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The effects of covid-19 pandemic on the educational status of medical residents of anesthesiology in Türkiye – a survey analysis

Covıd-19 pandemisinin Türkiye'deki anestezi asistanlarının eğitim durumuna etkisi-anket çalışması

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ABSTRACT

Aim: COVID-19 has been one of the biggest challenges that education systems have ever faced. The aim of this study is to determine the educational deficiencies of Medical Residents of Anesthesiology and Reanimation during the COVID-19 pandemic in Turkey.

Materials and Methods: Our study was carried out after the approval of the Ministry of Health and Ege University Medical Faculty Hospital Ethics Committee. This study is a cross-sectional survey study. A web-based questionnaire containing 32 questions was sent to the Anesthesiology and Reanimation Specialization Students in Education and Research Hospitals and University Hospitals in Turkey, in a computer environment, by sending it via e-mail with the approval of the Turkish Society of Anesthesiology and Reanimation.

Results: The training hours decreased significantly in both University Hospitals and Ministry of Health Training and Research Hospitals ($p<0.001$). This decrease was significantly higher in Ministry of Health Training and Research Hospitals than in University Hospitals ($p=0.032$). The resident training process during the pandemic has been interpreted as tiring by 89%, stressful by 85%, and humiliating by 35% of the participants.

Conclusion: During the COVID-19 pandemic period, anesthesia assistants both actively participated in COVID-19 patient treatment and continued their operating room missions. During this period assistant training was delayed or canceled. Considering the continuity of the pandemic, we think that we need to develop online training programs and determine the service-training balance well to protect the future of our expertise. These results reveal that residency training should be reorganized during the pandemic period.

Keywords: COVID-19, anesthesia, education, resident.

ÖZ

Amaç: *COVID-19 salgını, eğitim sistemlerinin bugüne kadar yüzleştiği en büyük sorunlardan birisi olmuştur. Bu çalışmanın amacı COVID-19 pandemi döneminde Türkiye'de Anesteziyoloji ve Reanimasyon asistanlarının eğitim eksikliklerini belirlemektir.*

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Gereç ve Yöntem: *Çalışmamız Sağlık Bakanlığı ve Ege Üniversitesi Tıp Fakültesi Hastanesi Etik Kurul onayı alındıktan sonra yapılmıştır. Bu çalışma kesitsel bir anket çalışmasıdır. Türkiye'deki eğitim ve araştırma hastaneleri ve üniversite hastanelerinde, anesteziyoloji ve reanimasyon uzmanlık öğrencilerine 32 soru içeren web bazlı anket bilgisayar ortamında Türk Anesteziyoloji ve Reanimasyon Derneği onayı ile e-mail gönderilerek gerçekleştirilmiştir.*

Bulgular: *COVID-19 pandemi döneminde eğitim saatleri hem Üniversite Hastanelerinde hem de Sağlık Bakanlığı eğitim ve araştırma hastanelerinde anlamlı olarak azalmıştı (p<0,001). Bu azalma Sağlık Bakanlığı eğitim ve araştırma hastanelerinde üniversite hastanelerine göre anlamlı olarak daha yüksekti (p=0,032). Pandemideki asistan eğitim süreci, katılımcılar tarafından %89 yorucu, %85 stresli ve %35 aşağılayıcı olarak yorumlandı.*

Sonuç: *COVID-19 pandemi döneminde anestezi asistanları hem aktif olarak COVID-19 hasta tedavisine katılmış hem de ameliyathane görevlerine devam etmişlerdir. Bu dönemde asistan eğitimi aksamış ya da iptal edilmiştir. Pandeminin sürekliliği göz önüne alınırsa uzmanlığımızın geleceğini korumak için online eğitim programlarını geliştirmek ve hizmet-eğitim dengesini iyi belirlememiz gerektiğini düşünüyoruz. Bu sonuçlar, pandemi döneminde uzmanlık öğrencisi eğitiminin yeniden düzenlenmesi gerektiğini ortaya koymaktadır.*

Anahtar Sözcükler: *COVID-19, anestezi, eğitim, asistan.*

INTRODUCTION

Residency training in medicine is an organized program offered to medical assistants in under guidance and supervision. The program is designed in a way to ensure both their professional and personal development and the delivery of appropriate health services to the patients (1). The coronavirus disease 2019 (COVID-19) is a viral respiratory illness caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2). The disease spread throughout the world in a very short period after emerging in the Hubei province of China in the last month of 2019. The World Health Organization declared a Public Health Emergency of International Concern on January 30, 2020; and declared the COVID-19 outbreak a global pandemic on March 11, 2020. The first case of COVID-19 in Turkey was confirmed on March 11, 2020, by the Ministry of Health. After that, all hospitals served as pandemic hospitals (2).

COVID-19 has been an extremely difficult and challenging situation for the community but also for healthcare professionals. The outrageously increased patient burden has created intense stress for all the health institution employees. Extraordinary arrangements are made regarding the routine working patterns in outpatient services, clinics, surgical operations, intensive care units, and emergency services. Health services are perishable, unstocked, intolerant of waiting, and indispensable (3). A qualified workforce is one of the main components of health services. The specialty education in medicine lasts a lifetime with the mission of continuing medical education. The implementation of this long, difficult, and qualified training by experienced and passionate teams is the key to success (4, 5).

During the pandemic period, medical resident education was halted in the world and in our country, as all physician elements, due to the life safety of assistants and lecturers. During the pandemic, the training has started and ceased in different ways all over the globe. Medical residency training students continued to work in the system as they were permanent physicians and in a way this on-the-job training has become a part of their service production (6). In addition to their job descriptions and branches, they took a heroic role in the process by providing services to COVID-19-related patients at different levels and environments based on assignments and volunteering. The information and experience support that resident physicians receive as face-to-face training from their superiors have dramatically decreased in this period. Some of the sessions have been digitized or completely disappeared. The communication, which is not the same as before, may have created a sense of deprivation, increased responsibility, and increased pressure on ongoing tasks (7). It can turn into a desire to leave the comfort zone and start a new period, or to withdraw with panic and anxiety, to leave the environment and loneliness (8).

The desired transformation around the world for specialist training such as distance education, simulation, and e-learning were stagnant in slow development for different reasons (9). The COVID-19 pandemic has made this transition necessary, making it applicable very quickly even in the most resistant units. This has pushed the

digital transformation in medical residency education forward years at a time (10). The need for infrastructure resources, training materials, measurement, and evaluation techniques suitable for doing this, and training staff in quality and quantity to implement them has increased. The over-loaded working environment during the pandemic has also disrupted the face-to-face training of assistant physicians in healthcare facilities (9, 10).

The aim of this study is to determine the educational deficiencies of medical residents of Anesthesiology during the COVID-19 pandemic in Turkey.

MATERIALS and METHODS

This was a cross-sectional survey study. The ethics committee of Ege University approval has been granted on *23.03.2021* and protocol number: *E-99166796-050.06.04-96844*. Survey questions were sent via e-mail to 1624 residents who members of the Turkish Society of Anesthesiology and Reanimation are. The survey form consisted of 32 questions on demographic characteristics, the education given in the institution during the COVID-19 period, satisfaction with the education, also anxiety, and motivation about the future (Supplement 1). A total of 165 Anesthesiology and Reanimation residency fellows from Turkey have participated in the web-based questionnaire.

Statistical Analysis

IBM SPSS Statistics for Windows, version 25.0 (IBM Corp., Armonk, N.Y., USA) program was used for statistical calculations. Data were presented as percentage (%), median (minimum-maximum), and mean ± standard deviation. The normal distribution of data was evaluated with the Kolmogorov Smirnov (KS) test. McNemar Test was used in categorical variables. A p-value less than 0.05 was considered statistically significant.

RESULTS

A total of 165 of 1624 residents who were members of the Turkish Society of Anesthesiology and Reanimation participated in the study by responding to the survey questions. A majority of the physicians were working at the University Hospitals *(75.8%)* and 24.2% at the Ministry of Health Training and Research Hospitals. The gender distribution was quite even 51.5% *(n=85)* were female, and 48.5% *(n=80)* were male. The mean age was 29.2±3.2. The demographic characteristics were given in (Table-1). The working years of the residency students were given in (Table-2).

In the educational institutions of the study participants, 27.9% of the surgeries were halted, 24.8% continued, and 47.3% partially continued during the COVID-19 pandemic period. Training hours decreased significantly in both university hospitals and Ministry of Health Training and Research Hospitals *(p<0.001).* This decrease was significantly higher in Ministry of Health Training and Research Hospitals than in university hospitals *(p=0.032)*.

There were some critical questions elaborating on the course of the pandemic period workload: Did your working order in the hospital change during the COVID-19 pandemic period? 91.5% answered yes to the question. Did your weekly working hours change during the pandemic period? It increased by 38.7%, decreased by 25.2%, and remained unchanged by 36.1%. Did the number of monthly shifts vary during the pandemic period? 54.6% increased, 41.1% decreased, and 4.3% unchanged.

When the time allocated as individual hours per week for academic research was compared during and before the pandemic, it was seen that the number of those who did not spare any time increased statistically significantly *(p<0.001)* (Table-3). The amount of time allocated to education before and during the COVID-19 pandemic comparing the training hours *(seminars, article hours, case reports, lectures, morning meetings, and mortality-morbidity meetings)* were given in *Table-4*. More than half of the medical residents utilized Zoom application *(55.8%)*, followed by Microsoft Teams *(34.4%)* and 9.8% face-to-face *(Figure-1)*. During the COVID-19 pandemic period, online-training participation of residents outside the clinic was 62.6% and online-congress participation was 85. The question “Does your institution have a structured 'Assistant Training Program' or 'Core Training Curriculum?” has been answered 78.2% “yes” and, 21.8% “no”. The training hours decreased significantly in both University Hospitals and Ministry of Health Training and Research Hospitals *(p<0.001).* This decrease was significantly higher in Ministry of Health Training and Research Hospitals than in university hospitals *(p=0.032)*.

In the questionnaire, 73.6% answered yes to the question *"Do you think that the pandemic may have a negative impact on your ability in practical applications in the operating room?"* The answer to the question “Do you think that your assistantship training period should be extended due to the pandemic?” has received a negative response of 72.7%. The assistant training process during the pandemic has been interpreted as exhausting by 89%, stressful by 85%, and humiliating by 35% of the participants *(Figure-2)*.

Table-1. Demographic data of residents.

	N	%
Female/Male	85/80	51.5/48.5
University Hospital/ Ministry of Health Training and Research Hospital	125/40	75.8/24.2

Table-2. Working months of residency fellows.

	n	%
0 – 24 Months	94	57
25 – 48 Months	44	26.6
≥ 49 Months	27	16.4

Table-3. Comparison of theoretical training hour before and during the COVID-19 pandemic.

Hours	Before COVID-19 Pandemic n (%)	During COVID-19 Pandemic n (%)	P Value
0	21 (12.7)	49 (29.7)	*<0.001*
0-4	78 (47.3)	85 (51.5)	*0.464*
4-6	60 (36.4)	19 (11.5)	*<0.001*
>6	6 (3.6)	12 (7.3)	*0.18*

Table-4. Comparison of the educational methods before and during the pandemic.

	Before COVID-19 Pandemic n (%)	During COVID-19 Pandemic n (%)	P Value
Seminars	136 (82.4)	109 (66.1)	*<0.001*
Article Hour	104 (63)	47 (28.5)	*<0.001*
Case Presentation	74 (44.8)	33 (20)	*<0.001*
Lecturer Course	66 (40)	50 (30.3)	*0.017*
Morning Meetings	57 (34.5)	21 (12.7)	*<0.001*
Mortality & Morbidity Hour	6 (3.6)	2 (1.2)	*0.125*
None of These	9 (5.5)	34 (20.6)	*<0.001*

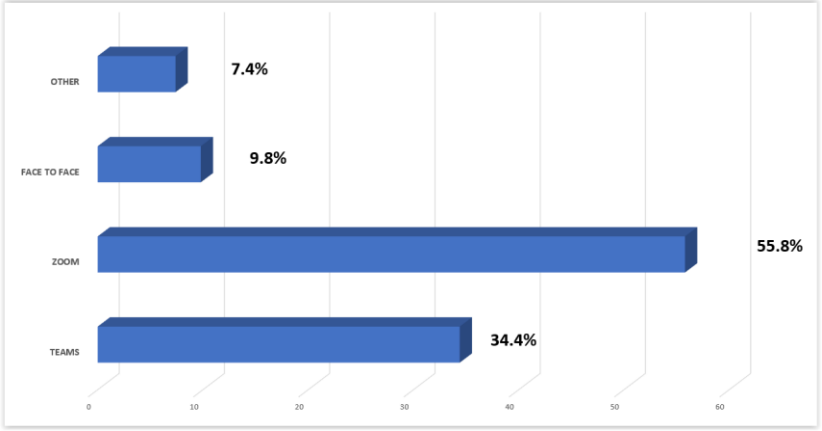

Figure-1. The preferred educational methods for theoretical medical content.

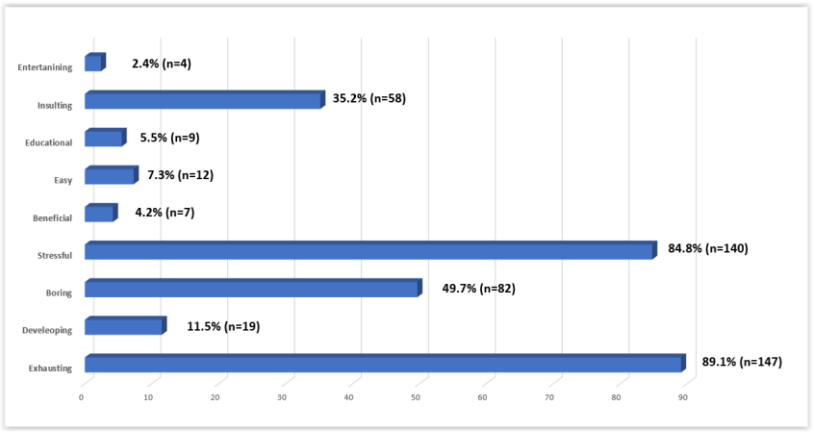

Figure-2. How do you evaluate your assistant fellowship during the pandemic (more than 1 response was accepted)?

DISCUSSION

The unexpected progress of pandemic status in our country emphasizes the importance of pre-preparation of action plans and being proactive to cope with the difficulties created by large-scale extraordinary situations in the institutions where residency training is given, and that the implementation of these plans is not left to the initiatives of the institutions (11). This reality is more applicable to anesthesia assistants who are in the early stages of their residency training. It is also a fact that institutions with high educational capacity and adequate standards in the pre-pandemic period were less affected by the pandemic (12, 13).

Regarding this study, 57% of the anesthesia assistants have been working for less than 24 months in the hospitals. The remaining population were divided as 26.7% has been working for 25- 48 months and only a minority of them 16.7% more than 49 months. In several institutions, despite the presence of anesthesia assistants during the pandemic period, it has been learned that a residency training program was not implemented. It was observed that 21.8% did not have a structured *'Assistant Training Program' or 'Core Training Curriculum'.* Arrangements should be made to increase the communication between residents and specialists, chief assistants and faculty members in institutions, and appropriate mechanisms should be established to meet the educational needs of residents during the pandemic period and to remove obstacles in front of education. In this study, 73.6% of assistants answered yes to the question *"Do you think that the pandemic may have a negative impact on your ability in practical applications in the operating room?"*

In order to increase the quality of online education, necessary adjustments should be carried out both in terms of infrastructure and to increase the interaction between the trainer and the trainees (14, 15). Certain standards should be established by arranging the legislative infrastructure for online education applications; online training should be given within a certain program and according to established standards (16). Non-formal and formal education and post-graduate continuous medical education / continuous professional development activities should not be halted. This might negatively affect the motivation of residents, especially those who were in the early stages of residency (17). In this study, the evaluation of assistant fellowship during the pandemic by the participants revealed very important aspects. Almost 9 residents out of 10 *(89%)* have responded as exhausting, 84.8% as stressful, and 49.7% as boring in the questionnaire. The most important downside answer was insulting which generated more than one-third *(35.2%)* of the participants. At this point, the management staff of the clinic should cautiously work on motivational training to change the perception of their front-line employees. Every institution that provides residency training should review its ability to cope with the difficulties related to patient care, clinical functioning and anesthesia education caused by the pandemic during this period. One should bear in mind that by no means, the decreased motivation will result in decreased productivity and efficiency in an environment where workload has increased logarithmically (18-21).

On the contrary, there are several upsides to the COVID-19 pandemic challenge in terms of developing the training capabilities of institutions and beneficial to the learning environment of residents. The online programs and off-site virtual meetings might contribute to the professional development of assistants (22). However, it should be foreseen that attendance does not necessarily equate to participation, it is a perquisite. The amount of evidence accumulated with these live meetings has increased a great deal on the topics of online material use, and overall course performance (23). The e-mentor application of the Turkish Association for Child and Adolescent Psychiatry in Turkey is one example of this. The e-mentorship project was designed and actualized by Eyüp Sabri Ercan who is the president of the Turkish Association for Child and Adolescent Psychiatry (24). Additionally, there are still areas of improvement, experts who produced educational material could share these with multiple institutions and this could lead to increased collaboration among different centers across the country. Novel approaches need to be developed with a focus on interactivity without physical proximity (25). In our institution, the education before and during the COVID-19 pandemic has been conducted via seminars, article hours, case reports, lectures, morning meetings, and mortality-morbidity meetings. More than half of the medical residents utilized Zoom application *(55.8%)*, followed by Microsoft Teams *(34.4%)* and 9.8% face-to-face. During the COVID-19 pandemic period, online-training participation of residents outside the clinic was 62.6% and online-congress participation was 85.9%.

One very important aspect of the whole process is assessment, gap identification and follow up but up to date the institutions are far beyond this stage apart from over-loaded patient burden (26). A majority of the parties involved in the distance learning process have been optimistic and supportive of the course of this method. Instructors have assumed that residency training was mainly provided face-to-face but the inclusion of online training in the corporate training program at a certain rate has certainly enriched the content (27, 28). However, there have also been significant educational burdens as social interaction was limited (29). At this stage providing well-being support could enhance the motivation of residents and also maintain a safe working and learning environment (30). The management staff of the clinic may coordinate programs to eliminate the risks of stress and burnout as a proactive intervention.

Last but not least, the difficulties experienced in the institutions that provide anesthesia specialization training in the importance of the pandemic should be discussed at congresses and symposia with the participation of representatives from the relevant institutions to ameliorate fellows' conditions.

CONCLUSION

During COVID-19 pandemic, the anesthesia and reanimation residents were the most important front-line infantry of doctors who contributed to the fight against COVID-19. It has been clearly seen that the health systems will not be the same in such pandemic periods. For this reason, innovative solutions to age-old problems in education and health services should be produced without waiting for things to return to normal.

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Competing interests

The authors declare that they have no competing interests.

Conflict of interest: No conflict of interest was declared by the authors.

References

1. Sneyd JR, Mathoulin SE, O'Sullivan EP, So VC, Roberts FR, Paul AA, et al. Impact of the COVID-19 pandemic on anaesthesia trainees and their training. Br J Anaesth. 2020;125(4):450-5.
2. Ministry of Health. Delayed of elective operations and other measures to be taken. Health Services General Directorate. Republic of Turkey: Ministry of Health; 2020. https://hasta.saglik.gov.tr/TR,64508/
3. Association of American Medical Colleges. Away rotations of U.S medical school graduates by intended specialty. In: 2019 AAMC medical school graduation questionnaire. 2019. https://aamc-

orange.global.ssl.fastly.net/production/media/filer_public/c6/a7/c6a79bc8-3279-4e0a-9bbf-7b9359172db1/away_rotations_by_specialty_gq_2019_public.pdf Accessed 17 March 2021.
4. Association of American Medical Colleges. Medical student away rotations and in-person interview for 2020–21 residency cycle. 2020. https://www.aamc.org/what-we-do/mission-areas/medical-education/away-rotationsinterviews-2020-21-residency-cycle Accessed 9 Nov 2020.
5. American Society of Anesthesiologists. COVID-19 resources for medical students and residents. 2020. https://www.asahq.org/education-and-career/asa-medical-student-component/covid-19-resources-for-medical-students-and-residents . Accessed 9 Nov 2020.
6. Renew JR, Ladlie B, Gorlin A, Long T. The impact of social media on anesthesia resident recruitment. J Educ Perioper Med. 2019;21(1): E632.
7. American Society of Anesthesiologists. Residency information by state. 2020. https://www.asahq.org/education-and-career/asa-resident-component/residency-information-by-state. Accessed 9 Nov 2020.
8. American Society of Anesthesiologists. Anesthesiology virtual open houses for 2020 residency applicants. 2020. https://docs.google.com/spreadsheets/d/1EZB7StsKLsuu8YK-Kb_s_EoYsmJM0QU6MObxk9Sml_0/edit#gid=0. Accessed 9 Nov 2020.
9. Association of American Medical Colleges. Frequently asked questions for ERAS residency applicants. 2020. https://students-residents.aamc.org/applying-residency/faq/faq-eras-residency-applicants. Accessed 21 Mar 2021.
10. Jiang J, Key P, Deibert CM. Improving the residency program virtual open house experience: a survey of urology applicants. Urology. 2020; 146:1–3.
11. Weiner S. Applying to residency is tough even in normal times. The pandemic isn't helping. In: AAMC news. Association of American Medical Colleges. https://www.aamc.org/news-insights/applying-residency-toughеven-normal-times-pandemic-isn-t-helping. Accessed 9 Nov 2020.
12. Seifi A, Mirahmadizadeh A, Eslami V. Perception of medical students and residents about virtual interviews for residency applications in the United States. PLoS One. 2020;15(8): e0238239.
13. Woolliscroft JO. Innovation in Response to the COVID-19 Pandemic Crisis. Acad Med. 2020;95(8):1140-2.
14. Back DA, Behringer F, Haberstroh N, Ehlers JP, Sostmann K, Peters H. Learning management system and e-learning tools: an experience of medical students' usage and expectations. Int J Med Educ. 2016;7:267-73.
15. Gray K, Tobin J. Introducing an online community into a clinical education setting: a pilot study of student and staff engagement and outcomes using blended learning. BMC Med Educ. 2010;10:6.
16. Haskins SC, Feldman D, Fields KG, Kirksey MA, Lien CA, Luu TH, et al. Teaching a pointof-care ultrasound curriculum to anesthesiology trainees with traditional didactic lectures or an online e-learning platform: a pilot study. J Educ Perioper Med. 2018;20(3): E624.
17. Wittich CM, Agrawal A, Cook DA, Halvorsen AJ, Mandrekar JN, Chaudhry S, et al. E-learning in graduate medical education: survey of residency program directors. BMC Med Educ. 2017; 17(1):114.
18. Chen F, Carter TB, Maguire DP, Blanchard EE, Martinelli SM, Isaak RS. Experience is the teacher of all things: prior participation in anesthesiology OSCEs enhances communication of treatment options with simulated high-risk patients J Educ Perioper Med. 2019;21(3):E626.
19. Lawrence K, Hanley K, Adams J, Sartori DJ, Greene R, Zabar S. Building telemedicine capacity for trainees during the novel coronavirus outbreak: a case study and lessons learned. J Gen Intern Med. 2020;35(9):2675-9.
20. Sartori DJ, Olsen S, Weinshel E, Zabar SR. Preparing trainees for telemedicine: a virtual OSCE pilot. Med Educ. 2019;53(5):517-8.
21. Isaak RS, Chen F, Martinelli SM, Arora H, Zvara DA, Hobbs G, et al. Validity of simulationbased assessment for accreditation council for graduate medical education milestone achievement. Simul Healthc. 2018;13(3):201–10.
22. Timberlake MD, Mayo HG, Scott L, Weis J, Gardner AK. What Do We Know About Intraoperative Teaching?: A Systematic Review. Ann Surg. 2017;266(2):251-9.
23. de Oliveira Filho GR, Dal Mago AJ, Garcia JH, Goldschmidt R. An instrument designed for faculty supervision evaluation by anesthesia residents and its psychometric properties. Anesth Analg. 2008;107(4):1316–22.
24. Ercan ES, Tufan AE, Kütük ÖM, Perçinel Yazıcı İ. E-mentoring program organized by the Turkish Association for Child and Adolescent Psychiatry during the COVID-19 pandemic. Eur Child Adolesc Psychiatry. 2021;30(1):173-5.

25. Blanié A, Gorse S, Roulleau P, Figueiredo S, Benhamou D. Impact of learners' role (active participant-observer or observer only) on learning outcomes during high-fidelity simulation sessions in anaesthesia: a single center, prospective and randomised study. Anaesth Crit Care Pain Med. 2018;37(5): 417–22.
26. Naranjo DM, Prieto JR, Molto G, Calatrava A. A visual dashboard to track learning analytics for educational cloud computing. Sensors (Basel). 2019;19(13): 2952.
27. Mitchell JD, Mahmood F, Bose R, Hess PE, Wong V, Matyal R. Novel, multimodal approach for basic transesophageal echocardiographic teaching. J Cardiothorac Vasc Anesth. 2014; 28(3): 800–9.
28. Mayer RE. Thirty years of research on online learning. Appl Cogn Psychol. 2019;33(2): 152–9.
29. Leppink J, Duvivier R. Twelve tips for medical curriculum design from a cognitive load theory perspective. Med Teach. 2016;38(7): 669–74.
30. Sweller J. Cognitive load theory and educational technology. Educ Technol Res Dev. 2020; 68(1):1–6.