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Review

COVID-19 pandemic is the new era of distance education for surgeons

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ABSTRACT

The global novel coronavirus-2019 (COVID-19) pandemic necessitated an immediate change in surgical education and cessation of face-to-face education brought about a new era, the era of distance education. Distance education comprises a range of platforms that provide illustrations, case-based learning, procedural skills, and comprehensive course curricula, allowing real-time interactions between users for an immediate exchange of information. On the other hand, for most surgeons and surgical educators, distance education is new and confusing. It can be frustrating when students do not complete an online training session or drop out of a learning module. In this article, the key concepts behind distance education, strategic tools for planning, and content design were explained and easy-to-apply recommendations in light of the current literature were provided. Additionally, the status of distance education in Turkey has been evaluated considering the recent developments in distance surgical education.

Keywords: COVID-19, distance education, fellow training, resident training, surgical education.

The novel coronavirus (severe acute respiratory syndrome-coronavirus-2; SARS-CoV-2) pandemic lead to a dramatic shift in surgical residency and fellowship training.[1] Within days of the outbreak, people were recommended to stay at home to help with the struggle of our colleagues against the virus. Since taking control of the pandemic took longer than expected, future strategies were needed to be developed for the management of surgical caseload as well as continuous surgical training.

Distance education emerged as online courses and case discussions over the last decade, however, participation in these activities was not mandatory.[2] A decision-making process took place in order to determine how to continue with the educational activities of surgical trainees. Distance education was considered to be the optimal solution.

In this article, a broad definition of distance education was provided and the sudden evolution of Turkish surgical education from face-to-face to distance education was displayed. Additionally, the effectiveness of current distance education practices was overviewed and finally, strategies to improve the quality of distance education for surgical training were suggested.

WHAT IS DISTANCE EDUCATION?

Distance education is probably the fastest-growing branch of education worldwide. In the Encyclopedia Britannica, distance education is defined as "a form of education in which the main elements include physical separation of teachers and students during instruction and the use of various technologies to facilitate student-teacher and student-student communication".[2] Before the pandemic, there were large numbers of students

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attending online distance education programs in Turkey. One of the main distance education providers in Turkey is Anadolu University.[3] Anadolu University has a unique vantage point with the strongest roots of distance education dating back to the 1980s.

Since the 1980s, the growth of distance education has been intertwined with technological advancements in Turkey, parallel to the trends occurring in other developed countries. Over its course, four main types of distance education became prominent (Table 1). We believe that among the four types of distance education, blended learning would fit the best for surgical training as the transfer of skills will require face-to-face sessions with the residents and fellows.[4] Theoretical preparation for skill acquisition can be achieved through distance education in this model.

The advantages of distance education have been accentuated especially during the period of the pandemic.[1,5] In distance education, lecturers bring education to the learner via videos, online sessions, workshops, or e-mails. This prevents the gathering of the trainees in meeting rooms, thus, decreasing the risk of disease spread. Another advantage is that trainees can learn from the best and most experienced surgeons, meet with their role models online and interact with people they will unlikely encounter in their field.

Above all else, the quality of the educational content is enhanced as a result of the rigorous endeavors to produce concise distance education materials.[6] These materials are usually reviewed by a panel of experts and some materials are tested before use. Thus, the creation of high-standard learning materials is made possible.

Another asset of distance education, especially useful for residents in their early years of surgical training, is its flexibility. It is known that the junior residents are overwhelmed by a huge workload, disrupted by on-calls and in-hospital overtime. Distance education provides learning material and support to these residents 24/7 from anywhere, in or out of the hospital.

CURRENT STATUS

Within the Turkish surgical community, academic programs and larger societies have stepped up to develop distance education content for trainees. The Turkish Surgical Association, the Turkish Society of Colon and Rectal Surgery (TKRCD), and other societies have continued to record and share new surgical training videos online. These online activities, when supplemented with images, videos, and online discussions have been beneficial in learning, recalling, and incorporating knowledge (Figure 1). However, the increased popularity of online learning, combined with insufficient instructor experience on distance education and poor strategic planning, gave rise to some criticisms.[7]

One aspect of these criticisms was related to the preparation of distance education materials. Learning materials not suitable for on-screen

Table 1. Different types of distance education

Synchronous distance education	• Distance education via video conferencing • Simultaneous exchange of ideas • Instructor-trainee interaction • Peer-to-peer interaction • Personalized learning experience
Asynchronous distance education	• Prerecorded videos or audios • Flexible study times • Not personalized • Interaction with the instructor is not simultaneous • E-activities and online support systems are required to motivate trainees
Massive Open Online Courses (MOOCs)	• No requirement of prior education • Self-learning activities • No requirement of structured activities • Learner motivation is the primary drive
Blended learning	• Utilization of distance education combined with traditional face-to-face teaching methods

Figure 1. Surgical residents interacting with the web-based learning environment in combination with peer to peer discussions during an online distance education training.

viewing constituted a challenge for trainees. Another dilemma has been the use of PowerPoint slides which were otherwise prepared for face-to-face education. Moreover, with the intent to cover as much information as possible, visual materials can be overcrowded and maybe found distracting and disengaging by the audience. It is best to test these materials before using them in distance education, ensuring the desired messages are conveyed. Testing can be done with a small group of residents, and then adjustments can be made according to comments.

Another key challenge for trainers has been the requirement to satisfy the expectations of their audience, which consists of residents and fellows coming from different learning experiences, some with no previous exposure to online training. Likewise, the needs of the audience may not be similar. As a result, delivering distance education that is below expectations may discourage trainees from completing educational modules or cause them to log out from synchronous video training sessions.

In distance education, the failure to meet the completion criteria of online activity is called "dropout".[8] High dropout rates are usually a result of poor content design, failure to consider limitations of the delivery route, and not analyzing the needs of the audience. Proper analysis of the audience with a background and needs assessment is necessary. To our knowledge, no such needs assessment or target population research has been performed on the surgical trainees in Turkey.

Insufficient interaction with the trainees, regardless of the technological novelty and synchronicity used, constitutes another challenge for online education. Synchronous online educational activity may fail to attract the surgical trainees if the content is designed poorly with the instructor focused solely on conveying the textbook knowledge. As a consequence, the surgical trainee may find it difficult to become actively engaged with the learning environment and may feel isolated and abandoned.

Difficulty in engaging with the learning environment and feelings of isolation in distance education was first defined by Dr. Michael G. Moore.[9] He coined the term "transactional distance" to describe this phenomenon. Transactional distance is the collection of perceived psychological and affective distances between learners and instructors in distance learning environments. Moore[9] emphasized the importance of reducing the transactional distance to achieve a deeper, enduring learning experience.

More recently, Virginia Gewin[10] described helpful tips in the transition to online learning. She noted the importance of creating focused lessons for online learning that highlight a few main points. She highlighted the utility of live-video conferencing as a follow-up to the previously shared self-learning module and stated that live conferencing should not be used for all educational activities due to overuse and frequent poor connections.

Currently in Turkey, adaptation to distance education from face-to-face education is taking its small steps. There is a huge technological potential and infrastructure to create effective and successful distance education modules, materials, and content for surgical trainees. However, the outcome can be diminished with lengthy, non-interactive, poorly designed online lectures. Societies and educational institutions stepping up to the challenge of distance education should assure that all the lectures have been evaluated in terms of quality in accordance with distance education standards.

THE TARGET GROUP AND THEIR NEEDS

An educational institution has several tools it can use when assessing the needs and structure of a target group.[11] The most frequently used one is a questionnaire. Questionnaires are popular, cheap, easy to administer, and analyze. A typical questionnaire prepared to analyze a target group should take 10 to 20 minutes to finish. The main subjects of training should be introduced to the trainees to explore their needs, and their answers should provide a better understanding of their demands.

Additionally, questions on demographics, background education, work experience, preferred study times and distance education tools should be included in the questionnaire. Optimal analysis of this data prevents the educational material from being at a "too high" level, assuring the use of appropriate terminology and language. Content that is familiar to residents and fellows is essential to capture their attention. The preferred distance education tools vary from desktop computers to smartphones. Therefore, knowing which media is accessible and preferred, may dictate the design of the education module. The pace of distance education can be varied depending on the program, in any case, it should be delivered at times that are suitable for the learners.

Even the age range of the target population plays an important role in designing distance education materials. Baldelli et al.[12] acknowledged that the age range of a target audience is crucial for designing distance education programs, as she observed that millennials were more tech-savvy than the baby boomers. It is essential to adjust the content according to the target audience's age group, learning style, and technological ability to reduce dropout rates.

We suggest that the Turkish surgical association develop an online questionnaire to assess the major needs and gaps which require special attention to improve distance surgical education.

STRATEGIC PLANNING

Distance education is a philosophy. Strategically, it attempts to widen the range of learners while removing perceived barriers to learning. This philosophy encourages learners to take charge of their learning. It is relatively cheaper compared to face-to-face education. Although, initially it requires finance to build the infrastructure of distance education, once established, the training materials can be reused and shared with a wide audience. Regrettably, financial resources directed for the planning and infrastructure of distance education in Turkey have been scarce, limiting the efforts for better contemplation of online training for surgeons.

While planning distance education, the choice between self-paced or program-paced learning should be made.[13] In self-paced learning, learners are left completely free to decide when and how long to study a subject. In program-paced learning, assignments and virtual meetings take place to assess trainees. Regardless of the pace, program attendance requirements, educational outcomes and assessment methods should be communicated to the student before the distance education session. In our opinion, a program-paced learning environment should be considered for surgical training purposes.

Strategic planning should consider the medium for teaching as well. This medium needs to be accessible to all surgical residents or fellows training in the institution. For surgical training purposes, we recommend web-based virtual learning environments such as Blackboard or Moodle. These are frequently used web-based platforms which can be maintained by surgical educators at a low cost.

To support residents and fellows, this online environment should be enriched with counseling and advice services and peer-to-peer discussions.[8] Additionally, a form of self-assessment and accreditation should be provided. Distance learning should be enjoyable, leaving participants with a sense of achievement.

Successful surgical training is not complete without leadership and communication skills. These skills can be achieved through distance education modules and practiced in case scenarios. Distance education materials provide a safe environment for residents to make mistakes without the serious consequences of real-life situations.

ADULT LEARNERS

Training of surgical residents and fellows is considered as adult education. Andragogy

Table 2. Differences of the face-to-face and distance trainers

Face-to-face trainer	Distance education trainer
Being an expert	Being a helper-colleague
Teaching	Helping students to learn
Being in classroom	Being at a distance
Provides information about the content only	Provides counselling and topic unrelated information when necessary

is the theory of adult education that is very different compared to the education of school-aged children. Andragogy states that the skills and information provided for adult education must be relevant to their daily lives.[14] Adults come to the table with their own set of life experiences and motivations, can direct their learning, and will intend to apply their learning to concrete situations sooner rather than later. Therefore, we encourage distance surgical trainers to incorporate many case presentations with real-world outcomes and debates in their training sessions. Accordingly, the modules prepared for adults should have reminders of previous learnings, lots of activities, examples, summaries, and progress tests.[15,16] With immediate feedback after education, they will be far more likely to internalize the training.

Breaking the fourth wall is another technique used to engage with the adult learners, the fourth wall referring to the screen of the distance education medium. Breaking the fourth wall is the demolition of the barrier between the trainer and the trainee in a distance education module. This can be done by directly talking to the audience in a prerecorded video or initiating dialogue in a synchronous online meeting. With their participation, the residents and fellows are induced to be critical and active participants rather than passive spectators. When the fourth wall is broken, the audience becomes more involved in the educational content, improving the outcome of the training.

DIFFERENCES BETWEEN FACE-TO-FACE TEACHING AND DISTANCE TUTORING

The electronic platform necessitates an entirely different preparation for the surgical trainers. Unlike the face-to-face classroom training, the e-learning sessions should be prepared as 20 to 30 minutes of learning modules with references to other electronic or non-electronic resources.

Differences between face-to-face and distance training are summarized in Table 2. In distance education, the trainer acts as a facilitator between the educational material and the trainee, helping the student make the best of the content.[17] To improve social learning, the distance educator should promote discussions and debates and more importantly should not act as the expert on the subject as in case of the face-to-face education.

The distance trainer should aim to stimulate and motivate learners more than the face-to-face trainer to reduce transactional distance, break the fourth wall, and prevent feelings of isolation. The distance education content must present new material while adding value to the existing information of the trainee. We recommend the utilization of interactive media, a media that can deliver individualized feedback to students in response to their activity. The faster students receive feedback, the faster they learn. The medium that does this best is computer and web-based training.

In conclusion, in this article, it was attempted to explain the key concepts behind distance education and provide some easy-to-apply recommendations to the face-to-face surgical trainers which they can incorporate into their distance education practice. A needs assessment should be performed before designing the content. Providing rich material with real-life scenarios, encouraging discussions and peer-to-peer interactions, providing immediate feedback, using web-based technology, and participating in the training with prior knowledge should be considered as the essential elements of an optimal distance surgical training session.

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