



## SPECIAL ARTICLE

**COVID-19 and education: restructuring after the pandemic**

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**SUMMARY**

COVID-19 challenges to keep a valuable educational offer with lockdown measures and social distancing are reviewed. Scientific Societies had to think of new alternatives to maintain meetings with conversion to a virtual format and development of online resources, rapidly available and broadly accessible. Other in person activities as face-to-face clinics have been substituted by telemedicine; the same happened with surgical training in theatre, given the suspension of most of the operations. Finally, the need to share and communicate in a continuous evolving scenario, has impacted negatively the integrity of peer review process, not following the normal procedures to ensure scientific integrity and reproducibility in the earliest phases of the pandemic.

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COVID-19, the disease caused by SARS-CoV-2 infection, has been declared a pandemic by the WHO in March 2020. The death toll has already surpassed 1 million casualties worldwide [1], with no distinction between high-, middle- and low-income countries.

Despite important advancement on virus treatment [2], no effective vaccination is available yet, so the fear of detrimental outcomes because of an uncontrolled virus spread remains real and thus affecting government and public health responses.

As an infectious disease, whose agent can be transmitted via human contact, containment measures such as social distancing have been adopted worldwide, with lockdown and quarantine imposed to respond to the halt of the pandemic. Inevitably, large gatherings have been banned since, and therefore, in-person academic activities, including conferences and traditional scientific

societies' meetings, have been cancelled or postponed, with an urgent call to foster alternative education strategies.

The purpose of health profession education is to improve the health of communities, and given the current circumstances, to adapt to the onset of COVID-19, the novel unexpected threat to human health. An unprecedented need to share information in a rapidly evolving scenario has led to cooperation and innovation among medical societies [3]. These initiatives aim to spread knowledge, which has the potential to save lives and counteract anxiety and frustration secondary to the unforeseen circumstances and the detrimental effects of SARS-CoV-2 [4]. Web-based technology and social media platforms can be used to counteract the physical distancing in a dynamic fashion, reaching a broad and different audience [5].

Webinars (web seminars) have been used regularly by professional bodies and academic institutions, as well as teleconferences held via various online software, but the additional value provided by the discussion over Internet has been exponentially growing, given the new reality of social distancing [6].

While many will remember SARS-CoV-2 as a source of disruption, it is likely that the new competencies developed in education will be better suited to address today's emerging needs and realities, allowing members from all over the world and outside the traditional healthcare organization to meet with no time or zone restrictions.

The need for patient-centred care during the pandemic has been stressed by patients and healthcare professionals [7,8]. In particular, during the pandemic, patients or other groups that are not routinely able to join the traditional face-to-face events were actively involved and engaged into the ongoing debate much more than an indoor event would have previously allowed [9]. Travelling might in fact represent an impediment, particularly for disabled or end-stage organ disease patients, and indeed, the overcome of this barrier has already represented a fundamental gain of the COVID-19 era, highlighting the patient-reported outcome contribution [4]. There are also other initiatives confirming that the conversion of traditional face-to-face education to online platforms can be very effective, even for patient care [10].

On a separate note, being aware that between 2 and 5 tonnes of CO<sub>2</sub> is emitted by every attendee flying intercontinentally to attend a conference [11], it is important to recognize that the push towards more online meetings and educational activities will be beneficial for the overall sustainability of science dissemination.

The pandemic has provided also a unique opportunity for registry development: to maintain a rigorous standard for evidence-based medicine, big data resulting from multicentre [12,13] and multi-societies' [14] collaborations are needed in order to provide scientific validation; thus, a new input for surveys and studies requiring online participation seems to gain momentum at the present. The European Society of Organ Transplantation (ESOT) has pioneered the importance of relevant information dissemination and dialogue among its members from trusted resources, such as the official Society website itself, in the effort to improve the community health [15]. Dynamism and strategic leadership are essential to keep the pace with the community transformation and strive for medical education: an alternative business model, as part of its e-learning

platform earlier this year, was developed to provide the scientific community with a repository of video lectures and webinars on COVID-19, that could be watched remotely at any time, allowing for more interaction by the participants in a forum, which has proven to be a highly used resource among transplantation professionals [15]. The e-learning platform allows individuals to raise awareness or clinical questions within specific communities, mobilize resources and provide support in the absence of physical contact. This initiative leads to an ongoing learning experience for users and provides ample opportunities for education. A platform that allows the sharing of recommended management of a transplant programme with the evolution of the disease assists the transplant community and counteracts the struggle of an unknown situation. Furthermore, research reveals that social media is most effective in tackling the loneliness that might result from the lockdown measures and could enhance existing relationships, as well as forging new meaningful connections, particularly for scientists and at different career stages [16].

The massive extension of open-access publications and other online material, required to be at the forefront of this unprecedented emergency, has amplified the impact of one of the major issues during the pandemic: the rush to publish at the cost of scientific rigour. This was confirmed in a recent evaluation of retracted COVID-19 articles. The study identified 26 retracted articles of which 17 were analysed in depth for their reasons for retraction or withdrawal. The main reasons for retraction of articles were concerns, issues and errors in the results and/or conclusions, and concerns, issues and errors in the data [17]. The postpublication debate by the scientific community has unfortunately shown how an extraordinary amount of articles that did not reflect scientific quality was fast-track peer-reviewed and published even in high-impact journals, only to keep the pace with the increasing global spread of the disease. It is a real concern that even prestigious journals did not follow their normal procedures to ensure scientific integrity and reproducibility [18,19]. Despite the nature of social media might be lacking a detailed critical appraisal of content, in this occasion their immediacy allowed peer review from multiple sources almost extemporarily and contributed to retract misleading information timely before it could have caused more harm.

There has been a dramatic rise in the number of publications on SARS-CoV-2 and organ transplantation since the start of the pandemic. However, clinical data

are mostly reported as case studies or small case series. As a result, position statements and clinical practice guidelines are based on low-level evidence providing little robust guidance for healthcare professionals during the pandemic. The establishment of COVID registries and publications of COVID-specific analyses from existing registries will help to build a more solid evidence base in transplantation [20–22].

This stigma has been considered also in the development of a new safe and effective vaccination, and although several trials are ongoing, extreme carefulness needs to be the guide for clinical safety, before rushing into such a delicate new scenario, since science cannot preclude from rigour.

Aside from an easily accessible and trusted source of thematic content, the advancement of remote learning will certainly push for a higher grade of flexibility from both learners and educators. Because of the spread of SARS-CoV-2, surgical trainees were likely to see the number of in-theatre educational opportunities limited, hence particularly for surgical training, a shift towards virtual assessment, potentially complemented via an online-enhanced experience of the operation, might become a new standard of practice in the case of a new unforeseen pandemic occurrence.

Finally, another emerging previously underutilized reality during COVID-19 is telemedicine: virtual clinic and testing via smartphone applications use to avoid overcrowded and potentially infectious doctor's offices or to track and isolate asymptomatic carriers.

Is telemedicine then here to stay? While it is undoubted that the healthcare system benefitted from the use of this technology in response to the above-described barriers related to social distancing, the longer-term use of the telemedicine needs to be ascertained. Telemedicine is an alternative to face-to-face care that is cost-effective and particularly during the pandemic an acceptable choice to patients who felt more vulnerable because of reduced access to hospitals. However, some groups have already identified which clinical and administrative activities will remain after the pandemic [22].

Unfortunately, for most of the disease whose failed tertiary prevention could significantly impact on mortality figures, there is still uncertainty whether the lack of in-person care and treatment might be substituted. The overall financial impact on hospital and global community economy of telemedicine and web technologies in general could then result in a lack of cost-effectiveness in the longer term for the community health. The same principle seems also to translate into the Society traditional education meetings, where even if the scientific content might be spread and communicated in alternative ways than a frontal lecture, the lack of the in-person networking and the social interaction offered by a gathering seem difficult to replace via a remote experience.

In conclusion, the new costs related to the development of high technology and web-based applications need consideration with the overall financial impact of the lockdown. Historically, many ground-breaking inventions resulted from the biggest crisis, so it is very likely that the whole educational offer from the academic institutions and societies will learn from this pandemic and evolve to a changed model where new and traditional formats, such as frontal lectures used more than 2000 years ago by the ancient Greek and Latin philosophers, will work side by side.

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### Author contributions

Maria Irene Bellini wrote the original manuscript; Liset Pengel, Luciano Potena and Luca Segantini critically reviewed the manuscript.

### Conflict of interest

The authors declare no conflict of interest.

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