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# "Webside" healthcare from medical interns' perspective: Telemedicine implementation and need for training

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**Abstract:**

**BACKGROUND:** Telemedicine involves the use of electronic communication and technology to remotely deliver clinical services to patients. With the increase in the adoption of telemedicine in healthcare delivery, "webside healthcare" is becoming the virtual analog of bedside care. The Ministry of Health in Saudi Arabia has recently established the use of telemedicine, including social media (SM) and medical applications (Apps) to enhance the quality and accessibility of healthcare services to patients and healthcare providers. In the present study, we evaluated medical interns' perception of the use of telemedicine, SM, and medical Apps in patient care, their awareness of related guidelines to find out if targeted training is needed.

**MATERIALS AND METHODS:** A qualitative study recruited and interviewed, through semi-structured key informant (KI) interviews and focus group discussions (FGD), a total of 24 male and female medical interns. The Interns were purposefully sampled from all Saudi Arabia's 5 main geographical regions until data saturation was observed. The transcripts of five KI interviews and 6 FGDs done were thematically analyzed and are presented as themes and subthemes.

**RESULTS:** Medical interns discussed the advantages and disadvantages related to telemedicine, SM, and medical Apps in healthcare services. Overall, interviewees appreciated the role telemedicine, SM, and medical Apps play in the healthcare and for such particular specialties as family medicine and (tele-) psychiatry. However, the interns believed that training on the technical operational aspects of different telemedicine modalities with an emphasis on targeted education for related ethical and legal regulating guidelines was vital.

**CONCLUSION:** Most interviewed medical interns had a positive perception of telemedicine and were willing to use it in their daily clinical practice. However, there were some challenges to its successful implementation such as prompt training on its proper use and clear ethical and legal guidance.

**Keywords:**

Healthcare delivery, junior physicians, medical applications, medical training, patients' privacy and confidentiality, social media, telemedicine

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## Introduction

Telemedicine is "the delivery of healthcare and the exchange of healthcare information across distances,"[1] utilizing current information and communication technologies. Telemedicine may be classified as (i) health-related communication from one health professional to another health professional and between a health professional and a patient,[1] or as (ii) synchronous (live) and asynchronous (prerecorded) exchange of information, such as text, audio, video, or images.[1,2] As telemedicine becomes more popular between patients and physicians, efforts are made to observe and maintain professional standards of communication with this new virtual "webside care" similar to traditional in-person bedside care.[3]



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Telemedicine involves various ways of delivering healthcare remotely, using technology including social media (SM) and medical applications (Apps), both of which have been successfully and increasingly utilized in healthcare in the last decade.[4] In Saudi Arabia, the Ministry of Health (MOH) also utilizes SM and medical Apps to deliver healthcare. Health promotion messages are distributed by Saudi MOH-affiliated accounts on SM platforms, such as Twitter and YouTube.[5] Several medical Apps also launched before and during the pandemic are utilized by both physicians and the public. These include Sehha and Qareboon Apps for the provision of virtual general and mental healthcare, respectively, and Tawakkalna app for documenting the user's health status.[6-11]

Several barriers and facilitators of telemedicine and e-consultations' implementation have been described in the literature; the provision of emotional and technical support to patients, engagement and motivation, and training of patients and clinicians are described as important facilitators;[12] barriers include poor body language and communication, and patients' negative perceptions of online health consultation privacy and security.[12]

Recently, the 2020 Stanford Health trends report described healthcare practitioners' preparedness for the use of technology in healthcare as a gray area, a "transformation gap," since both current and future physicians feel inadequately trained.[13]

Successful implementation and maintenance of the use of telemedicine in the healthcare depend on the competency and efficiency of medical professionals who use the technology.[14] However, little is known about telemedicine-related views, knowledge, and skills of our future healthcare providers, the medical interns. Hence, the aim of the present paper was to examine medical interns' perception of the role of telemedicine, SM, and medical Apps in patient care, their awareness of guidelines governing telemedicine use and whether related targeted training was necessary.

## Materials and Methods

This was a qualitative study conducted from June to September 2020, through semi-structured focus group discussions (FGD) and key informant (KI) interviews. Ethical approval for this study was obtained from the Institutional Review Board (IRB), vide letter no. IRB-UGS-2019-01-205, dated 16/04/2019. Written informed consent was obtained from all study participants before data collection. Participants were assured that all data would be kept confidential and they had the right to withdraw from the study at any time.

The inclusion criteria were male and female medical interns who had completed at least 1-year internship training, from any region in Saudi Arabia and had given informed consent to participate in our interviews. Additional criteria for choosing KIs were medical interns who had participated in student councils, student clubs, or other similar activities.

A total of 24 medical interns were recruited from the five main regions of Saudi Arabia: eastern, western, central, northern, and southern regions. A purposeful sampling method was used for recruitment to ensure that all five main regions of Saudi Arabia were represented. Recruitment was done through Twitter direct messaging ($n = 15$) and face-to-face contact ($n = 9$). The aim and method of the study were explained to the medical interns, and consent to record the interviews and discussions was sought and given. Recruitment was stopped when data saturation was observed.

Six FGDs (A to F) and 5 KI interviews (K1-K5) were completed. All interviews were conducted through the Zoom platform, version 5.2.1., at a time convenient for the participants and lasted 1 h, on average. Each focused group discussion included medical interns from the same province.

During the semi-structured interviews, interns participating in the FGDs and KI interviews discussed different aspects of their use, perception and views on telemedicine, SM and medical Apps' utilization in healthcare, addressing in particular (in sequence): their general perception on the suitability (including advantages/disadvantages) of telemedicine, SM and medical Apps for healthcare delivery at present and in the future; awareness of related ethical and legal guidelines and confidentiality and privacy aspects, as well as the need for targeted training on associated technical and ethical requirements for safe and proper use of telemedicine, SM and medical Apps in healthcare delivery. The respective questions asked in interviews are reported in the results and tables.

All FGDs and KI interviews were audio-recorded and transcribed verbatim. Translation from Arabic to English was done by the researchers and a reverse translation into Arabic done by an external assistant. All transcripts were manually coded and organized in themes and subthemes by 2 researchers and reviewed by a third researcher.

## Results

A total of 24 medical interns participated in the KI interviews and FGDs. The participants' mean age was 25 years (minimum 23 years and maximum 30 years), 22

participants were Saudis, 15 were females, and 2 were married. Seven participants were medical interns from the Western province, 7 from the Eastern province, 5 from the Central province, 4 from the Southern province, and 1 from the Northern province.

Interviewed interns discussed advantages and disadvantages of the use of telemedicine, SM, and Medical Apps' in healthcare [Table 1]. Top perceived advantages were saving patients' time and effort and facilitating interns' educational purposes. Interviewees also praised SMs ability to raise the health awareness of the population. They described how some doctors use their SM accounts to educate the public about the conditions they specialize in. Thus, they can quickly disseminate health information among the different groups in the communities of the population. These advantages of SM are facilitated by its relative ease of use together with the wide availability of smart devices in the population.

As a downside to the use of telemedicine, SM, and medical Apps, our interviewees noted that some population groups in Saudi Arabia, especially the elderly, might not know how to use the technology or are uncomfortable with its use. Furthermore, from a physician's perspective, medical Apps might not be suitable for the performance of a full physical examination. Regarding SMs disadvantages, interviewees agreed on how SM platforms have become the space for rumors and health-related misinformation [Table 1].

Moreover, using telemedicine tools for healthcare delivery might be viewed by the public as a form of dereliction of duty of care, suboptimal care, by the medical staff. In addition, interviewees were worried that telemedicine utilization might prove time consuming, overwhelming physicians already struggling with work-life balance [Table 1].

Interns also analyzed the possible context of the use of telemedicine, SM, and Medical Apps, including important aspects facilitating interns' use of telemedicine in healthcare service and delivery [Table 2]. No notable gender or regional differences were observed among our interviewees regarding the reported themes and subthemes. Participants had a positive opinion on the role

**Table 1: Views of medical interns regarding the advantages and disadvantages of telemedicine**

| Themes | Supporting quotes |
|---|---|
| **Perceived advantages of medical applications and social media use in healthcare** | |
| Saving patient's time and effort | *"The patients do not have to come to the hospital for everything, they can consult their physicians through the Apps from home"* A1 |
| For educational purposes | *"…because our field is huge, we can't cover everything about everything, with this app it was easy to find the information in seconds"* K5 |
| Raise the population's health awareness | *"The advantage is that there are now known doctors in SM and people take information from"* C2 |
| Reach the masses quickly and easily | *".advantage is that we can reach a large group of people with a click"* E1 |
| Reach the different groups (ethnic, age, gender, etc…) within the community | *"You can reach different groups of community and different age groups"* K4 |
| Ease of use and wide availability | *"…it made things much easier for the younger generations…"* A3 |
| | *"….it is in everyone's hand and it is easy to spread the knowledge to all different groups of the population"* C3 |
| **Perceived disadvantages of medical applications and social media use in healthcare** | |
| Lack of knowledge on how-to-use or discomfort in using | *"…older generations will prefer to come to clinics…those older than 50 have no knowledge of how to use technology, and even if all of them had WhatsApp not all of them can write and read"* C1 |
| Might not be suitable for physical examination | *"Telemedicine is not suitable for all specialties, especially the surgical, you need to examine the patient. It may be enough for (taking) history but not for physical examination…when we ask the patients for a picture of the lesion it can be unclear"* E3 |
| May facilitate the spread of rumors and (health) misinformation | *"We need to educate the public of how to tell (identify) what is true and what is not, and who to listen to"* D3 |
| | *"There were people who spread fear as well as wrong information"* K3 |
| May be viewed as suboptimal care by some members of the population | *"…people still didn't accept everything to be through technology and it still needs time"* K5 |
| Might require extra time and effort of physicians and affect their work-life balance adversely | *"…it could be overwhelming for the doctor if patients contact (reach out to) their doctors too often, if I described it nicely"* K2 |
| | *"For the information to reach the people, the account must have a lot of followers. A person (physician) needs to be popular and put in much effort for 2-3 years to reach the required number of followers. This makes a lot of people avoid this activity (health promotion)"* B2 |

Apps=Applications

**Table 2: Views of medical interns on the context of telemedicine use and the medical specialties that would benefit from telemedicine modalities**

| Themes | Supporting quotes |
|---|---|
| **In your opinion, how can telemedicine modalities be utilized in healthcare, i.e., context of telemedicine use?** | |
| Health promotion | *"In health promotion, when the patient presents to the hospital because he has learnt of (e.g., from social media {SM}) the symptoms of such (his) condition"* D1 |
| History taking | *"We can use SM for history taking, for example by making a form with the questions of history for the patient to complete"*A2 |
| Clinical investigations/tests (laboratory, radiological, etc.) | *"For example, one of my colleagues in a governmental hospital told me that if a hospital in rural area needs a radiologist to read the imaging, they can send it to another (specialized) hospital"* E1 |
| | *"We can use it for investigations, instead of the patient going to the hospital just to give (blood, urine, etc.) samples, he can book an appointment for a pickup service to collect the sample from him while he is at home"* A2 |
| Management | *"Medical Apps help us especially in management since we cannot memorize all the doses"* A1 |
| Follow-up | *"Regarding the DM, there is an app to monitor the reading (of blood glucose) and share it with the physician"* B3 |
| | *"We can also use it for follow-up for example the patient has to come to the clinic only every 3 months and during these 3 months, the patient can follow-up with the doctor through the virtual clinics"* C2 |
| | *"It's a tool you can use it as much as you can. More in follow-up, (monitoring of) blood pressure, heart rate, (blood) sugar. Virtual clinic is good except in physical examination"* D2 |
| | *"All specialties need SM and medical Apps. However, I don't think seeing a patient virtually is as efficient as in the clinic… (telemedicine is) more useful in follow-up"* D4 |
| **In your opinion, which medical specialty would benefit from telemedicine the most?** | |
| Family medicine | *"…since they (family physicians) are the first line of healthcare and they only need simple information that can be communicated through virtual clinic, and because it (family doctor visit) includes all other specialties in general"* A2 |
| | *"…especially that the relationship between the patient and (family) doctor is up to 30–40 years and (involves) a lot of follow-up (visits)"* E1 |
| All specialties | *"I think all specialties can benefit from them, they can educate the patients more in SM and help them know which specialty they should consult for their condition"* A3 |
| Psychiatry | *"Psychiatry since some patients hesitate to visit the clinic because of the stigma of psychiatric patients (conditions)"* C3 |
| Pediatrics | *"To help in educating the mothers about the vaccinations and the children's development"* A1 |
| Ophthalmology | *"In tele-retinal screening program for diabetic retinopathy and retinopathy of prematurity, where the patient comes for his internal medicine or family medicine appointment and a photo of his retina is sent to the ophthalmologist for further evaluation. So, the patient won't have to go for an ophthalmologist unless needed"* K4 |
| Dermatology | *"Dermatology if the app is well developed and you can send a picture or video"* F2 |
| Radiology | *"Radiology also can benefit from it if the imaging is already done and only interpretation is left"* F3 |

SM=Social media, DM=Diabetes mellitus, Apps=Applications

technology could play in healthcare with the majority supporting the use of telemedicine, SM, and medical Apps, in healthcare. *"The… new era of medicine depends on technology greatly… It (technology) is difficult because still we are not used to it, but it has potential"* D2. In addition, interviewees discussed the medical specialties that would benefit the most from telemedicine, SM, and medical Apps [Table 2].

Table 3 summarizes medical interns' opinions on the regulating ethical and legal guidelines for telemedicine and related knowledge and training aspects.

When asked if they were aware of any guidelines on ethical and legal considerations of using SM and medical Apps in healthcare, almost all participants did not know of any such telemedicine regulating guidelines. Nonetheless, all interviewees agreed on the importance of guidelines to regulate the use of technology in the healthcare context and showed willingness to learn more.

During the discussions on ethical, privacy, and confidentiality aspects of SM and medical Apps' use in healthcare, some participants opined that providing care through SM and medical Apps could help protect the privacy of some patients. Interns mentioned as an example individuals who need mental healthcare but would rather not attend a psychiatry clinic because of the stigma attached. What's more, interviewees pointed out that caution must be exercised when using SM and medical Apps to postcases online for healthcare-related purposes to ensure patients' privacy and confidentiality are not breached [Table 3].

Above all, interns agreed that having the technical know-how and knowledge of the associated ethical and legal aspects of the use of telemedicine, SM, and medical

**Table 3: Medical interns' views on telemedicine regulating ethical and legal guidelines and related knowledge and training aspects**

| Themes | Supporting quotes |
|---|---|
| Are you aware of any guidelines addressing ethical and legal considerations of using SM and medical Apps? | *"Not aware"* C1 |
| | *"No (not aware of specific guidelines), just the ethics we studied (in medical school)" C2* |
| | *"Not aware of specific guidelines.I depend more on common practice (generally accepted medical practice and technology use)"* K4 |
| Importance of guidelines to regulate technology use in the healthcare context | *"No (I am not aware of any guidelines). Yes, such guidelines are important (for practice)" K3* |
| | *"I tried to search (for guidelines) before . but I could not find something clear" B1* |
| | *"No, I don't know (about such guidelines). Yes, I think it (technology use regulating guidelines) is important since we are moving to that area (increasing role of technology in healthcare purposes)"* K1 |
| Protection of patient's privacy and confidentiality | *"SM and (medical) Apps can help actually with confidentiality and privacy for those psychiatric patients who are afraid of the (mental illness) stigma"* C1 |
| | *"If it will help others, I might post it (a patient's case) in general terms (nonidentifying description) after taking the patient permission and ensuring privacy, but not just because the case is interesting"* E2 |
| | *"They (physicians) should post it (patient information) with no (identifying) patient data as they do now. If it is purely medical, I prefer it to be shared in the specific Apps for medical profession (for physicians/medical trainees)"* K2 |
| Improving medical trainees' and physicians' telemedicine related knowledge and skills | *"For sure the answer is yes to both, training on use of SM and medical Apps and related ethical and legal aspects. I feel that there should be regular training sessions, updated every 6 months to 1 year, to address the latest programs (Apps) that emerge into the medical arena. The training should be under the auspices of the healthcare institution where physicians work and train. This allows for providing patients with improved and up-to-date healthcare services. The current situation on the ground is dependent on each physician's personal initiative to train and remain updated on the latest programs (medical Apps)"* E3 |
| | *"Yes, I think SM and medical Apps, all of these electronics (telemedicine), are beneficial in the practice and should have a big part in our teaching process in all subjects. Nowadays, we have the SM, Apps, and websites, all of them…. facilitate a lot in respect to the charts, diagnosis, treatment, everything even the patient education. So yes, I agree on training (as interns and undergraduate medical students)…. for us to learn these Apps and websites. Same for the ethical and legal part (aspects)"* D3 |
| | *"Yes, I think we need to train in both undergraduate and postgraduate. For postgraduate I would recommend to incorporate courses with CME Hours to encourage them to attend. For medical students (undergraduate) I would recommend that it be included in their curriculum in the final years. And the reason for need of undergraduate and postgraduate training is that they need to be taught the proper use of the SM (platforms); SM is full of misinformation and for that reason, I believe it is crucial to master the use"* E1 |

SM=Social media, Apps=Applications

Apps' in healthcare are essential for both medical trainees and physicians [Table 4].

Most participants agreed on the need for specific and targeted training on how to properly use SM and medical Apps in healthcare. However, some participants would rather have this training made optional and directed at those who lacked the confidence to use SM and medical Apps with their patients [Table 4].

On the issue of whether there was the need for specific training on the ethical and legal aspects of SM and medical Apps' use in healthcare, almost all interviewees believed that this training was a requisite for the protection of both patients and physicians [Table 4].

## Discussion

Our study revealed that medical interns appreciated the benefits of telemedicine and its potential of facilitating healthcare delivery. Nevertheless, they believed that they needed training on its proper use and instruction on related ethical and legal regulating guidelines.

Telemedicine was adopted in Saudi Arabia primarily to enhance access and improve the quality of healthcare services, particularly in rural and remote communities.[15,16] In the present study, interviewed medical interns appreciated as top advantages of medical Apps and SM, respectively, its ability to save patients' time and effort, enhance interns' own medical educational goals, raise awareness of the general public to health issues by their relative ease of accessibility and use, especially SM platforms. Published studies, among physicians, also report that top perceived advantages of telemedicine use include the saving of time and money, reach to remote areas and the potential as a tool for timely delivery of health promotion messages to a diverse large number of people.[17-22] Nevertheless, our interviewees noted that not everyone in the public

**Table 4: Medical interns' views on the need for targeted training on technical, ethical, and legal aspects of telemedicine**

| Themes | Supporting quotes |
|---|---|
| **Do you think medical interns and/or undergraduate medical students need training addressing the (technical) use of telemedicine, SM, and medical apps for healthcare and related ethical and legal aspects? Should the training be optional or mandatory?** | |
| Support training on the technical aspects and/or the ethical and legal aspects | *"Yes, when people consult you on WhatsApp for example, you need to know the specific question that you need to ask to arrive at the diagnosis. Even in the physical examination, I remember one time someone asked me on WhatsApp, she was afraid of DVT. I asked her about the temperature of the leg, and to measure and compare both legs. I don't know if the patient gave me a reliable info or not. So yes, we need to learn how to take and make sure of the info* |
| | *The ethical and legal (training need) yes. For the same example, if it was really DVT and I couldn't ask her the suitable question!?* |
| | *For the medical student also yes (they need training) because they are not certified for practice"* D4 |
| | *"We do need training indeed for both interns and medical students, especially if it's complicated app, for a better and ultimate healthcare delivery. Also, yes we need training on the ethical and legal aspects"* K4 |
| | *"Yes, for sure. In my opinion, telemedicine uses very different methods and technique than what we are training for in med (medical) school so we must be trained either as doctors or med (medical undergraduate) students before our practice is safe for our patients as well as ourselves. So, yes for (training on) the ethical and legal part (aspects)"* K3 |
| | *"Yes better to be trained on using the (medical) apps is the same as training on using the hospital systems (for patient care). Medical students can get basic simple training that can be intensified once they start applying and using these apps for actual patient care. Regarding the ethical training, yes there is need for training for both medical interns and medical students"* A2 |
| | *"Yes, it (training) has to be mandatory because doctors need to know what to say and when to say it, like what is happening now is not acceptable: you see a dermatology physician talking (posting on social media) the management of COVID19 patients in ICU. There are two options (for training medical students): In 6th year before internship or in 4th year, because a lot of students when they reach clinical years they start posting in SM; I am against adding it in 2 years because it increases the burden on the students and may cause them to neglect it"* A3 |
| Does not support training (or support only brief training) on the technical aspects and/or the ethical and legal aspects | *"No, I believe our generation can adapt and learn how to use new Apps very quickly. (Regarding training on the ethical and legal aspects) A printed copy of them (the guidelines) will suffice"* B3 |
| | *"For me I think I don't need training for medical Apps because already know how to use it; for others like students and healthcare providers yes, they need training, especially the old staff, and about the ethical part is supposed to be a guideline to explain true limit of the use of the medical Apps in providing healthcare to the people"* C3 |
| | *"Yes, but not necessarily, especially during these days… depends on the hospital and facility that you are in. Based on this once you have a personal account, take an orientation (training course) with it. Regarding the ethical part, yes definitely. How to use it could be later but the ethical part everyone should be trained not only as interns but even as (medical) students"* D2 |
| | *"yes, sure there must be training material for medical students either in the main (compulsory) curriculum or as an optional training module. For medical interns, training could be optional for those who are interested"* K1 |
| | *"Yes, I think it is important (to train on the ethical and legal aspects) because this will unify the ground for us, it will protect you from the legal claims, and will make you a clean ethical doctor. Regarding the use: Yes, but briefly. I would prefer just a short video or tutorial on this topic"* E2 |

SM=Social media, ICU=Intensive care unit, Apps=Applications, DVT=Deep vein thrombosis

(consider the elderly) is comfortable with the use of telemedicine, SM, and medical Apps for healthcare, a concern noted in the literature.[14,22]

Discussing potential disadvantages of medical Apps and SM in healthcare, our participants believed that they did not provide the physician with a full picture of the patient's condition because of the inability to carry out a complete "regular" physical examination. SM may also facilitate the easy and problematic spread of misinformation and rumors about health issues. Similar concerns have been cited by a few other studies exploring the opinion of Saudi physicians.[21-23]

Another concern our interns raised about telemedicine use was that some patients might view care delivered through telemedicine as a form of dereliction of the duty of care by the medical staff. Comparable results were found nationally and internationally, where 53% of Saudi doctors[24] and 60.8% of Australian physicians[25] previously reported their discomfort in using online means to communicate with their patients.

Furthermore, our participants worried about the possibility of physicians being overwhelmed by the additional work, time, and effort perceived in the incorporation of telemedicine into healthcare delivery.

Related concerns indicate that using telemedicine and SM to deliver care would affect time for family, friends, and other commitments and have been addressed in other studies as barriers to physicians' utilization of telemedicine tools such as SM.[21,22,26]

Nevertheless, almost all our interns supported the use of telemedicine, SM, and medical Apps, in healthcare delivery, particularly for simple noncritical cases and in following up stable patients and those with chronic diseases or patients living a considerable distance away from hospital. This is consistent with the recent increase in the rates of adoption of telemedicine seen in Saudi Arabia,[23,27] ranging from 33% to 72%, in the use of telemedicine modalities reported by physicians in the different institutions.[14,24] On our reported themes and subthemes in this study, no notable gender or regional variation in telemedicine use was observed. This may be because medical interns' interaction with patients is closely supervised and regulated to follow uniform standards across the different medical training institutions.

Our interviewees acknowledged that telemedicine had facilitated clinical laboratory and radiological investigations test results through online ordering and follow-up of results and the soliciting of the opinion of an expert or second opinion when interpreting test results. This is in accord with related literature in which physicians agreed that investigations could be communicated through online and thus facilitate the provision of care at a lower cost to the patient and reduce the bed occupancy in health facilities.[28-30]

Our interns indicated that family medicine was suited for telemedicine, SM, and Medical Apps' in facilitating patients' first contact with the healthcare system and for long periods of follow-up as needed. Some interviewees believed that all healthcare disciplines including psychiatry, pediatrics, ophthalmology, and dermatology could benefit from telemedicine. Interestingly, this opinion is in line with the preferences of the Saudi public as a recent study concluded that the preferred specialties for the use of telemedicine for virtual consultations by the Saudi public included internal medicine, dermatology, and pediatrics.[31] Radiology was also mentioned by our interns as amenable to benefit from telemedicine use in interpreting radiographic images. This is consistent with the published literature indicating specialties with essentially visual patient data, such as radiology and dermatology, which might be better suited than others to utilize telemedicine technology.[32]

Almost none of our interviewed medical interns were aware of telemedicine regulating guidelines. Nonetheless, all participants recognized the vital role of such guidelines governing telemedicine use for healthcare delivery and showed a desire to learn more about them. These findings confirm the results of recent Saudi studies reporting physicians' concern about the legal aspects of the use of telemedicine[14,24,27] and that only about a third of studied Saudi physicians were aware of telemedicine-related guidelines.[14] It is worth noting that telemedicine regulations in Saudi Arabia were only recently discussed by the National Health Information Centre in 2018.[33] Physicians avoid using telemedicine, as some studies concluded, because of their inadequate knowledge of the guidelines; a telemedicine implementation barrier.[17,22]

Our interns appreciated the possible role of telemedicine, SM, and medical Apps in protecting the privacy and confidentiality of those patients who value discretion, such as those seeking mental healthcare services. The anonymity offered by telepsychiatry services, such as Qareebon medical app from the Saudi National Committee for Mental Health Promotion, could help increase awareness of mental health disorders and related services in the community, and increase service utilization by reducing recipients' feelings of shame and the stigma of mental illness.[7,34] Moreover, our interviewees agreed on the importance of protecting patients' privacy, obtaining patients' informed consent, and removing any patient identifying information when considering posting cases on SM and medical Apps. Breaching patient privacy and its negative consequences was addressed in the literature as a risk in the use of SM for healthcare.[35,36] In fact, in a 2020 study that aimed to measure the amount of identifiable information healthcare professionals would share about their patients on Twitter, physicians were found to be more likely than other medical professionals to disclose patient identifiable information,[37] which constitutes violation of patients' privacy and confidentiality and will no doubt lead to complaints with adverse legal effects on a physician's career.[38]

Our interviewed interns regarded as vital the knowledge and training on the technical and related ethical and legal issues for the use of telemedicine, SM, and medical Apps' for the purposes of healthcare. Telemedicine virtual "webside" visits, just like their contemporary traditional in-person bedside visits, require skills in effective engagement of patients, verbal and nonverbal communication, explaining risks and benefits to patients, learning to read a patient's body language or tone of voice, knowledge of telemedicine regulations and the consequences of breaching them and maintenance of the standards of professionalism.[3,39-43] Multiple recent studies conclude that both current and future physicians welcome technological advances in medicine but feel

inadequately trained to cope with them and are actively seeking additional training.[44-46]

The literature on this topic of training discusses a variety of optional and mandatory telemedicine training programs[47-49] in the preclinical and clinical undergraduate years.[46,50] Furthermore, the American Medical Association and the American Telemedicine Association have developed codes and guidelines for the use of telemedicine, which can be useful resources for physicians as well as training and regulatory bodies.[51,52] Some of our interns claimed that being technology "natives" without accompanying formal training was adequate; they possess the necessary technical skills and ability to deliver good patient care through teleconsultations. However, this has been recognized in the literature as a "fallacy" and may result in low quality of care with high variability and documented inconsistencies delivered to the patients.[53,54] Training on and learning more about telemedicine and its clinical application would reduce physicians' uncertainty about it as well as promote improved care delivery.[13,17,22,55]

A key strength of this study is that our interns had all completed at least one full year of internship training, which would make their perspective more representative of a typical medical intern. Moreover, care was taken to represent interns training in Saudi Arabia's five main regions, thereby reflecting an inclusive range of experiences and opinions. In addition, our interviews were conducted during a period of wide intensive deployment of telemedicine in Saudi Arabia, following the onset of COVID-19 pandemic, which ensured that our interviewees were familiar with the themes analyzed in this paper. Despite this, our findings have to be considered in light of some limitation, namely that medical interns might generally have limited online interaction with patients. Furthermore, reported interns' views might have been influenced by the exceptionally heightened telemedicine use during the pandemic period. The study may be repeated at a later, postpandemic time, with perhaps more ubiquitous and normalized telemedicine practice. Nonetheless, we reckon our results highlighted essential aspects of the utilization of telemedicine, SM, and medical Apps in healthcare that may inform decisions on internship training.

## Conclusion

Medical interns appreciated the benefits of telemedicine, SM, and medical Apps, and the majority agreed on their role in facilitating healthcare delivery. However, interns face key challenges to safely and successfully utilize these technologies in clinical practice considering their lack of technical operational skills and knowledge of related ethical and legal regulating guidelines. There is, thus, the pressing need for specific accredited, uniform coaching of medical trainees on both of these aspects of technical and regulatory telemedicine.

The presented results are expected to have important current and future implications for clinical practice as well as the continuous professional development of both junior and senior physicians. Future examination of varying healthcare contexts and other healthcare workers and provider categories is warranted.

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## Conflicts of interest

There are no conflicts of interest.

## References

1. Craig J, Patterson V. Introduction to the practice of telemedicine. J Telemed Telecare 2005;11:3-9.
2. Shih J, Portnoy J. Tips for seeing patients via telemedicine. Curr Allergy Asthma Rep 2018;18:50.
3. Elliott T, Matsui EC, Cahill A, Smith L, Leibner L. Conducting a professional telemedicine visit using high-quality webside manner. Curr Allergy Asthma Rep 2022;22:7-12.
4. Zimba O, Radchenko O, Strilchuk L. Social media for research, education and practice in rheumatology. Rheumatol Int 2020;40:183-90.
5. Alghamdi S, Alqahtani J, Aldhahir A. Current status of telehealth in Saudi Arabia during COVID-19. J Fam Community Med 2020;27:208-11.
6. MoH Ministry of Health: All the Kingdom Will be Covered by Telemedicine in Two Months; 2018. Available from: https://www.moh.gov.sa/en/Ministry/MediaCenter/News/Pages/news-2018-03-06-006.aspx. [Last accessed on 2022 Jan 02].
7. Gov.sa Unified National Platform: E-Directory for Psychological Health; 2021. Available form: https://www.my.gov.sa/wps/portal/snp/servicesDirectory/servicedetails/s9140/!ut/p/z0/04_Sj9CPykssy0×PLMnMz0vMAfIjo8zivQIsTAwdDQz9LQwNzQwCnS0tXPwMvYwN3A 30g1Pz9L30o_ArAppiVOTr7J uuH1WQWJKhm5mXlq8fUWxpaGKgX5DtHg4Aw5wwHA!!/. [Last accessed on 2022 Jan 02].
8. Ministry of Communications and Information Technology. Annual Report 2019; 2019. Available form: https://www.mcit.gov.sa/sites/default/files/annual_report_eng_v2.pdf. [Last accessed on 2022 Jan 02].
9. Al-Samarraie H, Ghazal S, Alzahrani AI, Moody L. Telemedicine in Middle Eastern countries: Progress, barriers, and policy recommendations. Int J Med Inform 2020;141:104232.
10. Telemedicine. Available from: https://www.moh.gov.sa/en/Ministry/Information-and-services/Pages/Telemedicine.aspx [Last accessed on 2022 Feb 20].
11. MOH Apps for Smartphones; 2021. Available from: https://www.

moh.gov.sa/en/Support/Pages/MobileApp.aspx. [Last accessed on 2022 Feb 20].
12. Almathami H, Win K, Vlahu-Gjorgievska E. Barriers and facilitators that influence telemedicine-based, real-time, online consultation at patients' homes: Systematic literature review. J Med Internet Res 2020;22:e16407.
13. Stanford University School of Medicine. The Rise of the Data-Driven Physician; 2020. p. 15-6.
14. Albarrak AI, Mohammed R, Almarshoud N, Almujalli L, Aljaeed R, Altuwaijiri S, *et al.* Assessment of physician's knowledge, perception and willingness of telemedicine in Riyadh region, Saudi Arabia. J Infect Public Health 2021;14:97-102.
15. Alharbi A, Alzuwaed J, Qasem H. Evaluation of e-health (Seha) application: A cross-sectional study in Saudi Arabia. BMC Med Inform Decis Mak 2021;21:103.
16. El-Mahalli AA, El-Khafif SH, Al-Qahtani MF. Successes and challenges in the implementation and application of telemedicine in the eastern province of Saudi Arabia. Perspect Health Inf Manag 2012;9:1-27.
17. Ayatollahi H, Sarabi FZ, Langarizadeh M. Clinicians' knowledge and perception of telemedicine technology. Perspect Health Inf Manag 2015;12:1c.
18. Malhotra P, Ramachandran A, Chauhan R, Soni D, Garg N. Assessment of knowledge, perception, and willingness of using telemedicine among medical and allied healthcare students studying in private institutions. Telehealth Med Today 2020;5. [https://doi.org/10.30953/tmt.v50.228].
19. Al-Ghamdi S. Popularity and impact of using smart devices in medicine: Experiences in Saudi Arabia. BMC Public Health 2018;18:531.
20. Mishra S. When patients connect with physicians on facebook: Physician perspectives on benefits, challenges, and strategies for managing interaction. Health Technol 2018;9:505-15.
21. Panahi S, Watson J, Partridge H. Social media and physicians: Exploring the benefits and challenges. Health Informatics J 2014;22:99-112.
22. Campbell L, Evans Y, Pumper M, Moreno MA. Social media use by physicians: A qualitative study of the new frontier of medicine. BMC Med Inform Decis Mak 2016;16:91.
23. Mubaraki AA, Alrabie AD, Sibyani AK, Aljuaid RS, Bajaber AS, Mubaraki MA. Advantages and disadvantages of telemedicine during the COVID-19 pandemic era among physicians in Taif, Saudi Arabia. Saudi Med J 2021;42:110-5.
24. Alanzi T, Al-Yami S. Physicians' attitude towards the use of social media for professional purposes in Saudi Arabia. Int J Telemed Appl 2019;2019:6323962.
25. Brown J, Ryan C, Harris A. How doctors view and use social media: A national survey. J Med Internet Res 2014;16:e267.
26. Barayev E, Shental O, Yaari D, Zloczower E, Shemesh I, Shapiro M, *et al.* WhatsApp Tele-Medicine – Usage patterns and physicians views on the platform. Israel J Health Policy Res 2021;10:34.
27. Kaliyadan F, Al Ameer MA, Al Ameer A, Al Alwan Q. Telemedicine practice in Saudi Arabia during the COVID-19 pandemic. Cureus 2020;12:e12004.
28. de Oliveira Andrade A, Soares AB, de Andrade Palis A, Cabral AM, Barreto CG, de Souza DB, *et al.* On the use of telemedicine in the context of COVID-19: Legal aspects and a systematic review of technology. Res Biomed Eng 2022;38:209-27. https://doi.org/10.1007/s42600-021-00133-8.
29. Blozik E, Wildeisen IE, Fueglistaler P, von Overbeck J. Telemedicine can help to ensure that patients receive timely medical care. J Telemed Telecare 2012;18:119-21.
30. Eshita IR. Knowledge and attitude of the physicians toward telemedicine. Glob Sci Res 2017;5:85-146.
31. Alshammari F, Hassan S. Perceptions, preferences and experiences of telemedicine among users of information and communication technology in Saudi Arabia. J Health Inform Dev Ctries 2019;13:1-15.
32. Kaliyadan F, Amin TT, Kuruvilla J, Ali WH. Mobile teledermatology-patient satisfaction, diagnostic and management concordance, and factors affecting patient refusal to participate in Saudi Arabia. J Telemed Telecare 2013;19:315-9.
33. National Health Information Center in Saudi Health Council. Telemedicine Regulations in the Kingdom of Saudi Arabia; 2018 Jun 29. Available from: https://nhic.gov.sa/en/Initiatives/Documents/TheGoverningRulesOfTelehealthEnglishEstablishingRules.pdf. [Last accessed on 2022 Feb 20].
34. Rajgopal A, Li CR, Shah S, Budhathoki SS. The use of telehealth to overcome barriers to mental health services faced by young people from Afro-Caribbean backgrounds in England during the COVID-19 pandemic. J Glob Health 2021;11:03040.
35. Alsughayr AR. Social media in healthcare: Uses, risks, and barriers. Saudi J Med Med Sci 2015;3:105-11.
36. Alanzi T, Alfuraikh A. Do healthcare providers pay attention to sharing hospital patient safety incidents through social media in Saudi Arabia? J Patient Saf 2022;18:e211-6.
37. Ahmed W, Jagsi R, Gutheil TG, Katz MS. Public disclosure on social media of identifiable patient information by health professionals: Content analysis of twitter data. J Med Internet Res 2020;22:e19746.
38. Rimmer A. Doctors' use of Facebook, Twitter, and WhatsApp is the focus of 28 GMC investigations. BMJ 2017;358:j4099.
39. Pourmand A, Ghassemi M, Sumon K, Amini SB, Hood C, Sikka N. Lack of telemedicine training in academic medicine: Are we preparing the next generation? Telemed J E Health 2021;27:62-7.
40. Sartori DJ, Olsen S, Weinshel E, Zabar SR. Preparing trainees for telemedicine: A virtual OSCE pilot. Med Educ 2019;53:517-8.
41. Yaghobian S, Ohannessian R, Iampetro T, Riom I, Salles N, de Bustos EM, *et al.* Knowledge, attitudes and practices of telemedicine education and training of French medical students and residents. J Telemed Telecare 2020. doi:10.1177/1357633X20926829.
42. Hare N, Bansal P, Bajowala SS, Abramson SL, Chervinskiy S, Corriel R, *et al*. Work Group Report: COVID-19: Unmasking telemedicine. J Allergy Clin Immunol Pract 2020;8:2461-73.e3.
43. Iancu AM, Kemp MT, Alam HB. Unmuting medical students' education: Utilizing telemedicine during the COVID-19 pandemic and beyond. J Med Internet Res 2020;22:e19667.
44. Aldebasi B, Alhassan AI, Al-Nasser S, Abolfotouh MA. Level of awareness of Saudi medical students of the internet-based health-related information seeking and developing to support health services. BMC Med Inform Decis Mak 2020;20:209.
45. Mulcare M, Naik N, Greenwald P, Schullstrom K, Gogia K, Clark S, *et al.* Advanced communication and examination skills in telemedicine: A structured simulation-based course for medical students. MedEdPORTAL 2020;16:11047.
46. Harendza S, Gärtner J, Zelesniack E, Prediger S. Evaluation of a telemedicine-based training for final-year medical students including simulated patient consultations, documentation, and case presentation. GMS J Med Educ 2020;37:Doc94.
47. Edirippulige S, Brooks P, Carati C, Wade VA, Smith AC, Wickramasinghe S, *et al*. It's important, but not important enough: EHealth as a curriculum priority in medical education in Australia. J Telemed Telecare 2018;24:697-702.
48. Waseh S, Dicker AP. Telemedicine training in undergraduate medical education: Mixed-methods review. JMIR Med Educ 2019;5:e12515.
49. Poncette A, Glauert D, Mosch L, Braune K, Balzer F, Back D. Undergraduate medical competencies in digital health and curricular module development: Mixed methods study. J Med Internet Res 2020;22:e22161.
50. Budakoğlu İİ, Sayılır MÜ, Kıyak YS, Coşkun Ö, Kula S. Telemedicine curriculum in undergraduate medical education:

A systematic search and review. Health Technol (Berl) 2021;11:773-81.

51. American Medical Association. Available from: https://www.ama-assn.org/. [Last accessed on 2022 Feb 20].
52. American Telemedicine Association – ATA. Available from: https://www.americantelemed.org/. [Last accessed on 2022 Feb 20].
53. Schoenfeld AJ, Davies JM, Marafino BJ, Dean M, DeJong C, Bardach NS, *et al.* Variation in quality of urgent healthcare provided during commercial virtual visits. JAMA Intern Med 2016;176:635-42.
54. Sharma R, Nachum S, Davidson KW, Nochomovitz M. It's not just FaceTime: Core competencies for the Medical Virtualist. Int J Emerg Med 2019;12:8.
55. Chen P, Xiao L, Gou Z, Xiang L, Zhang X, Feng P. Telehealth attitudes and use among medical professionals, medical students and patients in China: A cross-sectional survey. Int J Med Inform 2017;108:13-21.