PREPARATION FOR NATIONAL MEDICAL EDUCATION DISASTER LESSONS FROM COVID-19 PANDEMIC EFFECT ON SAUDI ANESTHESIA TRAINING: TRAINERS VIEW - A DESCRIPTIVE REPORT

Baraa O. Tayeb,[1,2*] MBBS, MS, D. ABA, ABHPM, CHSE, Wadeeah K. Bahaziq,[1,2] MBBS, FRCPC, Usamah S. Alzoraigi, MBBS[3,4] and Abdulaziz M. Boker,[1,2,5] MBBS, FRCPC, Med

Abstract

Background: COVID-19 pandemic was declared as a global emergency affecting all aspects of clinical practices including medical education. In this study, we surveyed the staff trainers of the Saudi Arabia residency anesthesia program 6 months into the COVID-19 to formulate an assessment plan of the residency training program during the pandemic.

Aims: The aim of this project was to study the effects of COVID-19 disaster on the Saudi Anesthesia Training program as assessed by the trainers and synthesize recommendations to address the identified gaps in the current and any future disasters.

Methods: We deployed a survey 6 months into the pandemic targeting trainers of the Saudi residency program. Using a mixed design method, our survey had 3 main sections: 1) COVID-19 pandemic impact on the residency program, 2) interventions to decrease the impact, 3) and demographics.

Results: We had 55 responses including 33 program directors (%83 of programs in the kingdom). More than 50% reported the clinical exposure for trainees as inadequate. The core and obstetrics rotation were the least interrupted while subspecialties rotations were the most interrupted. Our respondents suggested online teaching, small group discussion and simulation as the top methods to adopt for the deficiencies. Also, they suggested changing the assessment and evaluation methods. Stress level among residents, as per trainers, was 7 out of 10 despite the available wellbeing resources.

Conclusion: The real lesson to be learned and the eye opener from COVID-19 pandemic year to medical education institutes is the importance of establishing disaster backup plans for continuous education during a crisis.

Keywords: Anesthesia; postgraduate training; Disaster; COVID-19

1   Department of Anesthesia and Critical Care, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia.
2   King Abdulaziz University Hospital, Jeddah, Saudi Arabia.
3   Department of Anesthesia and Perioperative Medicine, King Fahad Medical City, Riyadh, Saudi Arabia.
4   Center of Research, Education and Enhanced Training, King Fahad Medical City, Riyadh, Saudi Arabia.
5   Department of Anesthesia and Critical Care, Faculty of Medicine, and Clinical Skills and Simulation Center, King Abdulaziz University, Jeddah, Saudi Arabia.

     * **Mailing address of the corresponding author**: Baraa Tayeb, MBBS, MS, D.ABA, ABHPM, CHSE; Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabi. Telephone number: +96626401000 (1-10199/10209). E-mail: btayeb@kau.edu.sa. Mailing Adress: P.B. Box 80215, Jeddah 21589

Main Messages:

- Global disasters and Emergencies like pandemics have wide effects on medical education and graduation of competent clinicians.

- The 3 most important ways to compensate for missing clinical training and rotations are online learning, simulation, and small group discussion.

- It is important to monitor trainee's wellbeing and offer resources as these disasters have profound emotional, social and personal effects on the medical community and personnel.

- Medical education experts and medical councils need to establish a disaster educational continuity plan including methods of teaching, assessment, competencies, and completion of training.

Research Questions:

- Are our medical education institutes have plans to be able to absorb effects of global disasters?

- Is it time to change trainee's evaluation to competency-based instead of time-based to ensure the graduation of competent clinicians?

- What is the potential of further integration of distant learning in medical education?

Introduction

In March 2020, the first case of COVID-19 was declared in Saudi Arabia and all public and private efforts were directed toward public protection and minimizing the exposure and potential devastating consequences of COVID-19 pandemic. [1] Consequently, several effects were expected to impact routine medical education activities and in particular anesthesia training in Saudi Arabia. In a national level survey by Bahaziq et. al. 2020 [2] the effects on the Saudi anesthesia residency programs from the resident point of view during the first 3 months of the pandemic were explored. The survey showed that there are high stress levels of average 6.5/10 among residents with high concerns about personal and family safety and the progress in training.

The Saudi Commission For Health Specialties (SCFHS) and The Scientific Council of the Saudi Anesthesia Residency Program (SCSARP) prepared guidelines and recommendations for appropriate changes to adapt to COVID-19 challenges. These recommendations included increase in online education, small group workshops and Personal Protective Equipment PPE training among many other steps to help the residents go through this period and acquire the competency needed for graduation. Graduating safe, competent, and well-trained physicians is paramount for patient and public safety as well to support and strengthen the medical teams combating the pandemic.[3]

The aim of this study was to survey the staff trainers of the Saudi Arabia Anesthesia residency programs 6 months into COVID-19 pandemic. Comparing and contrasting the trainers' survey at 6 months with the trainees' survey at 3 months previously conducted by our team[2] will help in assessing the changes and to prepare for future changes to support postgraduate anesthesia medical education in Saudi Arabia and draw lessons for around the world.

Methods

The study was approved by King Abdulaziz University Hospital (KAUH) Ethical Committee (reference no. IRB-No.412-20). We collected data using an electronic survey (appendix 1) on Google Forms. Data collection started August 2020, 6 months after the first COVID-19 case was diagnosed in Saudi Arabia.[1] The research team designed, reviewed, and piloted a survey to ensure the validity of the tool. Our survey was anonymous, we did not collect personal data. Any identifying data kept separate from the data set and no response were traced to individuals, hospitals, or regions. We kept the data confidential and password protected with restricted access to the research team only.

Using a mixed methods design,[4] our questions were both qualitative and quantitative including open ended questions to address any missed elements. We

designed the survey into multiple sections, namely COVID-19 pandemic impact on the residency program, interventions to decrease the impact, and demographics.

We extracted the quantitative data to Excel Sheets and manually coded the qualitative data. At least 2 authors independently reviewed and categorized the data. We employed a descriptive analysis for qualitative data, using cross-tabulations and multiple measures of dispersion. Also, we presented quantitative data for categorical variables as numbers, averages, sums, percentages, or frequencies as appropriate.

Results

We had a total of 55 responses to the survey with combined 600 years of anesthesiology practice and 397 years of residents' supervision. Of the respondents, there were 33 program directors which represents 83% of the programs in the kingdom, 7 department chairs and 2 deputy program directors (Table 1).

Table 1
Demographics of Respondents

Distribution by gender		
Male	36	65%
Female	17	31%
Prefer not to say	2	4%
Distribution by region		
Central	17	31%
West	30	55%
East	8	15%
Distribution by role		
Program Director	33	60%
Mentor	12	22%
Department chair	7	13%
Deputy program director	2	4%
Fellowship director	1	2%

Starting with non-clinical didactical education our data showed an increase in online teaching and small group workshops instead of in-person teaching over the last 6 months as trainers believed self-learning and online teaching to be the most important during the pandemic period (Tables 2 and 3).

Table 2
Importance of various interventions to utilize/ help residency program training in a pandemic period:

	Personal self-study	Interactive E-learning platforms	Online group oral case discussion	Conducting research	Engagement in specialty related quality projects	Being front liners and handling emergency cases	Simulation workshop-based training
6 Extremely important	43	34	32	5	9	13	15
5	4	16	14	14	20	20	20
4	2	5	8	15	15	9	13
3	6	0	0	9	4	11	1
2	0	0	1	8	3	0	2
1 Not important	0	0	0	4	4	2	4

Table 3
Interventions done by hospitals to decrease COVID-19 impact on medical training

What interventions did your department institute to decrease the impact on residents' medical training?	
Online teaching	14
Small group discussion	8
None	5
One to one teaching	4
Redistribution to other rotation and emergencies	4
Increase grand rounds and lectures	4
Self-learning	2
Reassurance and support	2
Other	3

When asked about what rotation were uninterrupted due to COVID-19 for more than 3 months, we found that regional and pain anesthesia rotations were the most interrupted while on the other end of the spectrum core and obstetric anesthesia were the least interrupted (figure 1). At the time of the survey, 19 respondents reported resuming all subspeciality rotations while 18

respondents still had more than one rotation interrupted (figure 2).

Clinically, residents' exposure to cases during the last 6 months reported to be adequate by 8 respondents (14.5%), fair by 18 respondents (32.7%), inadequate by 29 respondents (52.7%), and no exposure by 0 respondents. To compensate for missing rotations 38 respondents suggested online learning, 39 suggested using simulation, 25 suggested small group discussion, 2 suggested self-learning, and 3 suggested other ways including delaying graduation. These findings reflect the actual interventions done by different hospitals (Table 3). Our respondents suggested long term changes to the anesthesia residency program for this and subsequent years residents to adapt to the current circumstances (Tables 4 and 5) which included among others change in graduation requirements, change to competency-based evaluation and delay graduation if needed.

Forty two respondents had a COVID-19 airway team in their hospitals; however the majority of respondents 71% thought residents should not be part of that team or be a second line provider at most.

Respondents rated the residents stress level to be of a mean and mode of 7 out of 10 (Figure 3). The highest concern of our participants is the extension of the pandemic for a long period, followed by a significant gap in residents' competency, and finally delay in certification and graduation while some respondents indicated no concerns at all since this pandemic is affecting everybody equally (Figure 4). The 3 most methods used to address wellbeing support
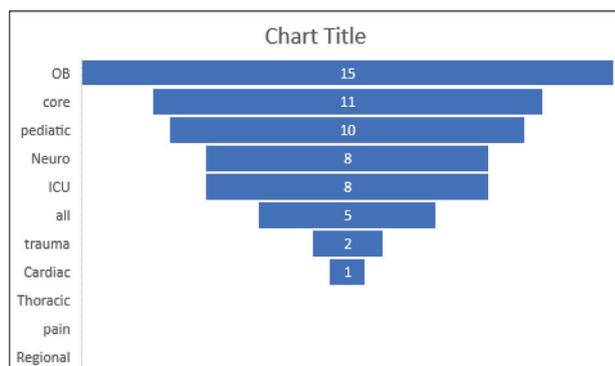
Table 4
Suggestion to current year graduates

What changes do you suggest to current year graduates to help their certification and education process?	
None	13
Simulation based education	11
Online based education	9
Small group discussion	7
Extension of program / keep residents until cases log completed	7
One to one counseling and discussion	6
Study-hard	4
Long term strategic plans	2
Mini exams followed by targeted workshop	2
Uncertain	2
Join program and distribute the residents as per requirement to fulfill their schedule	1
Decrease requirements for graduation	1
Continue the work-based assessment	1

were wellbeing clinics, social media groups and small group discussion, decreasing duty hours among other wide range of wellbeing interventions offered to residents (Table 6).

Fig. 1
Rotation uninterrupted for more than 3 months.

Fig. 2
Anesthesia rotations not offered anymore to residents at the time of the study.
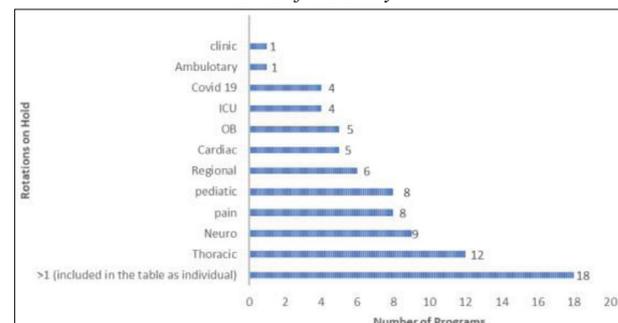
Fig. 3
The mean stress levels among residents (0-10).

Fig. 4
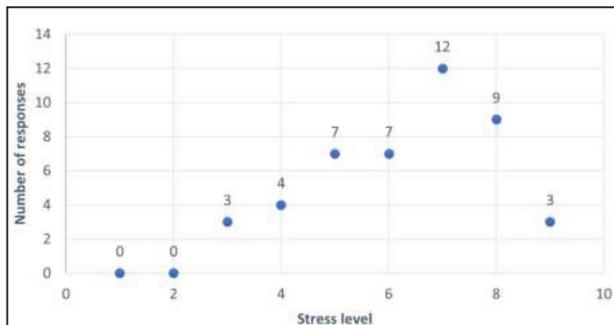*Highest concerns about residents.*

Table 5

Suggestions to anesthesia residency program subsequent year's graduates

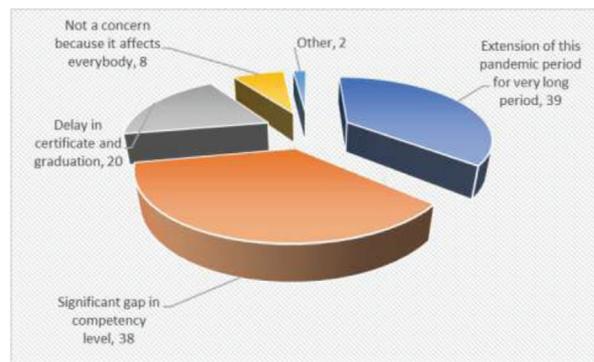| What changes do you suggest to anesthesia residency program subsequent years graduates to help their certification and education process?	
Nothing	14
Simulation learning and skills workshops	9
Depend more on continuous evaluation	8
E-learning	7
Appropriate/ increase utilization of teaching opportunities and review of the curriculum	7
Delete or re-evaluate the need /concept of subspeciality and non-anesthesia rotations	6
Small group education	5
One to one learning during cases	3
Increase working hours	3
Employ competency related evaluation as basis of completion of rotation instead of time.	3
Engage them early and provide safe learning	2
Work on residents' privilege	2
Delay graduation	2
Decrease to 4 years program	2
Separate each city into clusters	1
case based discussion	1
using logbooks to follow up their progress	1

Table 6

Wellbeing support for the residents offered by departments

In your institute/ Department, any wellbeing support have been provided to support the residents?	Number
Wellbeing clinic	28
Social media group support	17
Small group Discussion	17
Mentorship for residents	16
Decrease the working hours	13
One to one counseling	10
None	9
Psychological/psychiatry supports	7
Stop rotations from and to our institution	3
Residents were not allowed to do any suspected or confirmed COVID-19 cases.	3
Supportive Zoom meetings by MOH	2

Discussion

COVID-19 pandemic has brought to the specialty and practice of anesthesia many important opportunities as well as challenges. Opportunities like increased demands and reliance on anesthesiologist's expertise to manage surge in critical cases, support health care systems and provide highly needed leadership and training stewardship. Many of these opportunities also created more challenging situation to the specialty. One of these key challenges is to provide the needed balance between increased clinical demands and stressors and the need to train and graduate future

anesthesiologists.

During the early phases of the COVID-19 pandemic, like many other national training boards, SCSARP forecasted potential issues and solutions including the deployment of a national trainee's survey[2] to mitigate the possible negative impacts of the crisis on national anesthesia training programs. This study followed the first survey in a continuous effort to monitor and assess progress of the learning process from the trainer's point of view.

Our survey indicated the most important ways to compensate for missing anesthesia residents' rotations and exposure. These include activation of online learning, utilization of simulation, and small group discussion. As for online education, our study showed a spike in the use of electronic and social media-based education among most of the respondents. This is facilitated by the vast and developed technical infrastructure and computer science evolution during the 21st century which eased access to online teaching tools while keeping social distancing possible.[5]

The use of online teaching has been very important during this crisis worldwide and its incorporation into medical education and practice might last beyond the pandemic time.[6] For example, in one study,[7] more than 70% of participants (faculty and students) have increased confidence in the effectiveness of online teaching after using it.

Similarly, small group discussion is an easy and safe way of maintaining social distancing during pandemics when practiced appropriately; and there are available guidelines to help construct a positive small group discussion environment as the one published by Edmunds et. al. 2010[8] and Meo et. al. 2013.[9] Small group discussions have been practiced for decades and is found to be preferable by medical learners.[10]

Simulation has shown success historically in training anesthesia residents.[11] Interestingly simulation was not a highly used interventions even though it was highly suggested by our participants. This could be due difficult access to simulation centers, uncertainty of how to safely use simulation during pandemic or unavailability of simulation mentors.[12] In addressing these gaps, the Ministry of Health MOH in cooperation with SCFHS has supported simulation over the last few years as a way of medical education, patient

safety, and quality improvement. The Saudi Society for Simulation in Healthcare (SSSH) was established two years ago and is in the process of accrediting and supporting simulation centers around the country to achieve the intended goals. Also, SCSARP has incorporated simulation into the anesthesia residency curriculum. Finally, the SSSH published the SSSH Guidelines for Simulation Based Education During and Beyond COVID-19 Pandemic [13] to help guide the local scientific community on safe use of simulation-based education during COVID-19 pandemic. These changes will help in any future medical education disaster to overcome any obstacles in using simulation as an essential or back up for residents training to achieve needed competencies.

As for anesthesia subspecialties training, the impact of COVID-19 interrupted mainly elective-based sub-specialized rotations at tertiary hospitals, in contrast to emergency-based services like Core (general/trauma) anesthesia and Obstetrical anesthesia were less impacted or interrupted due to continuing need for service despite the pandemic. Interestingly, the need for some of these rotation was questioned by our participants as they suggested to re-assess the need for subspecialties and non-anesthesia rotations compared to core rotations during the primary residency program; while other participants suggested using simulation to address the deficiencies in subspeciality rotations that are difficult to encounter during disasters. Simulation has already shown to have positive results in subspeciality training in multiple studies including thoracic[14] and cardiac[11,15] among others.

Residents' assessment during the pandemic was one of the challenges reported in our study due to concerns in term of offering socially distant space to conduct national level exam, as well as the possible effect of decreased clinical exposure. One of the participants' suggestions was to move more toward formative assessment and competency mastering rather than time-based evaluation. Formative assessment was suggested to replace current ongoing part of promotion criteria which include conducting annual national level written, clinical and case-based discussion exams in addition to fulfilling other requirements like rotations, work base discussion and program director recommendation. This suggestion goes in parallel with

the future transition of the Anesthesia Training in Saudi Arabia towards Entrustable Professional Activities (EPA). Even before the pandemic, there was a school calling for the change of medical training evaluation from time based to competency based to adapt to our evolving healthcare system needs.[16] Competency based evaluations can be a substitute for prolonging training, as suggested by few participants, as during disasters we might need to graduate competent clinicians on urgent basis to help the community and this was done successfully in the United States and multiple other countries during this pandemic.[3,17] One of the remaining unanswered questions, if those residents who did not complete training requirements to be graduated with limited privileges.

Our participants rated the mean stress among the residents to be 7 out of 10, which is comparable to the 6.5 out of 10 resident self-reported stress in the Bahaziq et. al. 2020 study.[2] The continued unchanged high stress level could be explained with the continued uncertainty about the end of the pandemic, the approaching residency graduation exam, and/or the restricted social distance measures at the time. Since then, wide community COVID-19 vaccination has started, there have been increase in elective surgery and improvement in the training environment for residents and the residency exam has been completed, which in turn might have decreased the residents' stress levels. Due to all of that we expect that by the time of writing the manuscript the stress levels are improving. Nevertheless, we recommend for program directors to keep monitoring wellbeing and involve well-being specialists, as social workers and psychiatry specialists when needed. Physician well-being and needs are essential to acknowledge on national level by medical societies to support and prevent physician burn-out.[18]

The real lesson to be learned and the eye opener from COVID-19 pandemic year to medical education institute is the importance of establishing disaster backup plans for continuous education during a crisis using experts in medicine, education, and simulation as we do in any other high stake medical emergency. After all, medical education is the basis of future medical practice.[19,20]

Limitations to our study include the use of survey instead of more robust methods. Surveys in medical research have known limitations that we tried to avoid by peer testing the design, using open ended questions, and avoiding non-response bias during the design and deployment of the survey.[21] Also, another limitation is the continuously changing dynamic nature of the pandemic situation which makes the analysis and results variable and changing with time. An ongoing and continuous process for the changing needs assessment and gap identification and/or remediation steps are suggested strategies to overcome this limitation.

Conclusion

In time of global disaster, e.g., COVID-19 pandemic, medical education residency/fellowship programs could be affected. Anesthesia Educator experts and medical councils need to establish a disaster educational continuity plan including methods of teaching, assessment, competencies, and completion of training. One of the questions remaining unanswered, if those residents who did not complete training requirements to be graduated with limited privileges.

References

1. Algaissi A, Alharbi N, Hassanain M, Hashem A. Preparedness and response to COVID-19 in Saudi Arabia: Building on MERS experience. J Infect Public Health 2020; 13(6):834-838. doi: 10.1016/j.jiph.2020.04.016.

2. Bahaziq W, Tayeb B., Alzoraigi U, & Boker A. Gaps identification in Saudi anesthesia residency training during early time of pandemic: Trainee view. Saudi Journal of Anaesthesia 2021; 15(2), 155.

3. Flotte T, Larkin A, Fischer M, Chimienti S, DeMarco D, Fan P, & et al. Accelerated graduation and the deployment of new physicians during the COVID-19 Pandemic. Academic medicine: journal of the Association of American Medical Colleges 2020; 95(10), 1492-1494.

4. Creswell J, Hirose M. Mixed methods and survey research in family medicine and community health. Fam Med Community Health 2019; 7, (2).

5. Chick R, Clifton G, Peace K, Propper B, Hale D, Alseidi A, et al. Using technology to maintain the education of residents during the COVID-19 pandemic. Journal of surgical education 2020; 1, 77(4):729-32.

6. Rose S. Medical student education in the time of COVID-19. JAMA 2020; 323:2131.

7. Rajab M, Gazal, A, Alkattan K. Challenges to online medical education during the COVID-19 pandemic. Cureus 2020; 12(7), e8966. https://doi.org/10.7759/cureus.8966

8. Edmunds S, Brown G. Effective small group learning: AMEE Guide No. 48. Med Teach 2010; 32:715-26.

9. Meo S. Basic steps in establishing effective small group teaching sessions in medical schools. Pak J Med Sci Q 2013; 29:1071-6.

10. Madhuri A. Preference of teaching methods among medical students: Large group and small group teaching. Indian Journal of Anatomy 2018; 7:397-401.

11. Gaba D, DeAnda A. The response of anesthesia trainees to simulated critical incidents. Anesth Analg 1989;68:444–51.

12. Pan D, Rajwani K. Implementation of simulation training during the COVID-19 pandemic: A New York hospital experience. Simulation in Healthcare 2021; 16(1):46.

13. SSSH COVID-19 UPDATES. 2020. https://saudissh.org/sssh-COVID-19-updates/ (accessed 27 Dec 2020).

14. Bustamante S, Shravan Cheruku MD. 3D printing for simulation in thoracic anesthesia. J Cardiothorac Vasc Anesth 2016; 30:e61-3.

15. Bruppacher H, Alam S, LeBlanc V, Latter D, Naik V, Savoldelli G, et al. Simulation-based training improves physicians' performance in patient care in high-stakes clinical setting of cardiac surgery. The Journal of the American Society of Anesthesiologists 2010; 1; 112(4):985-92.

16. Lucey C, Thibault G, Ten Cate O. Competency-Based, Time-Variable Education in the Health Professions: Crossroads. Acad Med 2018; 93:S1-5.

17. Boker A. Toward competency-based curriculum: Application of workplace-based assessment tools in the National Saudi Arabian Anesthesia training program. Saudi journal of anaesthesia. 2016; 10(4):417.

18. Ferry C. Physician well-being amidst COVID-19: An analysis of online resource provision by the 123 national medical specialty societies in the AMA house of delegates. Psychiatry Res 2020; 292:113315.

19. Donini-Lenhoff F, Rockey P, Surdyk P, Heard J, Blackwell T. Emergency preparedness for residency/fellowship programs: Lessons learned during Hurricane Katrina and applied during Hurricane Ike. Disaster Med Public Health Prep. 2010; 4(Suppl 1):S71-4.

20. Newman B, Gallion C. Hurricane Harvey: Firsthand Perspectives for Disaster Preparedness in Graduate Medical Education. Acad Med 2019; 94:1267-9.

21. Safdar N, Abbo L, Knobloch M, Seo S. Research methods in healthcare epidemiology: survey and qualitative research. Infection control and hospital epidemiology 2016; 37(11):1272.