

Innovation in Surgical Education

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Undeniably, the technology used during surgery has drastically evolved over the last 100 years, but the training that surgeons undergo in their initial years and throughout their career has not matched this trend. With the improvements in technology showing no signs of stopping, will training and education programmes catch up and allow both young and experienced surgeons to keep up with these developments?

STANDARD SURGICAL TRAINING

A standard medical teaching programme following a science-related bachelor's degree in the USA comprises 2 years in a classroom learning about basic sciences and disease followed by 2 years in clinical wards. This structure has been in place for many years, but has been challenged by leading surgeons. During 'The Evolution of Education' session at the International Colorectal Disease Symposium (ICDS) 2020, Dr Laurence Sands shared the plans of his institution to radicalise their training programme. They plan to bring students into the clinical environment much earlier, and change the approach to how diseases, their signs and symptoms, are taught. In explaining how the standard educational approach is to learn about a disease and the symptoms it may present with, he gave the example of myocardial infarction. Students learn that myocardial infarction is accompanied by symptoms including chest pain, but they plan to flip this on its head and teach symptoms and the diseases associated; for example, that chest pain could be a symptom of myocardial infarction. It is thought that this approach of breaking down diseases into symptoms will improve decision-making when diagnosing patients.

CADAVER TRAINING

Concerning teaching the techniques involved in surgery, there are numerous approaches that can be utilised. Cadavers have been a staple in surgical training for decades, mainly because they are the most anatomically correct model available and produce the most realistic setting of operating without having to operate on a live patient. Cadaver training has been shown to be better than model simulation or standard training;¹ however, it can be difficult to access cadavers and is relatively expensive, thus it is not feasible to conduct all training using this approach. A technological advancement that has supplemented the shortfall of available training equipment is surgical simulators.

SURGICAL SIMULATORS

The benefits of surgical simulation are wide-ranging, including that their use provides medical professionals with more hands-on experience in a non-threatening environment. Individuals can be taught and practise technical training before operating on patients meaning that trainee surgeons are better prepared for future surgeries, with the ultimate aim of improving patient



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outcomes. Despite surgical simulators appearing to be a positive addition to the collection of surgical training programmes, issues regarding the standardisation of assessments, reliability, and validity are holding back their integration. A further limit to surgical simulators is that they are incapable of teaching how to care for a patient or the ethics or morals involved: a fundamental aspect of a surgeon's role.

In the session, Dr Sands noted that in a 2006 study comparing 30 randomised controlled trials of different training methods including surgical simulation (with or without computers), computer simulation was shown to be better than no training at all, but was not convincingly superior to standard training.¹ Video training was also compared, but was not consistently better than groups that had no training at all, and there was not sufficient data to determine if video simulation was better than standard training or the use of models. Video simulation tools have drastically improved since this study, calling for analyses of more recent randomised clinical trials.

VIRTUAL REALITY SURGERY

The movement towards a more technology-centric future has inspired innovators to incorporate virtual reality into surgical training,

one group in particular being FundamentalVR. This company has developed a software platform called Fundamental Surgery, which has a mission to provide everyday access to the best simulations to surgeons so they have the opportunity to rehearse, practise, and test themselves, all within a safe, controllable environment that reflects a real-life theatre and operation as closely as possible.² By combining both virtual reality and haptics (sense of touch), this approach has the potential to equip surgeons with valuable realistic experience during their training. The current speciality available is orthopaedics, but there are plans to soon branch out to general surgery, neurosurgery, urology, and more.

VIDEO LEARNING

Advances in Surgery Channel

An example of a training tool that utilises video is Advances in Surgery (AIS) Channel.³ Nicknamed a Netflix of medicine, this visual educational tool aims to reduce the learning curve in surgery and be in line with the new generation of surgeons. To do this, the surgical education online platform offers online courses, lectures, live surgeries, and congresses to share the latest changes in surgical techniques, as well as ensure that surgeons have access to information from leading surgeons for

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transferring knowledge from experts to surgeons around the world.

SUMMARY

continual improvement of their surgical skills. In the ICDS session, Dr Antonio Lacey, the conceiver of the idea of AIS Channel, commented that: "The main goal of AIS is to create bridges between leading surgical communities worldwide," and "the most important thing about AIS is the transfer of knowledge."

Live Surgeries

Dr Lacey also commented that vision and hearing are probably the most important senses of a surgeon. The sense of touch is still important, but has been somewhat mitigated by the use of robotics. One aspect of AIS Channel that supports visual and auditory learning is the option to watch live surgeries accompanied by a commentary from the leading surgeon performing the surgery. There is also a forum in which the audience can ask questions and interact with the session and surgeon directly to ask about tests that should be conducted during and post-surgery, and tips on how a technique should be performed. The ability to receive training from a leading surgeon can be difficult, meaning that this simple solution is vital and actively contributes to the mission of

Given the rapidly progressing field of surgery and that surgical training has been relatively stationary for the last decade, it should come as no surprise that innovators of the 21st century are drawing their attention to this area, which is much needed. It is evident that recent developments, such as surgical virtual reality and simulation, have the possibility to revolutionise how surgery and the techniques associated with it are taught. As to whether they will be formally integrated into a standard surgical training programme is not clear yet, but they will undoubtedly be a worthy supplementation of knowledge to facilitate continual learning in the evolving field that is surgery.

References

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