

# Microsurgery training during COVID-19 pandemic: Practical recommendations from the International Society for Experimental Microsurgery and International Microsurgery Simulation Society

Education and training are among the fields most severely affected by the restrictions related to the ongoing COVID-19 pandemic. Owing to the infection risks, lockdowns and the global travel restrictions enforced during the early phase of the pandemic, both faculty and trainees are restricted to attend in-person courses and meetings. This disruption lead to either complete intermission of some educational activities or a shift toward on-line education (De Ponti et al., 2020). This has in turn raised significant challenges that likely impacted on the content and quality of the educational act, with potential far-reaching consequences (Ahmed et al., 2020; Doulias et al., 2020).

Practical training is an essential component of the medical education, either as clinical training through bedside teaching or acquirement of practical manoeuvres and skills. Although simulators and some “home-made” equipment (Higgins et al., 2021) can partly replace patient contact and hands-on training, this highly specialized and costly equipment is only available at dedicated training centres and usually require the presence of the trainee in the training facility (Ghanem et al., 2020; Oltean et al., 2017; Tolba et al., 2017). Physical distancing has been advocated as one of the most effective means of reducing COVID-19 spread, together with the use of face masks and hand hygiene. However, the design of the training facilities and the bulky or fixed equipment are not always compatible with the general guidelines for physical distancing. Although microsurgical training in itself is an individual and confined activity, there are several risk moments during training when physical distancing is difficult to achieve. These risk include traveling back and forward to the training facility, common activities such as lectures, coffee and lunch breaks as well as cleaning the instruments and the working space at the end of the training session.

For this reasons, we herein summarize brief practical recommendations based on the collective experience from microsurgical courses planned or conducted during the COVID-19 pandemic at several training centres around the world.

## 1 | ORGANIZATION

The organizers need to comply with the national, local and institutional guidelines and regulations regarding public gatherings and

hygiene measures. Numerous countries have imposed restrictions on the indoor group activities which may limit the number of trainees. Lowering the number of course participants may be needed in order to comply with the rules of social spacing.

Courses require planning in advance and incur a range of costs. However, some of the expenses related to the experimental animals, anesthesia and consumables may be avoided if registered participants choose not to participate. We advocate for a generous and flexible canceling policy which should allow trainees to avoid or minimize an economic loss and consequently facilitate a decision to cancel their participation in case of minor, unspecific symptoms or manifest COVID-19.

The on-site lectures can be successfully replaced by streamed or pre-recorded lectures. Abundant evidence confirms the feasibility and efficiency of online lectures while reducing the time the participants will physically spend together. Live on-line lecture via Zoom or any other platform increase the participants' engagement and involvement. Lecture material should be made available only after the lecture and ensuring the participants to have their web camera turned further enhance the experience and encourage questions and dialogue and maximize the active participation. Additionally, scheduling the theoretical lectures in the early morning would also allow the course participants to avoid crowding in congested areas and public transportation at peak times while traveling to the training site for the practical training, further minimizing potential COVID-19 exposure. Pre-recorded short educational materials covering knotting and suturing techniques, pitfalls and errors should also be made available for individual review. This may shorten the time spent in close contact with other participants during the training in the lab facility.

## 2 | DISTANCING AND PERSONAL PROTECTION

A major objective of physical distancing and shielding is minimizing the risk of virus transmission by pre-symptomatic and asymptomatic individuals. Dual scopes and face to face positioning of trainees should be avoided unless a complete separating shield is present. A distance of at least 1.5 m between participants should be maintained.

In cases when separating Plexiglas screens are used this distance could perhaps be reduced. The screens height should be 20–30 cm higher than the tallest part of a sitting participant. The working stations should be maintained throughout the course and purposed rotations between different microscope models should be avoided. Fitting cameras and screens to the microscopes may further reduce the need for close contact between instructors and trainees.

Additionally, the course venue should ideally have forced ventilation and abundant disinfection of all surfaces by regularly spraying 70% ethanol or other disinfectants should be performed, including after each training session. The waste should be discarded in touchless garbage bins. We recommend the constant use of surgical gloves and face masks and the wearing of disposable, single use surgical gowns. Although the trainees will not be able to wear face shields due to the work with the microscope, we recommend that instructors should strive to wear both face masks and face shields, particularly in the close proximity of the trainees. It is advisable that each instructor provides assistance to a limited number of trainees, preferably the same throughout the course in order to further avoid new potential spread chains between participants.

Whereas coffee and lunch breaks are traditionally a prime opportunity for socializing and networking, this option needs to be significantly limited. We recommend planning breaks individually or in small groups instead of collective breaks. Thus, it is advisable that participants do not leave the course premises for lunch, and that they avoid any self-serve food or drink options (buffets, salad bars, drink stations) but instead opt for a cold meal (lunchboxes or sandwiches). These items should be distributed individually to a place where physical distancing is possible to limit contact. If vending machines are used hand sanitizer, or other protective measures should be made available to ensure proper hand hygiene before and after utilizing vending machines.

Needless to say, all participants should be symptom-free at any time during the course. Any changes in health status (i.e., fever, running nose, cough, loss of taste or smell, gastrointestinal manifestations etc.) should be reported to the organizers and the course attendance should be interrupted. A negative PCR test at the start of the course would be desirable. However, it would be unreasonable to request such a test from the participants as this would incur additional costs and resources. Once the vaccination starts, it should be strongly considered as a prerequisite for participation. As vaccines will be increasingly available it would be likely that healthcare personnel will be prioritized for vaccination while younger, healthy individuals could become less prioritized in the vaccination process.

### 3 | CONCLUDING REMARKS

The COVID-19 pandemic and the restrictions incurred by it have impacted greatly on the medical education and mandated the development of new approaches based on E-learning. Nonetheless, essential practical training required in many medical areas has required rescaling and multiple adjustments. Residents or doctoral students

have a limited time to complete their training and research projects and this hiatus could negatively impact their career including the acquisition of essential practical skills. Whereas no training should be done on the expense of health and safety, be it personal or collective, we believe that practical courses can be conducted safely in carefully controlled environments during periods with a lower intensity of COVID-19 transmission. Vaccination will likely reduce the spread but SARS-CoV-2 will likely be around for at least a year. Besides helping to overcome this educational gap, E-learning materials may contribute to a better standardization of the educational content while reducing travel and accommodation costs for participants and lecturers alike.

#### DATA AVAILABILITY STATEMENT

Data sharing not applicable

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## REFERENCES

- Ahmed, H., Allaf, M., & Elghazaly, H. (2020). COVID-19 and medical education. *The Lancet Infectious Diseases*, 20(7), 777–778. [https://doi.org/10.1016/S1473-3099\(20\)30226-7](https://doi.org/10.1016/S1473-3099(20)30226-7)
- De Ponti, R., Marazzato, J., Maresca, A. M., Rovera, F., Carcano, G., & Ferrario, M. M. (2020). Pre-graduation medical training including virtual reality during COVID-19 pandemic: A report on students' perception. *BMC Medical Education*, 20(1), 332. <https://doi.org/10.1186/s12909-020-02245-8>
- Doulias, T., Gallo, G., Rubio-Perez, I., Breukink, S. O., & Hahnloser, D. (2020). Doing more with less: Surgical training in the COVID-19 era. *Journal of Investigative Surgery*, 22, 1–9. <https://doi.org/10.1080/08941939.2020.1824250>
- Ghanem, A., Kearns, M., Ballestín, A., Froschauer, S., Akelina, Y., Shurey, S., Legagneux, J., Ramachandran, S., Cozzolino, S., Ramakrishnan, V., Pafitanis, G., Zakaria, Y., Al-Maaytah, K., Komatsu, S., Kimata, Y., Cifuentes, I., Soucacos, P. N., Tos, P., & Myers, S. (2020). International microsurgery simulation society (IMSS) consensus statement on the minimum standards for a basic microsurgery course, requirements for a microsurgical anastomosis global rating scale and minimum thresholds for training. *Injury*, 51(Suppl 4), S126–S130. <https://doi.org/10.1016/j.injury.2020.02.004>
- Higgins, G. C., Thomson, S. E., Baker, J., Honeyman, C., Kearns, M., Roberts, J., & Tay, S. (2021). COVID-19 lockdown and beyond: Home practice solutions for developing microsurgical skills. *Journal of Plastic, Reconstructive & Aesthetic Surgery*, 74, 407–447. <https://doi.org/10.1016/j.bjps.2020.08.033>
- Oltean, M., Sassu, P., Hellström, M., Axelsson, P., Ewaldsson, L., Nilsson, A. G., & Axelsson, M. (2017). The microsurgical training programme in Gothenburg, Sweden: Early experiences. *Journal of Plastic Surgery and Hand Surgery*, 51(3), 193–198. <https://doi.org/10.1080/2000656X.2016.1213735>
- Tolba, R. H., Czigány, Z., Osorio Lujan, S., Oltean, M., Axelsson, M., Akelina, Y., Di Cataldo, A., Miko, I., Furka, I., Dahmen, U., Kobayashi, E., Ionac, M., & Nemeth, N. (2017). Defining standards in experimental microsurgical training: Recommendations of the European Society for Surgical Research (ESSR) and the International Society for Experimental Microsurgery (ISEM). *European Surgical Research*, 58(5–6), 246–262. <https://doi.org/10.1159/000479005>