New online tools to speed-up training of neurointerventionalists: an example in Central Asia

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There is significant heterogeneity in access to endovascular stroke therapy (EVT) worldwide. Even within Europe, the rate of emergent large vessel occlusion patients treated with EVT ranges from <1% to >15%. In order to achieve a more uniform access rate that nearing 15%, something like 500 new teams with EVT capabilities must be created in Europe. As difficult as this may look, at least this problem can be tackled by expanding a solid basis of existing regional stroke services and experiences. The situation is completely different in Central Asia, where most countries have very few EVT resources for stroke.

The Uzbekistan authorities have just announced that reimbursement of interventional stroke therapy will start in 2024. This will lead to the creation of EVT centers. Experiences and models from leading countries in North America or Europe may be considered as a starting point for their creation, but they cannot necessarily be replicated. New software tools allow automatic identification of patients suitable for EVT, the simulation and real-time adjustment of logistical processes, and better communication among members of the medical teams.

Yet the shortage of physicians trained in EVT cannot be solved by these tools and remains the central bottle neck. Robotics in neurointerventions has shown incremental progress, but remote neurointervention remains as a concept at this point and it clearly will not solve the shortage of neurointerventionalists in Uzbekistan in 2024.

How should those intervenationalists be trained, and where? Every country has its own approach to organizing medical care and for training healthcare professionals. But some standards can be agreed upon across national borders and medical traditions. As an example, the European Board of Neurointervention (EBNI) published specific requirements, varying with the training background of the interventionist. This approach might need modifications outside of Europe, based on the geographical and cultural context and on new technological opportunities. The European Society of Minimally Invasive Neurological Therapy (ESMINT) has started an outreach project to Uzbekistan with the objective of creating a collaboration in the training of new interventionalists, with a focus on EVT in stroke. In this editorial, we briefly discuss the current thought process within this project.

Interventional training rests on three pillars: theoretical knowledge of disease and treatment methods, manual skills, and procedural understanding. A key idea of ESMINT’s outreach project is the use of new online tools as a cost-effective and impactful method of knowledge exchange.

**Theoretical knowledge** can be gained through self-study but still requires some structured courses that should finish with an examination. ESMINT organizes a theoretical neurointerventional course in Oxford (ECMINT) and a theoretical stroke course in Prague (EXMINT). They are currently running in their fifth and sixth cycle, respectively. The online part is well-attended by participants worldwide, but the physical part can accommodate only around 100 participants per cycle and the participants are mainly coming from Europe. To limit the requirements for travel, the authors suggest setting up a similar course in Central Asia based on ESMINT’s experiences. This structured course should be complemented by participation in a multitude of webinars and online training, organized by ESMINT, the Society of NeuroInterventional Surgery, and other organizations.

**Manual skills** in catheterization and application of specific devices can be improved through training on virtual simulators and advanced flow models for interventional procedures. These training exercises are organized in experienced centers worldwide. Typically, the hands-on-time of an individual participant is <2 hours which is sufficient to gain basic understanding. Longer training is highly desirable to reach a higher skills level, but requires the investment of more time by the trainers. It has been reported recently that trainees of hands-on training can be supervised, at least in part, also via online streaming systems. This new approach reduces travel requirements and enables training in regions that are remotely located or otherwise hard to reach. It enables targeted training and even examinations across wide distances.

**Procedural understanding** with important decision-making skills can be acquired first and foremost by observing procedures in teaching hospitals with a stepwise shift to performing procedures. Unfortunately, there is not enough space in the existing hospitals to welcome trainees from all over the world, at least when considering the number of foreign trainees and the need for training interventionalists for the local services. Moreover, there are substantial hurdles for a longer fellowship, such as cost, language difficulties, and administrative burden. ESMINT has established a fellowship and observership program that accepts four and six fellows per year, which is far too little to cover European needs, let alone global ones. To mitigate this problem, ESMINT established the e-fellowship, a 6-month program that enables young members to interact directly with ESMINT mentors and remotely view neurointerventional procedures, currently from 17 centers. The goal is to expose young neurointerventionalists to the breadth of neurointerventional procedures performed by highly experienced neurointerventionalists.

The e-fellowship is a specific use case for live case broadcast that has been a part of neurointerventional education since the beginning of the field. The e-fellowship program is currently being further developed to reach out to other regions, such as Central Asia.

**Remote support** using specific video streaming environments emerged as an additional method to support newly trained interventionalists. It has been successfully implemented in the structured curriculum of Bonn University hospital, where 15 EVTs with a physical mentor in the room are followed by 15 procedures with a remotely connected mentor. It can support decision-making in critical moments of the procedure, specifically as emergency support in case of complications. This system works best when mentee and mentor know each other, even when they are not from the same center. Once installed, the usage of the system is simple and straightforward from
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a technical perspective, but using it across national or continental distances requires careful planning that respects language and cultural barriers. The method is not designed for EVT beginners. The purpose is to increase the patient safety in EVTs done by trained interventionalists who need some additional advice in complex situations. Who would not appreciate feedback by esteemed colleagues?

Online tools can speed up learning processes by transferring knowledge in quick and cost-effective ways. Several options have emerged in our toolbox in the last few years. Including them into the training and treatment processes will substantially accelerate the access for more patients to highly effective endovascular stroke therapy, in Uzbekistan and elsewhere.

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