partnership to supply improved internet connectivity in rural and remote areas, digital literacy, and raising TM awareness would encourage its uptake as a pro-poor and liberating technology in Pakistan and other developing countries.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Author contributions

HS together with TA and HN conceptualized the study and acquired IRB approval. SF and HS administered the survey questionnaires and literature review. HS and HN carried out data analysis under the overall guidance of GS. HS prepared the first draft. HN and TA improved the draft while GS reviewed, edited, and made it submission ready.

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