The role of simulated learning environments in postgraduate medical education and training

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At the same time as the number of medical graduates is rapidly increasing, simulated learning has emerged as a teaching modality with potential to complement traditional models of clinical education and to enhance clinical training capacity across the continuum of medical training. While simulation has the potential to add significant value to postgraduate medical education and training, it is not a substitute for clinical exposure and further research and evaluation is required to optimise its use and ensure evidence-based practice.

The AMA supports the use of simulated learning environments (SLEs) as an adjunct to existing clinical training frameworks for junior doctors. This position statement sets out the principles that should underpin the use of SLEs in postgraduate medical education and training.

1. Background

1.1. Simulation is an educational technique that facilitates learning by reproducing all or part of a clinical event or experience,[1] and is often designed to precede a real-world encounter with an event. SLEs provide an immersive educational experience where trainees have the ability to practise and refine their clinical skills and to apply these to model situations.

1.2. SLEs can range from low fidelity, simple part-task training to high fidelity computer-driven models in specialised laboratories. The appropriate modality depends on the clinical skill taught and the desired educational outcome.

1.3. Simulated learning provides trainees with time for dedicated skills practice and an opportunity to receive immediate feedback on their performance in a safe environment. This approach is particularly useful for junior doctors engaged in critical care, trauma and the management of clinical events that occur infrequently,[2] as well as for surgical and procedural training.

1.4. While simulated learning has the potential to add significant value to postgraduate medical education and training, it cannot replace what a doctor learns through direct patient contact.[3,4,5] To date, outcomes-based research on the use and effectiveness of simulation technology in medical education has been limited.[6] Many simulation facilities are under-utilised due to a lack of structured programs, which can themselves be impaired by the absence of clear objectives.[7]

1.5. There are also well-documented limitations to simulated learning,[8,9] including:
(a) competence in a simulation centre does not automatically or predictably transfer to competence in clinical practice;
(b) self-assessed confidence and competence in a simulated procedure can outweigh performance on objective testing;

[1] Maran, N. J., & Glavin, R. J. (2003). Low- to high-fidelity simulation - a continuum of medical education? Medical Education, 37 Suppl 1(s1), 22-28.
[2] Nestel D et al. Coping with increasing numbers of medical school students in rural clinical schools. MJA Vol 190. No 2. 19 Jan 2009.
[3] AMA Position Statement – Core terms of internship (2007).
[4] AMA Position Statement on Competency-based training in medical education (2010).
[5] Wearne, S. Teaching procedural skills in general practice. From Australian Family Physician Vol. 40. No 1/ 2. Jan/Feb 2011.
[6] Issenberg SB et al. Features and uses of high-fidelity medical situations that lead to effective learning: a BEME systematic review. Med teach. 2205 Jan; 27(1):10-28 9 (Abstract).
[7] http://www.ldu.leeds.ac.uk/news/conference_04_05/documents/ForrestandCooperHandout.pdf
[8] Wearne, S. Teaching procedural skills in general practice. From Australian Family Physician Vol. 40. No 1/ 2. Jan/Feb 2011.
[9] Thomson, J et al. Supervision – growing and building a sustainable general practice supervisor system. MJA. Vol 194. No 11. 6 June 2011.

(c) diverse cognitive and learning styles mean simulated learning programs must be carefully applied and evaluated; and
(d) appropriate learning facilities are required, teachers need to be trained, and curricula needs to be developed and evaluated.

2. AMA position

2.1. SLEs should be used to complement medical education delivered in patient care settings,[10] and to reinforce the clinical training experience for prevocational and vocational trainees by facilitating learning at an appropriate level and point in the underlying curriculum.[11,12]

2.2. When supported by purpose designed learning programs, SLEs can be an effective method of developing the technical and non-technical skills required for safe and competent clinical practice.[13] They provide an opportunity for controlled exposure, case simplification and mistakes in a safe and non-threatening environment[14,15] and allow clinical teams to learn and practise together.[16] This can lead to decreased levels of anxiety and improved confidence in decision-making and ability, particularly in the case of critical situations and rare events. [17,18.]

2.3. Simulation programs must integrate with the underlying curricula and align with professional standards and frameworks to assist in the development of relevant and appropriate clinical skills and competencies. Programs should be flexible enough to meet local curricula needs, to accommodate individual cognitive and learning styles, and must be accessible by all trainees, regardless of geographical location.

2.4. The use of SLEs must be evidence-based and include a strong focus on research and evaluation to optimise their use and ensure evidence-based practice. Simulation programs must be critically evaluated at regular intervals to ensure that they produce the desired outcomes, including enhanced clinical competence. Ongoing dialogue and exchange between educators and trainees is essential to ensuring their application is appropriate and consistent with requirements.

2.5. Simulated learning programs should only be implemented in areas where there is a clear or emerging evidence-base for their use, including but not limited to:
(a) communication and teamwork skills;
(b) recognising rare events, managing emergencies and the critical patient;
(c) clinical examination and procedural skills;
(d) diagnosis, clinical reasoning, decision-making problem solving and rational investigation ordering and interpretation;
(e) patient and health worker safety (including universal precautions); and
(f) intravenous fluid, electrolyte & blood product management. [19]

2.6. There is a strong case for the integration of simulated learning solutions across the continuum of medical training. Shared resource arrangements will enhance efficiency and effectiveness. The AMA acknowledges the work of Health Workforce Australia to enhance clinical training capacity in the health system via the use of simulated learning modalities,[20]

[10] Issenberg SB et al. Features and uses of high-fidelity medical situations that lead to effective learning: a BEME systematic review. Med teach. 2205 Jan; 27(1):10-28 9 (Abstract).
[11] De Visser H et al. Progress in virtual reality simulators for surgical training and certification. MJA. Vol 194 No 4. 21 Feb 2011.
[12] Crotty B. More students and less patients: the squeeze on medical teaching resources. MJA Vol 183. No 9. 7 Nov 2005.
[13] Cetiscape. Issue 5. May 2011.
[14] De Visser H et al. Progress in virtual reality simulators for surgical training and certification. MJA. Vol 194 No 4. 21 Feb 2011.
[15] Crotty B. More students and less patients: the squeeze on medical teaching resources. MJA Vol 183. No 9. 7 Nov 2005.
[16] Cetiscape. Issue 5. May 2011.
[17] O'Brien G et al. Interns' perceptions of performance and confidence in participating in and managing simulated and real cardiac arrest situations. Med teach. 2001 Jul; 23(4):389-395. (Abstract)
[18] Marshall RL et al. Use of a human patient simulator in the development of resident trauma management skills. J Trauma. 2001 Jul:51(1):17-21. (Abstract)
[19] Health Workforce Australia. Use Of Simulated Learning Environments In Professional Entry Level Curricula Of Selected Professions In Australia. December 2010.
[20] http://www.hwa.gov.au/work-programs/clinical-training-reform/simulated-learning-environments-sles

but is concerned that its focus has been primarily on undergraduate education; this should be extended to include prevocational and vocational training.

2.7. SLEs must be supported by transparent and accountable governance arrangements and must be sustainable in terms of workforce and infrastructure.

2.8. There may be significant costs associated with the establishment of SLEs and simulation programs (especially those using high fidelity equipment). Adequate and ongoing government funding is required to ensure SLEs are adequately equipped and staffed by appropriately trained professionals (including educationalists and technicians). The AMA is strongly supportive of government investment in this area.

See also:

AMA Position Statement on prevocational medical education and training (2011).
AMA Position Statement on competency-based training in medical education (2010).
AMA Position Statement on core terms of internship (2007).