In this issue of HKJEM, Chen et al. examined the effectiveness of paediatric emergency medicine education in a nationwide survey involving 258 emergency residents and physicians in 43 teaching hospitals in Taiwan. Notably, the study reported a lack of confidence in paediatric resuscitation. Only 52.3% of the respondents felt confident enough to care for the acute paediatric resuscitation, possibly due to lack of exposure to paediatric critical patients. Also, more than half of the respondents felt their paediatric emergency case exposure was insufficient and would like more extended paediatric emergency training. That resonates with similar findings in other parts of the world, where a perception of a lack of paediatric case exposure was found among emergency medicine trainees. Perceptions of inadequacy of case exposure in other specialties like geriatrics, psychiatry and obstetrics were also reported.

The cause could be multifaceted, including a deficiency in rotation opportunity, a lack of clear training objectives and structured experience in curriculum, and low caseload in some geographical regions. This situation is problematic as it has the potential to affect the quality of care and even the safety of certain groups of emergency department patients. Due to logistic reasons and time limitations, emergency medicine education administrators often cannot arrange for trainees to rotate to all the other specialties. For example, the current training curriculum of the Hong Kong College of Emergency Medicine does not require a compulsory rotation to paediatrics, geriatrics, psychiatry or obstetrics. In this regard, the exposure of a trainee in a particular patient group would be highly dependent on the case-load profile of the hospital he or she is being trained in. Worse still, the COVID-19 pandemic has aggravated this problem due to decrease patient volume and cancellation of training activities.

To compensate for the inadequacy in training time in other specialties, one of the solutions would be enhancing emergency medicine training by ‘e-learning’. E-learning or ‘electronic learning’ is often considered synonymously with ‘online learning’. This interpretation is overly simplistic. Pachler et al. defined e-Learning as ‘learning facilitated and supported through the use of information and communications technology, which may involve the use of computers, educational software, interactive whiteboards, digital camera, mobile devices, video-conferencing, virtual learning environment and online learning management system’. By moving teaching and learning online, well-designed e-Learning programmes break the limitation of rotation arrangement. E-Learning fits with the learning theory of student-centred learning and the flipped classroom which were shown to be superior to the traditional, didactic model of teaching. Programmes can ensure content coverage and allow trainees to learn at their own pace whenever and wherever they want. A meta-analysis by Cook et al. summarised a significant positive learning effect of e-learning compared with no intervention in health professions students regarding knowledge outcome, skills, learner behaviour and patient effect. However, the heterogeneity of difference studies was large.

A crucial question remains: What characteristics make an e-learning programme effective? In this issue of HKJEM, Tyebally and Dong report a qualitative focus group study of 27 residents from family medicine, emergency medicine and paediatric medicine. Theme analysis showed that crucial elements for the success of an e-learning programme would include access (e.g. early and unlimited access and easy technical access), instructional method (e.g. case-based scenario, interactive quiz, feedback and multimedia), design (e.g. purposeful organisation, autonomous learning and appropriate volume) and supplementary learning (e.g. synergism with team-based learning, written material and guidelines).

Another possible activity to address a lack of clinical exposure would be simulation training. Simulation provides standardised, repeatable scenarios for students without the availability of actual patients. It is already used in emergency medicine education and has been shown to have a favourable training effect on knowledge and clinical competence. The benefits of simulation training include patient safety, psychological safety for trainees, repeatability, and availability of feedback. However, simulation training may be limited by its cost and availability. High-fidelity manikins and simulation training centres are often very
expensive and not affordable by every institution. In addition, simulation training activities are usually given to students. As such they are not truly student-centred since it requires preparation and organisation.

One of the latest advancements is moving simulation from the real world to the virtual world, combining e-Learning and simulation training. Virtual patient simulation (VPS) is an online computer system that can provide a high-fidelity environment similar to the resuscitation room. The students are tasked to manage a critical case with a pre-designed diagnosis and script. Like an actual patient, the condition of the virtual patient changes depending on the learner’s decision. A realistic verbal response is given during history taking. Clinical pictures, sounds, radiography, and investigation results from real patients are given when sought. At the end of the scenario, feedback is automatically generated for the students by the computer system. Since the system is entirely online, students can repeat a simulation training as many times as he or she wants, without the restriction of time and place. The system also allows the cooperation of different students online as a resuscitation team. Examples include Body Interact™ (https://body-interact.com/) and Virtual Medical Simulation™ (https://virtualmedicalsimulation.com/).

Evidence suggests that VPS could improve knowledge and clinical skills (including clinical reasoning, procedural skills and team skills) more effectively, than traditional teaching only. Moreover, VPS has been found to have a comparable effect on improving resuscitation and team leadership skills to more expensive and logistically more difficult high-fidelity simulator. Learners report an overall positive attitude to VPS education.

E-learning and online virtual patient simulation were attempts to overcome problems with traditional medical education, namely, case availability and logistics problem. They also provided alternative education delivery for emergency medical education during the COVID-19 pandemic, which saw emergency residents’ training disrupted due to low caseload, lack of time and cancellation of learning activities. On a more global perspective, VPS could also, subject to affordability constraints, improve access to simulation training for students in remote areas and low-/middle-income countries. It also opens innovative opportunities that cannot be accomplished by in-person simulation, for example, an international online SimWar. Although VPS looks to be a promising tool, there are unresolved issues. For example, the platforms are diverse and its optimal utilisation and the translation of learning to high-stakes, fast-paced clinical situations in emergency departments need further exploration.

The COVID-19 has worsened some of the existing problems in emergency medicine residency education: lack of case exposure in certain patient groups and logistic issues. It was a catalyst for changing learning behaviour towards online learning. In particular, e-learning and VPS were used to mitigate these problems and improve current education effectiveness. More importantly, for the future, they offer opportunities to enhance and improve availability of training opportunities for emergency clinicians. Watch this space!

Alex Kwok-Keung Law

Joseph Epstein Centre for Emergency Medicine Research @ Western Health, Sunshine Australia and Department of Medicine–Western Health, Melbourne Medical School, The University of Melbourne, Parkville, VIC, Australia

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ORCID iD
Alex Kwok-Keung Law https://orcid.org/0000-0002-6218-949X

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