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# Feasibility and Acceptability of Telemedicine in Iraq

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Abstract

**Background:** In a variety of medical specialties, Telemedicine is extensively applied. Nevertheless, it is not evident whether this approach will be critical once COVID-19 is endemic. In this research, we have discussed the opinions of physicians and patients regarding the use of telemedicine.

**Methods: The** anonymous electronic questionnaire was sent forwarded to physicians working in the colleges of Medicine at the University of Mosul and the University of Nineveh plus to physicians working in the public and private hospitals and also in the private clinics in Mosul randomly without regard to their specialty. The survey contained 18 questions about the feasibility and acceptability of video consultations, ease of use, quality, and other issues. The evaluation of most of the items was on five-point Likert scale, but the perceived benefits and future expectations were open-ended. The survey of patients was also carried out through an electronic connection that was distributed randomly and included 14 questions on the willingness to undergo a video consultation, ease of use, benefits, difficulties, the mode of choice of consultation and the overall satisfaction measured on the same scale.

**Results:**114 physicians and 142 patients were involved. Video consultations were positively received by patients, with the reportedly acceptable communication and patient satisfaction, although there were some fears about technical difficulties and privacy. physicians were more reserved, indicating that they did not feel comfortable with virtual communication, decreased trust with remote clinical evaluation, and significant doubts about the lack of physical examination and laboratory results. The questionnaire had a satisfactory degree of reliability (Cronbach alpha = 0.736). There were considerable differences in a number of physician perceptions, but the perception of patients in different groups did not exhibit significant differences.

**Conclusion:** The physicians and patients found telemedicine to be an appropriate and viable mode of care provision and reception. Technical problem was the key to the successful use.

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## 1. Introduction

The global healthcare industry experienced a considerable digital revolution over the last decade with telemedicine becoming an inseparable part of the modern healthcare delivery systems. This has been significantly expedited during the COVID-19 pandemic that led to unprecedented rates of telemedicine use in both high-income and resource-constrained environments, which fundamentally reorganized the structure of healthcare service provision [1–5].

Telemedicine, which refers to the administrative care provision and clinical data by use of telecommunications technology, has shown significant potential in solving the endemic issues of healthcare access, quality, infrastructural constraints or constant warfare [1,6-7].

Telemedicine is a term used to describe the medical interaction between physicians and patients so as to enhance

health outcomes. This can be done via video, audio, smartphone, and other wireless communication mediums in remote areas where patients reside. Over the last few years, telemedicine has experienced a tremendous growth and has become a necessity in hospitals, special medical units, home health care, individual hospitals and even in personal clinics of physicians [3,4,6,9].

During the past years, telemedicine is becoming increasingly popular in low- and middle-income countries (LMICs) to maintain the provision of services in the current COVID-19 circumstances, especially in the management of chronic conditions, and the evidence shows that telemedicine may provide clinical outcomes that are as effective as face-to-face care in a variety of settings, at the same time being limited by insufficient cost effectiveness and sustainability assessments [3,4].

Based on a recent systematic review of telemedicine interventions to manage COVID 19 in LMICs, telemedicine visits improved unnecessary emergency department visits, diagnostic and prescribing quality, and post COVID 19 rehabilitation, but there were significant implementation gaps associated with infrastructure, equity, and integration into routine services [3].

Likewise, a scoping review on telehealth application in LMICs stated that even though the application of telehealth in the pandemic was comparatively limited, telehealth interventions were typically successful in sustaining services and enhancing access in addition to proving to be very effective in terms of patient and provider satisfaction in various regions, including the Middle East and North Africa [2,4].

Telemedicine was important in the Middle East and North Africa (MENA) region to ensure continuity of care and facilitate medical education in light of the pandemic. According to empirical evidence in the region, telemedicine programs have had an impact on better accessibility of the health care services and improved service delivery in various healthcare environments [2-4,11].

Although this is the global trend, the application of telemedicine in third world countries and war-torn areas poses unique challenges that require sensitive and situation-sensitive research. Iraqi healthcare system which has been subjected to a long-standing conflict, economic sanction, and political instability still experiences significant structural limitations. They are insufficiency in healthcare infrastructure, lack of skilled healthcare workers, and organizational vulnerabilities that all contribute to the inability to successfully implement digital health technologies like telemedicine [3,5,12].

A systematic review on the interventions of telemedicine in the conflict-affected countries of the Eastern Mediterranean Region of the World Health Organization has revealed that, although numerous interventions have been adopted in many cases, the lead has been taken by humanitarian organizations or academic institutions, they do not necessarily have a solid evaluation framework, sustainability plan, and sufficient attention to data governance and ethics [1,5,12].

The results of telemedicine programs applied in Iraq and in nearby Syria have proved that there are tangible benefits in terms of operation such as less medical evacuations and more access to specialist consultation in restricted and insecure settings. Nevertheless, these efforts were mostly informal, imposed by the outside, and focused in certain areas of their operations like in the military or humanitarian environments. As a result, little is known about the possible way of how telemedicine can be successfully introduced into the civilian healthcare system in Iraq and be maintained in the long term [1,12-14].

Simultaneously, more general assessments of telehealth in LMICs note that despite successful implementation of teleconsultation, telerehabilitation, mobile health applications, and other technology-enabled interventions in South Asia, sub Saharan, and some regions of the MENA region, their implementation is mostly fragmented and obstructed by infrastructural, financial, regulatory, and cultural factors [4,7,3].

These reviews highlight systemic issues like inadequate broadband connectivity, the absence of coherent national e health policies, inadequate funding, and privacy and cybersecurity issues that reflect many of the systemic issues reported in the Iraqi health system in the post 2003 period [2,3,4].

The telemedicine technology, organizational, and socio-cultural factors interact in a complex way to determine the feasibility and acceptability of telemedicine. Technologically, the presence of sound infrastructure of information and communication technology (ICT), right platform choice, and usability of the system are all the pre-requisites to effective implementation of telemedicine [3,5,12,15,16]

Organizational factors such as governance systems, staffing capacity, training processes, and connectivity with the current health information systems are the critical factors that would determine the sustainability and scalability of the telemedicine programs [3,5,12,17,18,19].

Perceived usefulness, ease of use and institutional support were among the factors that were found in empirical research in the Kurdistan Region of Iraq to influence acceptance of the telemedicine technologies among healthcare providers [17][19].

However, the acceptability is not confined to the sphere of healthcare providers, as it also implies patient-specific factors, including user experience, trust in online services, worries about data privacy and confidentiality, and preferences concerning the equilibrium between virtual and face-to-face care. These are the areas that are not well

researched in the context of Iraq. [5,20] The experience of conflict-affected environments in the region indicates that not all patients feel comfortable when deprived of face-to-face communication, which undoubtedly may have a negative effect on trust, communication, and the formation of therapeutic relationships [2,3,8,20,21].

Current developments in LMICs show that technology enabled health interventions are broadly acceptable and achievable at the side of users but have the potential to increase already existing disparities in access in situations where differences in digital literacy, level of education and capacity to own devices and connectivity are not sufficiently considered [2,4,8].

The telehealth adoption during the COVID 19 pandemic is demonstrated by studies that, although most patients and providers find teleconsultations convenient, they save time on travels, and lessen the risk of infections, they also mention issues with the quality of communication, confidentiality, and in some situations, prefer the hybrid approach where teleconsultations are complemented by face to-face care. Such considerations of the users are especially relevant in the Iraq case where the socio economic status differences, access to the internet and existing exposure to digital technologies can influence the possibility and the acceptability of the telemedicine interventions [2,3,4,8,15,17].

The existing body of literature shows that there are major gaps in the knowledge about the implementation of telemedicine in the civilian healthcare system of Iraq. Although single projects have proved to be operationally viable in certain settings, no serious studies have been conducted to examine clinical outcomes, quality measures, and sustainability in chronic healthcare provision[5]. The acceptability, satisfaction and perceived barriers are essentially limited regarding patient-centered research focusing on the opinions of healthcare users in Iraq [5,19]. In addition, essential problems associated with the technical preparedness of medical institutions, labor force preparedness, regulatory conditions, and ethical regulation of the field of digital health data in Iraq need to be systematically examined in order to make evidence-based policy and investment choices [16,19]. Digital health technologies Narrative reviews on Kurdistan Region in the digital health technologies area highlight the need to focus research on context-specific implementation on the usability, perceived value, and external influence of technology adoption on local healthcare ecosystems [1,3,12,15,16,17].

Besides that, studies of the Iraqi health system post-2003 highlight the compounding effect of conflict, sanctions, and political turmoil on service structure, funding, and human resource and come to the conclusion that reconstruction of the system demands strategic investments in health information systems and digital infrastructure domains directly applicable to the scaling of telemedicine [3].

Considering these facts, the study of the possibilities and agreeability of telemedicine in Iraq is a research focus and necessity. This kind of investigation can produce the necessary evidence to build sustainable, ethically based, and contextually relevant models that help address the unique issues of the Iraqi healthcare system, and use the opportunities offered by digital health technologies to provide more people with access to healthcare, enhance its quality and efficiency in conflict-impacted and resource-limited contexts [1-4,6,8,18,12,15,17,18,21].

The research design of this paper will be a survey-based research that will be carried out in the period (January-March) 2025 to understand the practicality and acceptability of telemedicine in the Iraqi healthcare system. The sample included physicians of the College of Medicine of the University of Mosul and the University of Nineveh, physicians of the private clinics and the sampled public and private hospitals in the city of Mosul. The main peculiarity of the current study is that the views of healthcare specialists working in academic, public, and private healthcare facilities are recorded, and this enables a thorough evaluation of the work of telemedicine in the daily clinical setting. The survey examined the experience of physicians using telemedicine, what they are finding to be beneficial and the major challenges surrounding the utilization of telemedicine such as barriers (technical, organizational, and practical). Besides, the study also evaluated the general satisfaction with telemedicine services in various clinical settings [8,18,22].

Methodologically, the application of the structured questionnaire to define the perception of physicians concerning the feasibility, acceptability, and satisfaction conforms to modern research on telehealth implementation where validated survey instruments are often used to evaluate the results of adoption and implementation. Recent studies on formulating and testing scales of telehealth experience and learning environment in medical and health professions education have shown the need to develop content validity and internal consistency reliability which is typically measured in terms of Cronbach alpha with a threshold of at least 0.7 in order to ascertain that composite measures of telehealth acceptance and usability are robust enough to inform practice and policy. Such psychometric considerations in the present study design can enhance its capacity to make a contribution, since it can produce valid, repeatable measures of the willingness of Iraqi physicians to implement and maintain telemedicine as a regular component of the clinical practice. [18,22,23].

## 2. Methods

The anonymous survey was sent to the official physician groups at the college of medicine, University of Mosul and the college of medicine, University of Nineveh by visiting both colleges and receiving official approvals of the associate dean of academic affairs. The physicians operating in the Mosul area in both public and private hospitals were also targeted using the contacts of friends and acquaintances

serving in these hospitals. physicians were chosen at random irrespective of their specializations. Moreover, the survey was sent to physicians working in their own clinics and in addition, randomly, through friends and acquaintances who had contacts with the physicians.

The questionnaire was composed of 18 questions that covered the feasibility and acceptability of video consultations/ telemedicine, the ease of using this technology with patients, the quality of it, and the challenges of the latter. Thirteen these were measured with respect to a five-point Likert scale, between strongly agree and strongly disagree. Two questions were open-ended, referring to the perceived benefits of video consultations and future expectations of consultations.

An electronic survey of patients was carried out as well, where the electronic link was sent to friends and acquaintances, who had different illnesses and contacted their physicians, but there was no specific sample. The questionnaire sent to the patients included 14 questions that were based on their involvement in video visits in case their physicians offered such services. It touched on the ease of use of this technology, the advantages of that technology, their confusion that they may experience when it comes to the consultations, their preferred method of consultation, and their general satisfaction with the video consultations. The scale of five points based on a Likert scale was used in rating responses, with a strong disagree to strongly agree.

## 3. Result

### 3.1 Reliability Statistics

Cronbach's Alpha (α) **Formula 1** was used as the reliability measure to test the internal consistency of items in the scale. The Cronbachs Alpha coefficient achieved was 0.736, which was a good result when it comes to the internal consistency of the items. This implies that the items have a moderate degree of correlation and also measure the underlying construct well.
Using the standard criteria, anything above 0.70 with the value of Cronbachs Alpha can be described as acceptable in the context of exploratory research [24]. Consequently, the scale can be considered as valid in the future analysis.

**Formula 1. Cronbach's Alpha**

$$\boldsymbol{\alpha = \frac{N}{N-1}\left(1 - \frac{\sum_{i=1}^{N} \alpha_i^2}{\alpha_T^2}\right) \ldots\ldots 1}$$

α = Cronbach's Alpha (reliability coefficient)
N = Number of items (e.g., questions in questionnaire)
$\alpha_i^2$ = Variance of the i-th item
$\alpha_T^2$ = Variance of the total score (sum of all items)

### 3.2 Patients' perceptions: Descriptive

An assessment of patient feedback (N = 142) indicates a generally favorable attitude toward video consultations with physicians, although concerns about comprehension, technological problems, and privacy are left. Modern patients (60.6 percent) thought it would be an easy task to exchange information with the physicians through video, and 63.4 percent were confident that their questions could be adequately answered. More so, 46.5 percent also stated that they would get the required care out of these virtual consultations and 49.3 percent also expected to get satisfied with the communication. However, technology and experiences were the areas of significant concern. Specifically, 54.9% reported needing technical support, and 70.4% expressed a desire for additional training to engage effectively in video consultations. Approximately one-third of patients voiced apprehensions regarding auditory (33.8%) and visual (33.8%) challenges, while 42.3% were uncertain about their ability to clearly understand the physician during a video appointment. In terms of privacy, almost half (47.9%) of the patients stated that they were concerned, and they should have safe and confidential platforms to develop trust in virtual healthcare. To sum up, where the majority of patients display a desire and a readiness to use video consultations, the implementation process will have to be strong and effective supported by technical services, patient education, and strict actions to provide privacy in discussing the identified issues. These findings indicate that patients are mostly open to virtual consultations, but proper implementation will require technical assistance, training of users, and privacy assurances. **Table 1.**

**Table 1.** Patients' perceptions

| Statement | Disagree | Neutral | Agree |
|---|---|---|---|
| If the physician's consultation were conducted by video, communicating would become easy for me | 14.1% (20) | 25.4% (36) | **60.6% (86)** |
| If the physician's consultation were conducted by video, I would receive the care I need | 16.9% (24) | 36.6% (52) | **46.5% (66)** |
| If the physician's consultation were conducted by video, my question would be answered | 7.0% (10) | 29.6% (42) | **63.4% (90)** |
| If the physician's consultation were conducted by video, I would concerns about privacy | 14.1% (20) | 38.0% (54) | **47.9% (68)** |
| If the physician's consultation were conducted by video, I would be satisfied with the interaction | 15.5% (22) | 35.2% (50) | **49.3% (70)** |
| If the physician's consultation were conducted by video, it would be difficult to understand | 28.2% (40) | **42.3% (60)** | 29.6% (42) |
| If the physician's consultation were conducted by video, there would be hearing difficulties | **33.8% (48)** | 32.4% (46) | 33.8% (48) |

| | | | |
|---|---|---|---|
| If the physician's consultation were conducted by video, there would be visual difficulties | **35.2% (50)** | 31.0% (44) | 33.8% (48) |
| If the physician's consultation were conducted by video, I would need technical support | 16.9% (24) | 28.2% (40) | **54.9% (78)** |
| If the physician's consultation were conducted by video, I would be interested in further training | 11.3% (16) | 18.3% (26) | **70.4% (100)** |

## 3.3 Physicians Perceptions: Descriptive

One hundred and forty-four physicians were surveyed where their views on video-based (telemedicine) consultations were evaluated. The findings indicate that there is a split opinion and both favorable and major issues on the application and efficacy of virtual healthcare delivery. Interaction and Communication: Only 32.5% of physicians believed that engaging with patients via video would be easy, while a larger percentage (36.0%) disagreed. Moreover, 47.4% of respondents expressed discomfort with video-based interactions, and only 28.9% said that they would comfortable communicate with patients in this form. On the reliability of information found among patients in the course of video consultative sessions, only 26.5% responded with agreement and 41.6% responded with disagreement. This shows a significant degree of deficiency in the reliability and efficiency of communication in virtual consultations. Despite these concerns, 38.6% of physicians felt that patients would be able to comprehend them clearly during video consultations, whereas 34.2% disagreed. This means that there is a degree of doubt on the level of understanding that patients have in virtual environments. Adoption Willingness and Future Outlook: A half of the physicians (50.0%) revealed that they do not want to provide telemedicine consultations in the future, and only 28.9% supported the notion. Nevertheless, 39.5% mentioned that their overall experience with telemedicine could be positive, suggesting a level of openness if certain issues are addressed. Technical Concerns and Support: A good majority of respondents (73.7% of participants) anticipated to encounter a lot of technical difficulties when using video platforms. Just 21.1% of them, on the contrary, believed that they would get sufficient technical assistance. Additionally, 57.9% of physicians were not confident that most of their patients (~80%) would effectively utilize video conferencing tools. Clinical Limitations: There were also major questions of the limitations of telemedicine in carrying out key clinical activities. Almost 79 % of physicians were in agreement with the impossibility of carrying out laboratory examinations to influence the effectiveness of video consultations. A more significant (92.1%) also showed concern that the value of virtual consultations would seriously decrease because of the absence of physical examinations. Time and Efficiency: Finally, 57.9% of the physicians felt that video consultations would consume more time than common in-person visits, which is a source of concern regarding workload and efficiency. **Table 2.**

**Table 2.** Physicians Perceptions

| Statement | Disagree | Neutral | Agree |
|---|---|---|---|
| If the physician consultation were via video, it would be easy for me to interact with my patients. | 36.0% (41) | 31.6% (36) | 32.5% (37) |
| If the physician consultation were via video, I would feel comfortable interacting with my patients. | **47.4% (54)** | 23.7% (27) | 28.9% (33) |
| If the physician consultation were via video, I would feel confident that I am receiving accurate information from my patients during the consultation. | **41.6% (47)** | 31.9% (36) | 26.5% (30) |
| If the physician consultation were via video, I would feel confident that my patients would understand what I say during the consultation. | 34.2% (39) | 27.2% (31) | **38.6% (44)** |
| I would like to have telemedicine (video) consultations with my patients in the future. | **50.0% (57)** | 21.1% (24) | 28.9% (33) |
| Overall, my experience with telemedicine will be positive. | 34.2% (39) | 26.3% (30) | **39.5% (45)** |
| I would find it difficult to communicate with my patients using telemedicine (video) consultations. | 23.7% (27) | 36.8% (42) | **39.5% (45)** |
| I will face technical challenges frequently during telemedicine (video) consultations with my patients. | 13.2% (15) | 13.2% (15) | **73.7% (84)** |
| I will receive adequate technical support before conducting telemedicine (video) consultations with my patients. | **34.2% (39)** | **44.7% (51)** | 21.1% (24) |
| I am confident that the majority (~80%) of my patients will be able to use video conferencing devices. | **57.9% (66)** | 28.9% (33) | 13.2% (15) |
| Limitations in laboratory tests will significantly constrain the value of my telemedicine (video) consultations. | 7.9% (9) | 13.2% (15) | **78.9% (90)** |
| Limitations in performing physical examination will significantly constrain the value of my telemedicine (video) consultations. | | 7.9% (9) | **92.1% (105)** |
| I believe that video visits will take longer than in-person visits. | 23.7% (27) | 18.4% (21) | **57.9% (66)** |

## 3.4 ANOVA Test on physicians' Perceptions:

Out of the 13 statements analyzed, 5 items revealed

statistically significant differences ($p < .05$) in responses between groups: convenience in working with patients through video, comfort level when using video visits, expected technical problems, restrictions associated with the absence of laboratory examinations, and restrictions due to the inability to perform physical examinations. These results show that the attitude of physicians to these aspects differs significantly depending on the attributes of a group, i.e. years of experience, departmental affiliation, or experience with technology. Conversely, there were no significant differences in perceptions of confidence in communication, readiness to use telemedicine, support systems and anticipated length of video visit between groups, indicating a more homogenous attitude between physicians on those questions. **Table 3.**

**Table 3.** ANOVA Test on physicians' Perceptions

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| If the doctor's consultation were conducted by video, communicating would become easy for me | Between Groups | .709 | 3 | .236 | .215 | .886 |
| | Within Groups | 152.023 | 138 | 1.102 | | |
| | Total | 152.732 | 141 | | | |
| If the doctor's consultation were conducted by video, I would receive the care I need | Between Groups | .129 | 3 | .043 | .045 | .987 |
| | Within Groups | 130.519 | 138 | .946 | | |
| | Total | 130.648 | 141 | | | |
| If the doctor's consultation were conducted by video, my question would be answered | Between Groups | .498 | 3 | .166 | .208 | .019 |
| | Within Groups | 109.980 | 138 | .797 | | |
| | Total | 110.479 | 141 | | | |
| If the doctor's consultation were conducted by video, I would concerns about privacy | Between Groups | 3.295 | 3 | 1.098 | 1.118 | .0344 |
| | Within Groups | 135.634 | 138 | .983 | | |
| | Total | 138.930 | 141 | | | |
| If the doctor's consultation were conducted by video, I would be satisfied with the interaction | Between Groups | .946 | 3 | .315 | .447 | .020 |
| | Within Groups | 97.363 | 138 | .706 | | |
| | Total | 98.310 | 141 | | | |
| If the doctor's consultation were conducted by video, it would be difficult to understand | Between Groups | 2.066 | 3 | .689 | .710 | .048 |
| | Within Groups | 133.822 | 138 | .970 | | |
| | Total | 135.887 | 141 | | | |
| If the doctor's consultation were conducted by video,There would be hearing difficulties | Between Groups | 1.388 | 3 | .463 | .468 | .705 |
| | Within Groups | 136.359 | 138 | .988 | | |
| | Total | 137.746 | 141 | | | |
| If the doctor's consultation were conducted by video,There would be visual difficulties | Between Groups | 1.275 | 3 | .425 | .405 | .749 |
| | Within Groups | 144.697 | 138 | 1.049 | | |
| | Total | 145.972 | 141 | | | |
| If the doctor's consultation were conducted by video, I would need technical support | Between Groups | 2.063 | 3 | .688 | .738 | .031 |
| | Within Groups | 128.585 | 138 | .932 | | |
| | Total | 130.648 | 141 | | | |
| If the doctor's consultation were conducted by video, I would be interested in further training | Between Groups | 1.118 | 3 | .373 | .491 | .689 |
| | Within Groups | 104.741 | 138 | .759 | | |
| | Total | 105.859 | 141 | | | |

## 3.5 ANOVA Test on Patients' Perceptions:

The p-value of all the groups does not exceed 0.05 (5% level of significance) which means that there are no statistically significant differences between the analysed groups in terms of their perceptions. This implies that the responses to the 10 statements on video-based consultations were similar among patients pertaining to all groups. The variables like age, gender, education level, or any other demographic variables did not significantly influence the perception of the ease of communication, quality of care, understanding, technical barriers, or interest in training by patients. The consistency of responses can indicate agreement between the patients regarding video consultations and their attitude to it, be it positive or defensive, irrespective of their backgrounds.

## 4. Discussion

This paper demonstrates that the acceptability and viability of telemedicine in Iraq can be perceived as a multifaceted interplay of technical, organizational, and sociocultural factors, and patients will be more inclined to use video consultations than physicians, even though significant hurdles related to infrastructure and clinical trust remain. This observation is in line with the world literature on telemedicine in the low and middle income countries, which suggests that technology enabled health interventions are acceptable and feasible on a recurring basis but are challenged by connectivity, resourcing, and regulation issues [1–4,6,7,12,14,18,19].

### 4.1 Interpreting patients' findings in light of the literature

The patient data in this study showed that the general

attitude towards video consultations is positive as the majority of the participants stated that they will find it easier to communicate with the physician, that their questions will be answered properly, and that they will be able to receive necessary care in such consultations, which demonstrates the presence of the reasonable degree of preparedness to apply telemedicine in the study community. These findings are consistent with the systematic reviews and reports of similar low and middle-income environments that indicate that digital health technology such as telemedicine, mobile health apps, and telerehabilitation is frequently rated highly regarding the level of satisfaction and acceptance among users when presented with the chance to use them [1–4,6,7,12,14,15,18]

Simultaneously, patients noted some barriers, in particular the technical assistance and the need to get some additional training to operate platforms, as well as the obvious concern on the privacy, data anonymity, and potential audio visual problems in the course of consultations. These findings are reflections of evidence that digital health interventions can increase access disparities in cases where disparities in digital literacy, education level, and financial capacity to access devices and internet connectivity are not appropriately met. Research in conflict-ridden and resource-starved environments also indicates that many cybersecurity and privacy issues can destroy confidence in online resources and restrict their daily application.

### 4.2 Physicians' stance and clinical/organizational barriers

The more reserved attitude toward remote communication with patients was expressed by physicians in this study, as most of them said that they were unhappy with remote communication, had low confidence in the adequacy of clinical information received during video visits, and thought virtual visits would be more time-intensive than traditional consultations. This trend of reluctance is similar to overall reviews on telemedicine in low and middle income nations, where practitioners have expressed dissatisfaction on the fact that the practice is depriving them of important elements of clinical examination, including direct physical examination, and the impact of such loss on overall diagnostic and treatment decision making.

The clinical value of video visits was identified as one of the main concerns of physicians here, as the perceived negative effect of limited access to laboratory tests and physical examination was noted, and most of them believe these limitations significantly decrease the utility of telemedicine visits. This is aligned with the literature on tele rehabilitation and chronic care which suggests that telemedicine is more applicable in cases of long term follow up of relatively stable chronic patients or advisory specialist consultation but is less applicable to acute or complex conditions where a thorough physical examination and face to face investigation is required.

Physicians also expected high technical issues, they have stated that their confidence in receiving proper technical support is low, and they lacked confidence that most of their patients will have the capability to utilize video platforms. These results are resonant with the findings of other researchers who have found that effective telemedicine programs require highly stable communication infrastructure, timely technical support services, and organized training of providers and users components that still have not been developed in numerous Eastern Mediterranean Region countries. [2–4,7,12,16,17,21,22].

### 4.3 Positioning the findings within Iraq and the Eastern Mediterranean

The situation described in Mosul is consistent with the previous accounts of the post-2003 Iraqi health system as structurally and financially weak, limited by labour shortages, and disrupted by the lack of digital infrastructure and health information system. Previous reports of digital health in the Kurdistan Region of Iraq also explain that telehealth utilization is decentralized, small-scale, and largely relies on personal scholarly or global projects, and there are no cohesive policies or regulations connecting them.

Locally, the outcomes are similar to those reported in other conflict prone countries in the Eastern Mediterranean, where telemedicine has been used to decrease medical evacuations and enhance access to specialists working in insecure or remote settings, though has frequently been done as short term initiatives with poor sustainability and assimilation plans into civilian health care environments. This highlights the importance of changing the current mode of telemedicine in Iraq to a service based model rather than a project based one, which is integrated into the care packages and with explicit regulatory and financing policies.

### 4.4 Methodological aspects and study strengths

The physicians and patients completed structured questionnaires are the basis of this study, which targets physicians at the Colleges of Medicine of the Universities of Mosul and Nineveh and physicians working in the public and private facilities; and patients with varied backgrounds, which provides reasonable representativeness of the study by key telemedicine stakeholders in an urban Iraqi environment. Application of Likert scale items with open ended questions is also in line with the up to date implementation research in the telehealth context where these tools are implemented to reflect feasibility, acceptability, and user experience.

The Analysis of internal consistency provided a Cronbachs alpha of 0.736, which is acceptable when doing exploration work and it was found that there is sufficient homogeneity in the items that are used to measure the underlying construct. ANOVA also revealed substantial differences between various items of the physicians (ease of

interaction, level of comfort, technical difficulty, limitations related to examination and testing), but found no significant differences between the subgroups of patients, which further indicates the presence of relatively homogenous patient attitudes based on demographic groups.

However, a few limitations should be mentioned: the research is limited to one city; the recruitment was partly based on electronic means, which may lead to biasing the sample with the better-equipped internet and device users; and cross sectional design does not allow us to make any causal conclusions or evaluate the changes in the future. These limitations resemble arguments in other past studies of digital health in low- and middle-income nations and indicate that longitudinal and interventional studies should be conducted in the future to understand telemedicine adoption patterns more effectively.

### 4.5 Practical implications and future directions

The results indicate that increasing the rate of telemedicine acceptance in Iraq would entail a multi level intervention where it is necessary to improve technical infrastructure (bandwidth, connection stability, device accessibility), implement efficient technical support of patients and physicians and develop clear clinical guidelines specifying which conditions can be treated remotely and which ones cannot. Allowing physicians to be trained about virtual communication skills, as well as providing easy to understand educational and training resources to the patients about using digital platforms, may serve to control the fear of miscommunication, poor interaction, and time burden.

On the policy front, the country requires a national digital health system urgently, which can be open to legal and ethical matters regarding data protection and privacy, licensure/accreditation of telemedicine services, and reimbursement systems, according to the global and regional trends. The experience of other low and middle income countries adds more reasons why telemedicine should be attached to larger programs, like chronic disease management, and tele rehabilitation, as this can make the programs more efficient and less economically stressing on health systems and households.

Collectively, this research makes it possible to consider telemedicine as a promising solution to enhance access to healthcare in Iraq, assuming that the models of implementation are preconditioned by the adaptation to the Iraqi context and the systematic approach to address the lack of infrastructure, human capacity, regulatory, and ethical frameworks, and the cultural factors that affect the adoption of technology. [1–4,6–8,11,12,14–17,21,22]

## 5. Conclusion

This paper measured the viability and acceptability of telemedicine between physicians and patients in Iraq in a post-pandemic healthcare environment. The results reveal that both the providers and the users of the services are generally oriented towards telemedicine as a convenient and okay way of healthcare delivery. The participants have shown favorable feelings towards video consultations especially on the aspect of convenience, access, and continuity of care.

Although these are positive perceptions, the study cited technical challenges as the most obvious barriers which inhibit successful implementation, especially the issues on internet connectivity and digital infrastructure. These challenges underscore the importance of technological preparedness in defining the viability of telemedicine programs particularly in a resource limited environment.

The study will add to the small number of studies that have been conducted on telemedicine adoption in low- and middle-income and post-conflict settings because it uses empirical evidence in Iraq. The results highlight the fact that telemedicine may be used as a supplementary model to the traditional face-to-face meetings and not as a substitute to them.

In practice, based on the obtained results, it can be concluded that the reinforcement of digital infrastructure, enhancement of technical assistance, and specific training of healthcare providers and patients are necessary to maintain telemedicine outside of the COVID-19 period. Further studies are suggested to determine the long-term effects, use of telemedicine in specialties, and cost-efficiency of it in various parts of Iraq.

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## Conflict of interest

None.

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