Editorial

Does simulation-based training have a future in Africa?

The term 'simulation', as it pertains to the training of healthcare professionals, appears in three of the 10 articles selected for publication in this edition of *AJHPE*.[1-3] This provides an ideal opportunity to pause and reflect on some aspects of this teaching technique in the context of healthcare training in Africa, a key mandate of the journal. Simulation-based training is not new. The technique, widely known for its use in non-medical industries such as commercial aviation and nuclear power production, was first used to train healthcare professionals more than 40 years ago.[4-6] 'Resusci-Annie' was born in 1960[7,8] and many of us can recall how we carefully wheeled her around the medical school while she patiently endured, and survived, endless resuscitation training sessions on a daily basis. More than 30 years later, a dynamic interactive 'gentleman' – 'SimMan'[8] – replaced ageing Annie. Since then, the human body simulation industry has grown in leaps and bounds and clinician educators are now confronted by a bewildering array of equipment designed to teach an ever-increasing number of basic and advanced technical and clinical skills.[5]

While the applications of human body simulation are diverse[9] and the educational benefits have been documented,[4-6,10,11] the question that needs to be considered is 'Should simulation-based training be an essential, non-negotiable component of training for a career in healthcare provision?'. Many will say that this question has already been answered and provide a list of important reasons why clinical simulation training centres are essential, including: (*i*) concerns about patient safety; (*ii*) risk of injury to trainees; (*iii*) medico-legal consequences of procedural errors; (*iv*) need for a 'safe' learning environment where errors can be made and remediated without dire consequences; (*v*) reduction in time needed to become proficient in the requisite skills; and most recently (*vi*) need for additional appropriate training opportunities in circumstances where the clinical teaching platform has become overloaded with both patients and students, and the combined epidemics of tuberculosis, HIV/AIDS and trauma have inappropriately skewed the case mix from a training perspective.[1]

While these reasons are all valid and important, it is somewhat disappointing to learn that robust evidence, demonstrating better health outcomes for patients managed by trainees who have undertaken simulation-based training, compared with those who have not, is still lacking.[6-9,11] Okuda *et al*.[6] made the point quite clearly by stating the following: 'As simulation becomes increasingly prevalent in medical school and resident education, more studies are needed to see if simulation training improves patient outcomes'. Gaba,[9] an internationally respected leader in simulation training, sounded an even sterner warning: 'The future of simulation in health care depends on the commitment and ingenuity of the health care simulation community to see that improved patient safety using this tool becomes a reality'.

One could argue that the need for such data is obsolete because many health sciences faculties worldwide have already spent, and continue to spend, considerable sums of money to set up and run simulation training facilities because 'simulation is here to stay'.

If only the latter assumption was a global reality. While 71% of medical schools that responded to a worldwide survey conducted in 1999 were using some form of manikin or simulator to teach anaesthesia skills to medical students,[12] and one-third of US medical schools were using human patient simulators by 2003,[5] the cost of setting up and maintaining such simulation facilities is prohibitively expensive and beyond the reach of most health sciences training centres in the developing world. In 1997, the start-up and first-year operational costs for a high-fidelity simulation centre in Canada was about USD665 000.[13] Even in South Africa (SA), one of the wealthiest countries in Africa, access to simulation-based training facilities at all the local universities was an incremental process that took more than a decade to become a reality.

So, if simulation-based training is essential, for the many good reasons we believe, then the question arises, 'What is the future of health sciences faculties where such training facilities do not exist?'. Should wealthy countries provide the equipment needed or should trainees go to wealthy countries, including SA, to undertake simulation-based training? This debate is a double-edged sword because simulation centres, set up by wealthy donors, require ongoing funding to run and maintain/repair/replace the necessary equipment. Unfortunately, these long-term 'hidden' costs are not always factored into start-up projects, and ongoing skills training gradually dwindles as equipment/systems failure becomes the order of the day. The alternative approach – sending trainees to centres where simulation-based training is available – is also not as easy as it seems. Firstly, it is not a viable option for large numbers of undergraduate students, but seems like an attractive option for postgraduate trainees. The truth, however, is that travel and subsistence costs, even in SA, are beyond the financial means of fellow African trainees, not to mention further afield, and so this option is only available to a tiny proportion of trainees who would benefit from the learning opportunity.

If simulation-based training is desirable, and the abovementioned realities are faced on the African continent, how should we proceed? There is no easy answer to address this huge challenge, but part of the answer must reside in the innovative and creative ways in which simulation equipment can, and will need to, be made from affordable, locally available materials. Simple examples of cheap innovations include the use of pig cadavers to teach intercostal drain insertion, or wooden boxes with 'portals' that provide laparoscopy training. While these models lack the attractive appearance and endless capabilities of expensive high-fidelity equipment, the level of training that can be achieved with them has not been formally documented to determine the size of the residual skills gap deficit, if at all.

Having developed workable models, we need to share their innovations with our fellow Africans, and with others, by means of workshops (virtual or face-to-face), conference presentations (virtual or face-to-face), peer-reviewed publications, education clearing houses such as MedEdPORTAL (https://www.mededportal.org) and social media, as appropriate. This is however not a comprehensive answer to the challenges we face, but we need to systematically address our essential training needs in a feasible, affordable and sustainable way. This area of 'innovation' research is largely

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unexplored and ready to be exploited, e.g. which models can be successfully made locally?; how well do locally made models work?; how large is the skills gap deficit of trainees using locally made simulation models compared with trainees using high-fidelity simulation facilities? Finally, we should not forget that data demonstrating health outcome benefits of simulation-based training, whether cheap or expensive, are still needed and there is no good reason why Africans could not also make a meaningful contribution to answering this question, perhaps the most important one of all.

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