Simulation based education

Professional entry student education and training
ACKNOWLEDGEMENTS

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Definitions and abbreviations

Definitions

Eligible health professions - as originally defined by Health Workforce Australia:

- Aboriginal Health
- Audiology
- Chiropractic
- Dentistry
- Dietetics
- Exercise Physiology
- Medical Laboratory Science
- Medicine
- Midwifery
- Nursing
- Occupational Therapy
- Optometry
- Oral Health
- Orthoptics and Prosthetics
- Osteopathy
- Paramedicine
- Pharmacy
- Physiotherapy
- Podiatry
- Psychology
- Radiation Science
- Social Work
- Sonography
- Speech Pathology

Graduate outcomes - Graduate outcomes refer to competencies or standards expected of new graduates. The Simulated Learning Technologies in Undergraduate Curricula: An Evidence Check Review for HETI (The Review) thematically analysed the published outcomes of ten from the 24 eligible health professions. See The Review at www.heti.nsw.gov.au/SimulationInUndergraduateCurricula.

Students - Professional entry students of eligible healthcare professions (see definition above) as originally defined by Health Workforce Australia.

Simulation - the imitation or representation of one act or system by another. Healthcare simulations can be said to have four main purposes - education, assessment, research and health system integration in facilitating patient safety.4

The Review - Simulated Learning Technologies in Undergraduate Curricula: An Evidence Check Review for HETI. See The Review.

Abbreviations

- HETI  Health Education and Training Institute
- ICTN  Interdisciplinary Clinical Training Network
- LHD  Local Health District
- OSCE  Objective Structured Clinical Examination
- SLE  Simulated Learning Environment
- SN  Specialty Health Network
The Health Education and Training Institute (HETI) undertakes a core role in supporting the NSW Health system in its education and training requirements. HETI’s vision is for a world class NSW Health Workforce supporting excellent patient care.

Working closely with Local Health Districts (LHDs), Specialty Health Networks (SNs), other public health organisations and health education and training providers, HETI ensures that education and training across the system:

- supports safe, high quality, multi-disciplinary, team based, patient centred care
- meets service delivery needs and operational requirements
- enhances workforce skills, flexibility and productivity

Simulation is the act of imitating or representing a ‘real-life’ situation or process from the simple to the very complex. In healthcare, simulation is used for education, assessment, research and health system integration in facilitating patient safety.

Simulation is an important educational modality in HETI’s inclusive educational approach. HETI aims to support effective and targeted use of the wide variety of simulation based educational methodologies and technologies currently available – from the use of high-tech manikins in specialised simulation centres to role play based learning delivered in the workplace – which all work to support the development of a capable workforce delivering excellent patient care.

In partnership with the Federal Department of Health, HETI has been working to increase capacity in the NSW health system to provide high quality clinical placement experiences for students. The Simulated Learning Environments (SLE) program is one of the federal initiatives that HETI oversees in NSW. The central aim of this program is to expand the capacity for simulated learning in clinical training across NSW.

This report summarises the current research finding on key reasons for using simulation in student training and explores the most effective ways this can be achieved.

HETI believes the information in this report will play an important part in ensuring that simulation based education for students is evidence based, targeted and prepares them well for their role in the NSW health workforce.

Heather Gray, PSM
Chief Executive
Health Education and Training Institute
“Simulated learning technologies are here to stay and we have an obligation to use them optimally in supporting health professional students in meeting the needs of the health care workforce.”¹
Summary of key findings

- Simulation includes a wide variety of educational techniques that are used throughout health education and training.
- The application of simulation based education varies considerably between professions and educational institutions.
- Simulation is currently most often used in student education to:
  - support learning of commonly performed skills and procedures
  - manage acutely ill (and deteriorating) patients
  - orientate students to practices on clinical placements and for entry to registered practice
  - assess skills
Simulation leads to increased knowledge and improved skills under specific conditions for several core graduate outcomes in undergraduate curricula...

Moreover, simulation has relevance in all undergraduate health professions education.²
Summary of key findings

**Why use simulation in student education?**

- There are many reasons to use simulation in student education including ethical imperatives, the potential to help address training system capacity issues and changes in the health system.

- Simulation leads to clinical skills acquisition and retention when ongoing practice is offered and these skills are able to be transferred to clinical settings. There is moderate evidence which shows simulation can lead to learning faster when compared with other methods and that it is effective when used in conjunction with other methods.³

- There is moderate evidence that patient safety, knowledge, attitudes and skills are improved or enhanced by a range of simulation modalities when integrated in curricula for medicine, nursing, pharmacy and dentistry.

**What is the most effective way to use simulation in student education and training?**

- Simulation in student education should be used to:
  - address core graduate outcomes
  - support the National Safety and Quality Health Service (NSQHS) standards

- There are several factors that those involved in student education should consider including:
  - the best environment for simulation based education
  - the most suitable modalities, tools and resources
  - program design
  - organisational considerations
Introduction

This report highlights the key reasons to use simulation in student education and training and explores the most effective use of simulation in student curricula.

It is intended to be a useful resource for simulation professionals wanting to optimise their work with students and to people involved in designing and delivering student curricula to identify new areas where simulation can be used to enhance education and training.

A variety of sources were used to inform the report, including:

- an evidence review facilitated by the Sax Institute for HETI titled ‘Simulated Learning Technologies in Undergraduate Curricula: An Evidence Check Review for HETI’ (The Review)
- the HETI Simulation Priorities Report Reference Group
- consultations with simulation providers across NSW
- HETI’s report on the Education and Training Requirements for Simulation Professionals in NSW – Priorities identified from a survey of simulation professionals’ (2014 in press)

For an in depth review of the evidence behind the use of simulation in undergraduate curricula, see The Review.
The scope of simulation modalities

“Simulation is the imitation or representation of one act or system by another. Healthcare simulations can be said to have four main purposes - education, assessment, research and health system integration in facilitating patient safety.”

Simulation includes a wide variety of educational techniques used throughout health education and training. It is important to have an understanding of the full scope of simulation modalities in healthcare to enable a full appreciation of the opportunities currently available.

The diagram below lists the scope of simulation modalities used in student education. Please see the appendices for NSW based case studies.
Why use simulation in student education?

“Simulation can lead to increased efficiency (learning faster) when compared with other methods.”

There are four main reasons to use simulation in student education: ethical imperatives; educational benefits; the potential to help address training system capacity issues; and ongoing changes to the health sector.

Further, patient safety, knowledge, attitudes and skills are improved or enhanced by a range of simulation modalities when integrated in curricula for medicine, nursing, pharmacy and dentistry and specifically in using protocols in clinical settings. Simulation can also lead to increased confidence in interpersonal collaborative practice and team training in medicine, nursing and pharmacy students.

There is evidence that good quality simulation can effectively substitute traditional clinical hours without compromising graduate outcomes, by up to 50% according to one recent study.

Ethical imperatives

There are ethical imperatives for the use of simulation in the education of students. The first imperative is to minimise risks to patients by ensuring students are prepared for clinical placements and for transition to professional practice.

The second imperative is to provide students with the opportunity to learn via simulation where strong evidence exists for the benefits of simulation training in comparison with or in addition to other training modalities.

Educational benefits

Simulation leads to clinical skills acquisition and retention when ongoing practice is offered and these skills are able to be transferred to clinical settings. There is moderate evidence that simulation can lead to faster learning when compared with other methods and is effective when used in conjunction with other methods.

Simulation also provided other educational benefits including:

- providing an opportunity to practise skills repeatedly, without needing to rely on finding a patient with a particular condition, allowing a greater focus on the student’s learning requirements
- simulation scenarios can be quickly created and adapted to suit learning objectives and some approaches can provide objective measures of performance
- a significant benefit of preparing students for critical incidents or crisis situations that occur rarely but require a high level of preparedness
Why use simulation in student education

“Simulation supports learners in the recognition and management of specific clinical conditions compared with non-experiential forms of learning in randomised control trials. For example, in dyspnoea, cardiac arrhythmias and pre- and post-operative care in the ICU.”

Addressing capacity issues

Providing high-quality clinical experiences for students is of utmost importance. Short patient length of stays, high patient acuity, disparities in learning experiences, programs competing for clinical sites and the amount of time instructors need to spend supervising skills all increase the associated challenges.

There is evidence that simulation can replace some clinical placement activities without impacting graduate outcomes. Simulation has been found to be at least as effective in terms of the learning students acquire in clinical placements for at least some professions and areas of learning. There is strong evidence that simulation can effectively replace traditional clinical hours without compromising graduate outcomes, by up to 50% in some profession according to a recent study.

Changes in the health sector

A number of recent changes in the healthcare environment provide compelling reasons for the use of simulation in student training. These include:

• in certain situations, it is no longer seen as appropriate for some skills to ‘practice’ on patients where competence can be achieved through other means
• new technologies in medicine require different approaches to training, for example endoscopic surgery
• there is raised awareness of adverse event management and the need for training in the area of critical incidents/adverse events
• there have been numerous changes to healthcare delivery including the move to ambulatory and community settings, increased acuity within hospitals and day surgery, all of which mean that there has been a reduction in opportunities for healthcare workers to gain the full breadth of patient care experience

“Simulation can lead to increased confidence in interprofessional collaborative practice and team training in medicine, nursing and pharmacy students.”
What is the most effective way to use simulation in student education?

“Simulated learning technologies are here to stay and we have an obligation to use them optimally in supporting health professional students in meeting the needs of the health care workforce.”

Simulation is currently most often used to support learning of commonly performed skills and procedures and for applying best practice in treating acutely ill (and deteriorating) patients. Simulation is also used for supporting student transitions into new clinical environments, for example orientating students for clinical placements and for entry to registered practice. Objective Structured Clinical Examinations (OSCE’s) and other simulation modalities are widely used for assessment of skills in student education.

The application of simulation based education varies considerably between professions and educational institutions. Accredited programs of study significantly differ in the simulation modalities they employ and the extent they are used. This variation is due in part to a relatively recent increase in the use of simulation in student education and disparity in perceived benefits and cost effectiveness.

Simulation leads to increased knowledge and improved skills under specific conditions for several core graduate outcomes in undergraduate curricula... Moreover, simulation has relevance in all undergraduate health professions education.
There is compelling evidence that simulation leads to increased knowledge and improved skills for several core graduate outcomes in undergraduate curricula.


Using simulation to address core graduate outcomes

**Patient safety**

- Role play
  - Patient assessment skills
  - Clinical reasoning
  - Application of theoretical knowledge

- Objective Structured Clinical Examinations
  - Professionalism
  - Clinical reasoning
  - Application of theoretical knowledge

- Virtual reality
  - Professionalism
  - Clinical reasoning

- Virtual patients
  - Professionalism
  - Clinical reasoning

- High fidelity manikins
  - Professionalism
  - Physical examination skills
  - Application of theoretical knowledge

- Simulated patients
  - Professionalism
  - Patient assessment skills
  - Application of theoretical knowledge

- Task trainers
  - Application of theoretical knowledge

- Animal and cadaveric
  - Procedural skills

CORE GRADUATE OUTCOME | MODALITY | CORE GRADUATE OUTCOME
Using simulation to address core graduate outcomes

“Most randomised control trials show simulation training significantly improves procedural skills performance.” 18

“Simulation leads to clinical skill acquisition and retention when ongoing practice is offered.” 19

“Confidence, knowledge and skills are shown to improve with simulated patient based simulations for communication, patient counselling, error disclosure skills professionalism and other clinical skills.” 20

Virtual patients compared with no intervention, are consistently associated with higher learning outcomes – knowledge, clinical reasoning and other clinical skills. 21

“For nursing students, although knowledge acquisition was unrelated to manikin fidelity, clinical reasoning skills were better supported by high rather than medium fidelity manikins.” 22
When designing a simulation based curriculum, the National Safety and Quality Health Service (NSQHS) standards should be considered. A copy of the NSQHS standards can be viewed at the Australian Commission on Safety and Quality in Healthcare website. The Standards address the following areas:

- preventing and controlling healthcare associated infections
- recognising and responding to clinical deterioration in acute health care
- medication safety
- clinical handover
- patient identification and procedure matching
- blood and blood products
- partnering with consumers
- preventing falls and harm from falls
- governance for safety and quality in health service organisations
- preventing and managing pressure injuries

Simulation offers a valuable opportunity to incorporate NSQHS standards into education and training of students of all professions at every stage of their journey to becoming a qualified health professional.

There are multiple possibilities for simulation to be used to support NSQHS standards. Following are two examples of how NSQHS standards can be incorporated into simulation based education and training for students in NSW.
Each year, infections associated with healthcare occur in a large number of patients, making healthcare associated infections the most common complication affecting patients in hospitals.

At least half of healthcare associated infections are preventable. Australian and overseas studies have shown that mechanisms exist that can reduce the rate of infections caused by these agents.

Infection prevention and control aims to reduce the development of resistant pathogens and minimise risk of transmission through the isolation of the infectious organism or the patient and by using standard and transmission-based precautions.

One strategy to reduce the number of organisms on the hands and to limit the spread of these micro-organisms is correct hand hygiene. “Correct hygiene has been found to be the single most effective action to reduce hospital acquired infections.”

Example 1 - Preventing and Controlling Healthcare Associated Infections (NSQHS Standard 3)

How can simulation be used to support NSQHS Standard 3?

Simulation professionals can play an important part in implementing protocols for hand hygiene by firstly ensuring that hand hygiene protocols are incorporated into existing curricula (that is consistent with the current national hand hygiene initiatives) but also by ensuring that student education reflects these protocols during simulation clinical skills education and training.

Where possible, ensure that assessment of simulation includes hand hygiene protocols and that students have access to the same equipment and consumables that they would in their workplace.

For consideration: Some NSW based simulation centres have included hand washing stations in their design to ensure that students can carry out hand washing procedures as they would be expected to do in the workplace. Student assessment at these centres includes adherence to hand hygiene protocols.
Using simulation to support National Safety and Quality Health Service standards

Example 2 - Medication Safety (NSQHS Standard 4)

Medicines are the most common treatment used in health care. Because they are so commonly used, medicines are associated with a higher incidence of errors and adverse events than other healthcare interventions. Some of these events are costly and potentially avoidable.

Some hybrid simulation scenarios delivered to students in NSW focus on administration of high-risk medication in a busy ward environment. Simulation educators work with actors to realistically reproduce distractions encountered in actual incidents where the incorrect medication was administered to a patient. Students are given the chance to work through scenarios and self-identify areas that could lead to errors.
Choosing the best environment for simulation based education

Simulation can take place almost anywhere and can be carried out throughout the students’ learning pathway. High technology learning environments are not essential for effective simulation practice, but simulation does need to be accessible for students throughout their undergraduate education and reflect the varied environments in which they will eventually work.25

An increasing trend seems to be the use of relatively short simulations in the workplace during periods of lower activity or at the end of shifts. Done effectively, this approach can minimise time away from the clinical setting and can lead to an optimum level of realism, as the setting and equipment is the same as encountered on a daily basis. Some simulation educators use mobile, low fidelity manikins for life support training or work with colleagues to act as simulated patients to recreate unusual, complex cases in the ward environment.

Dedicated training areas can be useful as they remove workplace distractions, provide dedicated training space and allow the use of non-mobile equipment. If a dedicated simulation area is to be used then it should resemble the working environment as closely as possible. Some NSW based simulation facilities are extremely realistic and include hand washing stations, ward equipment and layout, almost exactly as found in the ward or operating theatre environment.

“There is evidence to support the use of low cost mobile simulation facilities compared with static, resource intensive simulation centres.” 26

FAST FACT: There are over 50 simulation facilities in NSW of all shapes and sizes. Most are involved in undergraduate education. See the map of NSW simulation facilities (www.heti.nsw.gov.au/MapOfSimulationFacilities) for more information.
Choosing the best environment for simulation based education

**Purpose built simulation centre**
Typical modality used: Manikins
Example of outcome: Improved clinical reasoning skills

**On ward area**
Typical modality used: Objective Structured Clinical Examinations
Example of outcome: Improved clinical reasoning skills; Increased knowledge and understanding

**IT suite**
Typical modality used: Virtual patients
Example of outcome: Increased knowledge; Improved clinical reasoning and clinical skills

**Car park – mobile simulation centre**
Typical modality used: Simulated patients
Example of outcome: Improved confidence; increased knowledge and clinical skills

**Mock up of disaster emergency situation**
(can occur anywhere)
Typical modality used: Simulated patients
Example of outcome: Improved confidence; increased knowledge and clinical skills

**Meeting rooms/clinical treatment rooms**
Typical modality used: Role play
Example of outcome: Improved communication skills and clinical reasoning
Choosing the most suitable modalities, tools and resources

It is important to choose the correct modality to suit the desired learning outcome. See page 15 for details of how different simulation modalities can be used to meet core graduate outcomes.

Simulation modalities have different degrees of relevance across health professions. Evidence suggests that:

- simulated patients have value for all health professions
- task trainers are highly relevant in procedure-orientated health professions
- manikins are essential for recognising and managing deteriorating patients
- virtual patients assist the development of clinical reasoning but are not always helpful for empathic communication.27

Educators and organisations are often put off using simulation as they fear it is resource intensive, expensive and requires complex equipment. It is true that some learning outcomes are best met through the use of high-tech manikins however, low-tech, relatively low cost simulation can be used to successfully meet a huge range of learning outcomes.

“In a cost analysis comparing high fidelity manikins with medium fidelity manikins for the same learning outcomes, high fidelity manikins were costed at $AU6.28 per student compared with $AU1.21 for medium fidelity.” 28

Roleplay, computer based simulation, low fidelity manikins and task trainers can all be used to facilitate low cost, highly effective education and training.

Although high technology learning environments are not essential for high quality simulation practice, learning of procedures and skills must be contextualised. That is, students must have the opportunity to integrate whole procedures and skills with the people and settings that resemble those in their workplace. Small details often make the difference between a student’s capacity to become fully immersed in a simulation or not to take it seriously. Ensuring that consumables, medical equipment, patient records, etc. are as accurate as possible is an important step towards ensuring realism.

Audio-visual capture systems are now relatively inexpensive and easily integrated into non-specialised environments. Video assisted debriefing is widely used in simulation activity carried out in NSW and evidence suggests that it is valuable as a simulation tool.29
Simulation program design

“Feedback plays a critical role in effective outcomes. Simulation alone is rarely sufficient. It must be accompanied by strong educational design and feedback or debriefing is essential. The source, amount, nature and timing of feedback influences satisfaction, immediate and longer term outcomes.” 30

Design of simulation based education programs in student education should include:

- integration with broader curriculum activities
- theoretical underpinning
- explicit learning objectives
- briefing, feedback and debriefing processes to optimise student learning
- provision of multiple opportunities to practise and rehearse using simulation
- access to a wide range of simulation modalities
- access to scenarios including a database that includes profession specific and interprofessional resources that are graded by task difficulty and map to graduate outcomes
- adequate access to simulation resources where student programs are offered
- assessment methods that reflect curriculum goals and real clinical practice31

“Not using simulation (or using it ineffectively) in undergraduate education may result in greater costs in the longer term to the health and social care services.” 32
Organisational considerations

“Simulation has relevance in all undergraduate health professions education.” 33

Organisations involved in student education should consider using simulation throughout the student journey, utilising the full spectrum of modalities. To support effective use of simulation organisations should, where possible:

- use simulation to prepare students for clinical placements and to transition from students to professional practice
- ensure simulation facilities are accessible to students across their undergraduate education and reflect the varied environments in which they will eventually work
- support professional development for faculty involved in simulation education
- promote the utilisation of professional networking and resource sharing initiatives for simulation professionals
- ensure sound design of simulation programs and ensure that they are integrated with broader curriculum activities
- provide sufficient resources to support the use of a range of simulation activities;
- incorporate simulation into curricula and student programs
- ensure that simulation is used as effectively as possible by using the most appropriate modality and environment to achieve the learning outcome

HETI’s ‘Education and Training Requirements for Simulation Professionals in NSW – Priorities identified from a survey of simulation professionals’ report identifies the most popular professional development, networking and resource sharing initiatives used in NSW.
Appendices
Appendix A

Example of cadaveric and hybrid simulations

Simulation using cadaveric materials

Regulations around the use of human tissue in Australia are very comprehensive and require any users to hold a health anatomy licence, and operate according to the requirements of the NSW Anatomy Act 1977 and Human Tissue and Anatomy Legislation Amendment Act 2003. The specimens are treated with respect at all times and are housed in a secure environment.

Generally human tissue is used for those skills requiring a high level of accuracy and “feel” of tissues and landmarks. At the SCSSC we have several programs which incorporate human tissue and in many ways these can be equated to using part task or skills trainers. Specific uses include advanced airway management skills and endoscopic joint surgery. Generally tissue specimens are sections e.g. knee or shoulder rather than whole specimens.

Animal tissue

The SCSSC does not use live animals for any simulations or training. Butchered specimens of animal tissue can be useful for training in motor skills like insertion of surgical drains in the chest using a sheep thorax and suturing using pig trotters. Like human tissue these materials have the feel of real tissue.

Hybrid simulation using animal tissue and other materials

Trainers are often made for specific purposes by combining appropriate animal tissue with other materials. The example shown in the pictures is of a goat trachea in a butternut pumpkin which was used for teaching surgical airway management.

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Example of Computer Based/Virtual World Simulation

The NETRAD imaging facility, located at Cumberland Campus and was officially opened on Friday 21 February 2014. The project, made possible by $1.6 million in funding from Health Workforce Australia (HWA), aims to revolutionise imaging teaching and learning across Australia by providing 24 hour access to a Computed Tomography (CT) imaging system via an online interface.

The NETRAD CT scanner is identical to the most up-to-date technology available in clinical centres and comes complete with the latest dose reduction technologies such as iterative reconstruction algorithms, 3D dose modulation and a dose management system.

The software console can be accessed via a PC remote connection and custom built software interfaces, which have been designed and built in collaboration with the Australian Centre for Field Robotics at the University of Sydney and experts in remote access laboratories from the University of Technology, Sydney.

The NETRAD gives a unique simulated learning experience for students in any discipline that uses medical imaging. Users can remotely input specific imaging parameters, manipulate objects in the scanner, perform live CT scans and view the resultant reconstructed images.

One of the many benefits to students of using this facility is gaining basic skills before going out on clinical placements, saving the precious time of clinical educators. A range of phantoms can be used with NETRAD including an adult whole body phantom and a paediatric phantom, modelled on a 7-year-old.

For further information contact: Jessica Hill j.hill@sydney.edu.au or visit the website at: http://sydney.edu.au/news/fhs/607.html?newsstoryid=13047
SIMULATION TO ENHANCE SKILLS AND LEARNING

Simulation is an effective method for providing a safe environment for repeated practice by both students and experts without the risk of harm to patients and learners.

CONCORD CLINICAL SCHOOL

The Concord Clinical School is a teaching hospital of the University of Sydney based at Concord Repatriation General Hospital (CRGH), renowned for combining its teaching and scientific excellence. The teaching program provides a supportive and cooperative environment for integrated, inter-disciplinary learning at all levels, from the four years of the medical program through to graduate studies and medical professional training.

Supported by

CONCORD CLINICAL SCHOOL

SIMULATION

We employ simulation as a mode of education and a way of providing a safe learning environment where learning objectives can be met with no harm to patients. Medical, Nursing and Allied health students and health professionals use the clinical school and the variety of simulation available to meet specific learning needs. The range is from low fidelity part task trainers which allow for repeated practice to high fidelity models where the participants can be immersed in emergency scenarios as part of a team.

At The Sydney Medical School – Concord simulation doesn’t replace clinical hours but is used in conjunction with other learning methodologies.

Using high fidelity the students are also offered the opportunity to put their communication, physical examination and practical skills into practice by being immersed into a scenario. As a team they have to work through different aspects of the scenario, make decisions, initiate treatment and perform procedures. The model is programmed to display different signs and to respond to treatment. Following this the students attend a debriefing session where different aspects of the scenario are discussed.

Simulation facilities and equipment at Concord Clinical School were established with funding support, in part, from the Commonwealth Government through Health Workforce Australia.
HIGH FIDELITY SIMMAN 3G
The Cardiac/Trauma Simulation Room has capability to be used as an emergency room, operating theatre and intensive care ward. This room houses a high fidelity manikin, the SimMan 3G which can be programmed to mimic human signs and symptoms. This allows the participants to be immersed into a scenario where they have to make life saving decisions, perform procedures and communicate as a team. During the simulation the SimMan 3G can be programmed to respond to treatment or be made to deteriorate depending on the aim of the scenario and the treatment initiated by the participants. Lifesaving measures like advance airway management, including a surgical airway, defibrillation and needle decompression for a tension pneumothorax can be performed. The SimMan 3G can be moulaged with artificial makeup, wounds, fake blood and various materials to enhance the realism. Scenarios are developed in accordance with the learning objectives of the session and a debrief is held at the completion of the session to complete the learning experience. AV cameras are installed that allow live feeds to other teaching spaces, as well as recording for debriefing, teaching and research purposes.

3D VIRTUAL ANATOMY TABLE
The 3D virtual anatomy table allows students and health professionals from all disciplines to view and touch a virtual full sized body through various planes. They can observe selected structures or the body as a whole, from external and internal male and female anatomy to the fine structures of small nerves and blood vessels. Scans can also be uploaded to enable the participants to see anatomical differences as well as pathology. Tutors can use the table to teach and revise anatomy easily and can dissect at different cross sections demonstrating anatomical realism. Participants can rotate the body and cut through segments and cross sections with their fingers, the cut can then be undone easily, allowing for continual dissection.

PART TASK TRAINING
Part task trainers are used to teach medical students practical skills as part of the procedural skills program. This allows students to have multiple attempts at the procedure and to learn in a safe environment without any risk to the patient. The students eventually progress onto performing the procedure on patients under supervision.

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ABN 15 211 513 464 CRICOS 00026A
Appendix D

Examples of manikin for immersive simulation and task trainers for clinical skills development

The University Centre for Rural Health North Coast (UCRHN) Nyumbalihgu Simulation Centre is a vital component in the education of health care providers. The simulation centre utilises part task trainers and a range of low to high fidelity manikins to provide students and clinicians the opportunity to learn, rehearse and perfect procedures and develop human factors and crisis resource management skills.

Use of manikin for immersive simulation

The Nyumbalihgu Simulation Centre has two immersive simulation rooms equipped with wall oxygen supply, suctioning, a patient monitor and sophisticated life-like manikins. The manikins have realistic features such as blinking eyes, chests that rise and fall, palpable pulses, a range of heart, lung and abdominal sounds and the ability to speak, vomit, cough or cry. They also respond physiologically to interventions such as the administration of oxygen or fluid resuscitation adding further to the realism of the situation.

The manikins also have procedural features, which allow for chest tube, cricothyroidotomy, defibrillation and urinary catheter insertion.
Appendix D

Immersive simulation education is used to foster the development of teamwork and clinical management skills across different disciplines. It provides training opportunities to assist in the recognition and management of critical incidences and emergencies.

In between the two simulation rooms is the control room. The control room houses the computers that operate the manikins and is separated from the simulation rooms by one way mirrors. From here the instructors can watch the scenario, manipulate the manikins required and provide the patients voice.

All activities in the simulation room can be recorded and streamed to another room. This provides the instructor/s and participants with the opportunity to review and reflect on the activities further enhancing the learning experience.

The centre is also equipped with a large clinical skills room and a variety of part task trainers that enable students and other health professionals to develop and perfect procedural skills prior to performing them on patients.

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Example of task trainer

Suturing is an expected skill of all Junior Medical Officers. However, mastering this skill usually requires practice in a controlled simulation environment in order to minimise patient harm and discomfort. Undergraduate medical students, enrolled in the Joint Medical Program at the University of Newcastle, undergo suturing training in years 4 and 5 of the Bachelor program.

Within the Central Coast Local Health District (CCLHD) students have traditionally practiced suturing on an array of mediums including: pig’s trotters, pork belly, and commercially acquired suturing training tools which can become expensive when purchased over time. The use of ripe bananas was also trialled as a cheaper alternative with limited success.

After a little research, and a quick trip to Clark Rubber, a suitable alternative was acquired. A sheet of thin rubber (to replicate skin) and some medium density foam (to replicate subcutaneous fat) were fixed together to provide a realistic and cheap suturing model for practice. Student feedback has been very positive.

For further information contact: Greg.KerrisonWatkin@health.nsw.gov.au

Perineal repair model – Year 4 O & G medical student rotation
Example of simulated patients

St John of God Health Care uses simulated learning environments to portray highly realistic mental health simulations. Actors play patients with a mental health problem, they work alongside experienced mental health practitioners to simulate a highly realistic clinical interaction.

Almost 350 nursing and medical students have participated in more than 600 hours of mental health simulations during their clinical placements at St John of God Health Care's psychiatric hospitals since the project began in 2013.

Students have been very positive about their exposure to various simulations and frequently say that they can't believe the patient isn't 'real'. St John of God Health Care has developed simulated learning case studies for each of 12 simulated patients with full profiles given to actors playing the simulated patients and the briefings given to the mental health clinicians who interviewed them.

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Appendix G

The RIPE Interprofessional Simulation Program

The Randwick Interprofessional Educators (RIPE) are a group of clinical educators from medicine, pharmacy, social work, physiotherapy, occupational therapy and nursing engaged in teaching interprofessional team based care at Prince of Wales Hospital, Randwick.

Since 2011, the RIPE group have run ward simulations which challenge students from allied health, medicine and nursing to deal with authentic patient scenarios in interprofessional teams. Students explore aspects of interprofessional team based care including roles, communication and leadership in a safe learning environment. To date around 350 hospital based students have participated in the RIPE workshops.

Each simulation session involves two teams of five students drawn from five different health professions. They are brought into a simulated ward with three patients, two family members and a nursing unit manager. The student teams plan and execute team based health care over two rounds. Briefing, debriefing, acting as patients, family and confederates are done by RIPE health educators. At least six faculties are required to run each session.

The RIPE ward simulation provides a fun and safe environment for students from different health professions to learn from, with and about each other, with the common goal of patient care. Interprofessional simulation education tends to be a new experience for most students. Student evaluations showed improvements in self-reported understanding of all aspects of interprofessional team based patient care.

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Appendix H

Example of the use of manikins

Anaesthesia can be a bit of a mystery for medical students, even those who have spent time in theatre during their surgical placements. To better prepare final year students for their anaesthesia placements, we offer a simulation-based program that gives students a structured introduction to anaesthesia before they set foot in the operating theatre. Not only do students get a taste of anaesthesia, during the simulation part of the placement they also develop skills core to any rapid review of an acutely unwell patient.

The program has 4 components delivered in stages using a ‘scaffolded’ approach starting with the building blocks, airway skills and drills, upwards towards an integrated approach to assessing and responding to the acutely unwell patient.

The first part of the program (stages 1 – 3) involves using airway part-task trainers to take students through the steps involved in basic and intermediate airway management. Students then practice the skills with coaching from the anaesthetist facilitators.

Building on this approach, in stage 2 the students then move from the bench top to the bedside and work on airway drills using a mannequin in a simulated clinical environment. The complexity of the tasks is gradually increased using a ‘pause and review’ technique, i.e. students receive feedback and coaching during the simulation and might, for example, be asked to assess and manage an obstructed airway using the skills they learned in stage 1.

The 3rd stage involves students helping an anaesthetist ‘anaesthetise’ a well ‘patient’ (i.e. mannequin) having a straightforward procedure such as an appendicectomy. As part of the process, students are systematically introduced to the anesthesia machine and associated equipment as well as to basic anesthesia practice. The effects of cardio-active drugs are demonstrated using the mannequin and its vital signs monitor. Students explore what happens when they give drugs like atropine or adrenaline helping to consolidate their knowledge of physiology and pharmacology.

In stage 4 students get hands on practical experience focused on the early management of acute medical problems they are likely to encounter as interns such as chest pain and incipient sepsis. They manage the ‘patient’ as part of a team with help available in person or by phone. ‘Calling the boss’ and interacting with consultants over the phone requires important skills like speaking up and challenging others, and synthesizing and transferring information. These simulations use both the ‘pause and review’ technique (feedback and coaching during the simulation) and an immersive technique (feedback after the simulation).
Appendix H continued

Outcomes

This program has resulted in students being better prepared for their clinical placement by ensuring all of them develop the basic skills and receive a standard orientation to basic anesthesia prior to starting the clinical placement. In addition, it has improved the quality of teaching during the placement by providing more structured teaching opportunities.

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Appendix I

Example of role play

The Conversations in Clinical Supervision (Conversations) course is HETI’s immersive clinical supervision training package, delivering intermediate and advanced level communication training using simulation learning methods.

This one day interdisciplinary course addresses a range of challenges faced by supervisors and students including fitting into the ward environment; goal setting; understanding limits of ability; asking for help; performance appraisal and feedback and dealing with unfavourable feedback from students. It provides an interview structure that participants can use and adapt for each situation.

Role play sessions are used to focus on strategies for conversations with situation-specific goals relevant to a milestone supervision task or difficult conversation and involves participant’s role playing different models of interviewing.

Each interview session requires techniques that include both universal and situation-specific strategies. The course uses two formats or types of activity: group discussion and individual scenario practice.

The course goals are embedded in specific situations presented in trigger videos and contextualised scenarios, revealing themselves as the main purpose of an interview between supervisor and student.

For further information contact: heti-clinicalsupervision@health.nsw.gov.au or visit the website at: www.heti.nsw.gov.au/programs/cssp/conversations
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