Simulation in clinical teaching and learning

Practising clinical skills and teamwork in a safe environment

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Series Guest Editor
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Simulation-based education (SBE) is a rapidly developing discipline that can provide safe and effective learning environments for students. Clinical situations for teaching and learning purposes are created using mannequins, part-task trainers, simulated patients or computer-generated simulations. SBE has advantages over opportunistic learning, as clinical events can be scheduled, observed and repeated to consolidate learning. It also facilitates deliberate practice, enhances transfer of theoretical knowledge to the clinical context and eases transition into the workforce.

What is current Australian practice?

A report on the current use of SBE in Australian medical schools and teaching hospitals can be found on the Health Workforce Australia (HWA) website (www.hwa.gov.au/sites/uploads/simulated-learning-environments-medical-curriculum-report-201108.pdf). To further develop SBE capacity in Australia, HWA established capital funding of $46 million and recurrent funding for 2010–11 of $48 million. It has undertaken a review of existing and potential opportunities for SBE, established a mechanism for developing SBE initiatives across Australia and introduced instructor training.

What does best evidence tell us?

There is a positive relationship between SBE and learning outcomes, with participants reporting increased knowledge and displaying improved performance in simulated events. Some emerging evidence supports transfer of learning from SBE to clinical practice. Features of SBE that enhance its effectiveness include: feedback on performance, opportunities for deliberate practice, incorporating outcome measurements, matching simulation fidelity to educational objectives, skills acquisition and maintenance, and instructor training. Integrating SBE into the curriculum at the design phase ensures continuity between simulated and clinical learning environments.

Poorly designed simulation and inadequate instruction can promote negative learning; for example, if physical signs are missing, students may neglect to check for these. SBE may also encourage shortcuts, such as omitting patient consent and safety procedures, or it may foster artificial rather than genuine communication skills.

An example of simulation-based education — management of acute heart failure

Pathophysiology

Interactive demonstration: A computerised mannequin ("patient") displays tachycardia, low blood pressure, raised left atrial and pulmonary capillary wedge pressures, reduced cardiac output, and falling oxygen saturation. A student administers oxygen and frusemide, while other students watch the change in physiological parameters.

Preparatory skills

Skills station: Students are asked to administer oxygen to a "patient" with hypoxia. Mistakes in assembly of equipment are used as opportunities for learning.

Theory to practice

Pause and discuss: Students are asked to initiate treatment for a "patient" with acute heart failure. As they begin, the instructor stops the scenario and asks the students about their clinical reasoning.

Transition to night call

Immersive simulation: A senior student is called by a nurse to see a ward "patient" who is acutely short of breath. The student gathers information, diagnoses the problem and begins treatment. The instructor manages the simulation remotely. The debrief focuses on clinical reasoning and decision making.

Working with the health care team

Immersive multidisciplinary simulation: Senior medical and nursing students manage a "patient" with acute breathlessness. Together, they make a diagnosis, devise a management plan and implement it. The debrief reinforces appropriate knowledge and skills, and explores communication, understanding of roles and capabilities, and task coordination and decision making. ◆

Where are the new frontiers?

Health care is increasingly being delivered by multidisciplinary teams, but inadequate communication can cause errors and inefficiencies in care. Structured information exchanges can improve communication, and SBE provides an ideal environment for learning clinical and teamwork skills (Box).

With increasing emphasis on competency assessments, there will be greater use of simulation for assessment, both for procedural skills and teamwork. While the use of SBE will continue to expand with the advent of new technologies and methods, policy development is needed to ensure its coordinated and cost-effective implementation.

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