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Review

The benefits and barriers of online medical education perceived by students during the COVID-19 pandemic

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Abstract

Coronavirus disease 2019 (COVID-19) pandemic has brought a sudden shift towards the adoption of online academic medical education, allowing students to continue their training by distance learning. The shift from traditional classroom to more technology-based virtual learning experiences has been the main challenge for the medical schools who tried their best to offer online course content, involve students, and perform evaluations. Surveys performed on students' perception of online learning during this crisis identified besides barriers some benefits and ideas to be further implemented in practice.

The positive aspects of studying medicine online identified were: increased convenience (saving time previously spent on commuting and wasted because of inconvenient timetabling; possibility to organize a more flexible personal study schedule, the use of pre-recorded or shared materials); enhanced pedagogical quality (updated materials in accessible formats: videos, tutorials, individual audio/video perception better than in a crowded or old-fashioned lecture hall, better availability of optional lectures); a feeling of comfort and protection-avoiding contacts and potential risk of viral infection.

The difficulties, perceived as barriers to effective online learning, include: acquiring practical skills online (bedside and laboratory classes), low quality of some classes-monotonous, to keep focused, loss of motivation, emerging stress and frustration, technical issues (failures of overloaded communication platforms).

Conclusion. The last online academic year provided valuable insights on the aspects of studying medicine that work best with online teaching and identified the benefits and barriers perceived by students. The authenticity of the clinical learning environment cannot be replicated online where clinicians present role models of 'how' to be a doctor. This authenticity of the learning environment has been identified as important in academic medical education, mainly in specialties such as family medicine.

Keywords: *online medical education, students, perception, COVID-19 pandemic*

PRACTICA MEDICALĂ

Review

Beneficiile și barierele educației medicale online percepute de studenți în timpul pandemiei COVID-19

Rezumat

Pandemia Coronavirus 2019 (COVID-19) a adus o schimbare bruscă prin adoptarea educației medicale academice online, permițând studenților să își continue instruirea prin învățământ la distanță. Trecerea de la predarea tradițională la experiențe de învățare virtuală bazate pe tehnologie a fost principala provocare pentru universitățile de medicină care au încercat să ofere conținut de curs virtual, să implice studenții și să-i evalueze prin examene online. Sondajele efectuate cu privire la percepția studenților asupra învățării online în timpul acestei crize au identificat pe lângă bariere, unele beneficii și idei care urmează să fie valorificate.

Aspectele pozitive ale studierii medicinei online identificate de studenți au fost: confort sporit (economisirea timpului consumat anterior la deplasare și din cauza programării incomode); posibilitatea de a organiza un program de studiu personal mai flexibil, utilizarea materialelor preînregistrate sau partajate); calitate pedagogică îmbunătățită (materiale actualizate: videoclipuri, tutoriale, urmărirea audio/video individuală mai bună decât într-o sală de curs aglomerată sau nemodernizată, disponibilitate mai bună pentru cursuri opționale); un sentiment de protecție-evitarea contactelor și a riscului potențial de infecție virală.

Dificultățile percepute ca și bariere în calea învățării la distanță includ abilități practice reduce dobândite online (absența temporară și apoi access limitat la examinarea pacienților și la efectuarea practicii în laboratoare), calitatea scăzută a unor stagii online-monotone, pierderea motivației, stres și frustrare emergente și probleme tehnice.

Concluzie. Ultimul an universitar desfășurat online a oferit informații valoroase cu privire la aspectele studierii medicinei care pot funcționa bine cu predare online și a identificat beneficiile și barierele percepute de studenți. Autenticitatea mediului de învățare clinică nu poate fi reprodusă online, profesorii de la disciplinele clinice prezentând modele privind „cum” să fii medic. Această autenticitate a mediului de învățare a fost identificată că fiind importantă în educația medicală academică, în special în specialitățile clinice precum medicina de familie.

Cuvinte cheie: *educație medicală academică online, studenți, percepție, pandemia COVID-19*

Introduction

Coronavirus disease 2019 (COVID-19) pandemic was a difficult time for the educational sectors to deal with the closure of schools and universities; vocational education, especially medical education, has been more challenging (1). It has brought a sudden shift towards the adoption of online academic medical education, allowing students to continue their training by distance learning (2). This has had acute and long-lasting challenging effects on undergraduate and postgraduate medical education and didactic activities through the shift on distance learning. The migration from the traditional in-classroom medical teaching to more technology-based virtual learning experiences, was the main change in medical education imposed by the COVID-19 pandemic (3).

Medical universities tried to find alternatives ways to manage this difficult circumstance. The shutdown of face-to-face academic teaching stimulated the growth of online educational activities so that there would be no interruption to higher education. They have been focused in how best offer online course content, involve students, and perform evaluations (4).

Online e-learning is described as learning experiences using various electronic devices (computers, laptops, smartphones) with internet availability in synchronous or

asynchronous environmental conditions. It could be a platform that makes the process of education more student-centered, creative, and flexible (5). The provision of online courses is cost-effective and easily accessible especially when delivering curriculum to students in rural and remote areas (6).

E-learning is seen by the WHO as a helpful tool for meeting educational needs, especially in developing countries (7). Creative strategies have been implemented to combat the effect of crisis on medical education, using platforms such as Google Classroom, Zoom, and Microsoft Teams to take online courses. Virtual e-learning classes have been initiated to continue medical education, to stay in contact with students, and increase confidence of students in their faculty during the COVID-19 pandemic.

Medical students' perceptions of e-learning during the Covid-19

The digital medical teaching has affected the training of medical students who have been deprived of the traditional practical clinical training experiences in favor of virtual teaching experiences. Medical students moderately accepted e-learning during the Covid-19 Pandemic in a Saudi Arabian medical university (8).

The benefits of online medical education as perceived by students

In a British national survey of 2721 medical students from 39 medical schools, the advantages of online teaching appeared to be that it saves students time on travelling (19.82 %), provides flexibility (19.52 %), the ability for students to learn at their own pace (18.63 %), it is more comfortable (15.84 %) and it cuts costs (14.24 %).

Other medical students commented that it provides time efficiency, allows more time for students to focus on preparing for clinical placements, and reduces anxiety and being able to be in a different country (9). Several positive aspects of studying medicine online were identified in another study in Poland (10).

The major benefits of online teaching as perceived by this group of students included:

- *increased convenience*: saving time (and money) previously spent on commuting and wasted because of inconvenient timetabling (long pauses between the classes, their localization in distant placements); opportunity to take part in the classes independent from circumstances (e.g. staying abroad or during a quarantine); the possibility to organize a more flexible personal study schedule, the use of pre-recorded or shared materials and planning long-term tasks; a perception of better balance between studying and private/family life;
- *enhanced pedagogical quality*: updated materials in accessible formats (videos, tutorials), individual audio/video perception better than in a crowded or old-fashioned lecture hall, wider extent of recommended resources; better availability of optional lectures (which had been previously sometimes overlapping or occurred at late hours);
- *a feeling of comfort*: staying in familiar environment, in comfortable clothes, without pressure from the faculty setting; a chance for better studying/life balance (more sleep, regular meals, enough time for exercise);
- *a feeling of protection* - avoiding contacts and potential exposure to infection;
- *improvement in computer competence* (use of different options of communication platforms, preparing documents, presentations or databases).

The digital teaching formats which students found to be particularly valuable included:

- *recorded lectures*, followed by "questions & answers" session;
- *interactive clinical case-based discussions* in small groups;
- *workshops with interactive tasks and quizzes* (completion of therapeutic schemes, filling the gaps);
- *tutorials and films illustrating experiments* in basic sciences and clinical procedures (neurological examination, endoscopy, surgical interventions);
- *"live streaming"* from the operation room, ward round or outpatient clinic;
- *online interviews* with *real* or *simulated* patients (10).

The barriers to effective online medical education as perceived by students

In the British survey students stated that family distractions (26.76 %), internet connection (21.53 %), timing of tutorials (17.31 %), anxiety (11.08 %) and lack of space (11.03 %) as barriers to effective online teaching. Some of them experienced lack of motivation, difficulty concentrating and asking questions and a lack of contact with colleagues as further limitations (9).

Complaints associated with online teaching were reported in the Polish study as well (10). They included the followings:

- *unsatisfactory content*: the difficulties in acquiring practical skills online (bedside and laboratory classes), low quality of some classes - monotonous, time-consuming - difficult to keep focused, few opportunities of face-to-face interaction with teachers and peers;
- *technical issues*: poor internet connection, failures of overloaded servers and communication platforms; need to compromise home-office or online learning of other family members;
- *difficulties in learning process*: problems with concentration, loss of motivation, emerging stress and frustration;
- *poor institutional organization*: lack of clear structure and consistency within university/faculty, frequent changes in schedule, lack of coordination between particular departments - conflicting timetables;
- *lack of social life*: no contacts with peers - feeling of isolation affecting mental health, poor integration of 1st year students, lack of discussions and common projects helpful in learning.

The students, who did respond, claimed that online education, in comparison with traditional teaching, required more self-directed learning and greater discipline in the organization of learning requiring a high degree of intrinsic motivation. The majority of students (57.9 %) perceived this impact as negative: they found it more difficult to focus on particular problems and retain information, were getting more fatigued with constant exposure to their computer, felt less motivated to learn regularly without direct contact with teachers and traditional assessment forms, suggesting that this had a negative impact on their learning. A smaller percentage of students (18 %) noticed positive influences of this period upon their learning. Some reported becoming better organized in their scheduling of learning according to their personal needs, felt encouraged to look for additional resources and developed interest in specific topics or specialties (10).

The students' remarks about impact of online education on their individual studying revealed their problems with adapting to a more active approach to self-directed learning than they had previously be used to. The participants in other studies also perceived their autonomous learning (without regular guidance from teachers) as ineffective and complained of lack of self-discipline (11, 12, 13). These findings show the need for curriculum to become more

student-centered and with a greater focus on teaching study skills. An increased students' active participation in the medical education process using problem based learning and complex clinical scenarios should be considered (14,15). It is anticipated that with the implementation of e-learning, the role of faculty members will be transformed from the traditional teacher-centric to student-centric model which serves the current new curriculum applied (16).

The main sources of stress related to anxiety associated with online examination were the unpredictable internet or server failure resulting in interrupted/failed examination and time pressure during the tests (limited and unified time for each answer, one-way navigation mode without ability to return to previous questions). Some students were afraid to be wrongly accused of cheating or found the results of examination unfair related to concerns of cheating by other students. Faculty arrangements to prevent cheating or minimize its impact (obligatory sharing cameras, recording oral examination sessions, increased degree of test difficulty and/or pass threshold) were also perceived as stressful (10).

Undergraduates' attitude towards online teaching was affected by the stage of their studies. Students from clinical years (IV-VI) were more dissatisfied with the content of classes, which would not allow them to acquire competence in clinical subjects, in particular the practical skills needed for successful clinical practice. They claimed that even extended virtual teaching could not replace bedside classes. Similar surveys in other countries also revealed that senior students were less satisfied with online teaching and expressed their concern about their inappropriate preparation for clinical rotations and ultimately for transition from undergraduate to physician (9,17,18,19,20,21,22,23). For pre-clinical students, digital teaching was more acceptable in gaining theoretical knowledge, but they missed interactions with teachers and peers and the overall opportunity to integrate with students' community.

Distress and mental health issues related with online medical learning

There are studies in this field that showed a high level of anxiety and distress among medical undergraduates, expressed in the open comments (20,22) or evaluated with psychometric scales (24,25) and correlated with their learning context and lifestyle habits. In the Polish study, 50% of students found online examinations more stressful than traditional ones. Many students expressed being distressed and frustrated while identifying shortcomings of online teaching or its impact upon their individual learning. Moreover, lack of social contacts and isolation were expressed to affect their mental well-being. In this regard, half of the respondents felt that teachers tried to provide support (10).

In our university, students find support to recognize symptoms of anxiety, depression and distress, as well as to develop effective coping strategies. Considering the expected increase in mental health problems as a result of

pressure from various consequences of the pandemic, an appropriate system of professional counseling and treatment should be developed and strengthened by medical faculties.

Implications for practice

The students' feedbacks from these studies help teaching staff to accommodate the exponential growth in knowledge to already overfull curricula (26,27), to design a blended teaching approach, to train doctors best to work in the community setting and through virtual visits. The clinical lectures, lab class and exams are not the only aspects of the medical student experience that can be done remotely. Students also witnessed and took part in remote versions of vital medical tasks such as electronic health recording, tele-visits, e-prescription of medication, and social work coordination.

The teaching online in medical education must be recognized as a problematic. A clinical course is not a static or portable entity that can simply be moved online (21) but is a complex mix of content, experience, activities and learning. If the content can be delivered online other aspects are more difficult to teach in clinical programs. The authenticity of the clinical learning environment cannot be replicated online where clinicians can role model 'how' to be a doctor, and it has been identified as important in academic medical education, mainly in specialties such as general practice. This pandemic has allowed medical schools to incorporate telemedicine into their curricula, so that future doctors will be prepared to smoothly transition to telemedicine during future pandemics (28).

Conclusion

The last online academic year provided valuable insights on the aspects of medicine that work best with online teaching and identified the benefits and barriers perceived by students. The authenticity of the clinical learning environment cannot be replicated online where clinicians can role model 'how' to be a doctor. This authenticity has been identified as important in academic medical education, mainly in specialties such as family medicine.

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