HealthWorkforce AUSTRALIA

USE OF SIMULATED LEARNING ENVIRONMENTS IN PROFESSIONAL ENTRY LEVEL CURRICULA OF SELECTED PROFESSIONS IN AUSTRALIA

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Executive summary

This report provides a summary of a project undertaken through Health Workforce Australia's (HWA) Simulated Learning Environment's (SLE) program, which sought to gain an understanding of the current and potential use of simulation techniques in the curricula of selected health professions. This work is part of one of HWA's key objectives to examine options to train healthcare professionals more efficiently and effectively, through the adoption of new and innovative training techniques.

The project focussed on the twelve professions of medicine, nursing, midwifery, occupational therapy, oral health (including dentistry), paramedicine, clinical psychology, pharmacy, physiotherapy, radiation sciences, social work and speech pathology. Contractors were engaged by HWA to undertake this work through a Request For Quotation process. This report provides the results of this work which includes consideration of opportunities for interprofessional learning. Other professions will be included later in the program.

The results of this project demonstrate a high level of willingness amongst higher education providers to consider the delivery of the aspects of their programs of study through simulation activity. This is observed in the approach taken by the relevant accreditation bodies that have a role in the recognition of standards and curricula. In no selected profession did the accreditation body disagree to consider the use of simulation as a training technique.

The project found that the students supported learning through simulation techniques in all selected professions, although there was some reluctance in some professions if the activity was deemed by the students to not reflect the real environment. Interprofessional learning using simulation techniques was widely reported as conducive to the effectiveness of clinical training.

The report includes documentation of four aspects related to the integration of simulation into current educational programs for health professions. These are the curricula elements where simulation is most likely to be deployed and will achieve the best educational outcomes, the barriers to implementation, the use of simulation in interprofessional learning and recommendations for development and implementation.

Broadly, the recommendations focus on two main areas. These are the issues related to the simulation environment and the educational approaches deployed using simulation.

Common recommendations regarding the simulation environment include:

1. investment in human resources including training of educators and technicians and the provision of recurrent funding for staffing simulation programs;
2. promotion of collaboration within university schools, across multiple campuses and between schools;
3. increased geographical access to programs for all students;
4. engaging in site visits to centres to ascertain site readiness;
5. investing in enhancing current programs;
6. encouraging interprofessional learning by using simulation as the catalyst;
7. maintenance of standards in simulation through the adoption of certification and accreditation programs; and
8. simulation programs which are underpinned by strong governance and strategic business planning.

Common recommendations regarding the educational approaches include:

1. the development and maintenance of a case bank within professions and across professions;
2. investment in new technologies, virtual and web-based to enable broader reach;
3. evaluation and research to be embedded into all simulation programs;
4. aligning simulation curricula with professional standards and frameworks;
5. development and maintenance of universal skills boxes by profession; and
6. flexibility within simulation curricula to meet local curricula needs.

These recommendations offer valuable guidance for future investment in simulation techniques.

The project demonstrates that establishing simulated learning programs for students from a range of disciplines will directly reduce the strain on real health care settings for the provision of clinical placements. SLEs involve a range of environments and resources and can harness the use of new technologies including multimedia and online applications. SLEs have been met with widespread enthusiasm across the health disciplines and many in the field have responded to the challenges in implementing these programs with a range of possible solutions.

Further work is required to identify the full extent of applications of simulation and this should extend beyond pilot studies and lead to further validation and trial in the wider context. Opportunities for consumer engagement must be harnessed. Engagement with key stakeholders in the health and education sector is essential to success in the development and uptake learning using simulation technique.

Introduction

On 29 November 2008, the Council of Australian Governments (COAG) announced the establishment of a new Agency (Health Workforce Australia) to deliver significant national health workforce reforms to enable the health workforce to better respond to the evolving care needs of the Australian community, while maintaining the quality and safety of health services.

The health workforce reform package is being implemented through the National Partnership Agreement on Hospital and Health Workforce Reform. Part if this package aims to expand SLEs to contribute to increased clinical training capacity through investing in new and existing SLEs.

The key objectives of the SLE program are to:

1. Increase the use of simulated learning modalities in clinical training for entry level health professionals, postgraduates, VET sector and ongoing skills development training.
2. Optimise clinical training experiences through the use of simulation techniques to develop clinical skills and competencies required by health professionals.
3. Increase access to simulated learning techniques for students in regional, rural and remote settings.

This will focus on accessibility to regional and rural centres and encompasses both high and low technical training needs. Mobile SLEs will also be developed as a means of providing these training opportunities in the more remote locations. The distribution and configuration of the SLEs will be finalised following a national planning process.

The SLE program will be implemented through a range of initiatives including a national funding round to support collaborations between the higher education and health sectors, support for SLE trainers and educators and undertaking evaluation and research projects to support the uptake and utilisation of SLE.

To inform the design of the SLE program, HWA has undertaken work to identify the aspects of curriculum most effectively delivered through learning using simulation techniques. This phase of the program aims to seek national agreement by the Deans of the twelve selected professions (or equivalent), and accreditation bodies on aspects of the curricula that could be delivered through simulated learning techniques. Agreement on the suite of identified aspects of the curricula suitable to be delivered using simulation modalities will be key to informing a national plan for investment in and development of SLEs across Australia.

HWA is undertaking a rigorous approach to ensure that investment in SLEs is distributed equitably and that SLEs are effectively and efficiently used once established. The curricula project forms a significant part of this approach.

Methodology

Part of the planning process for the SLE National Strategy has involved the exploration and identification of opportunities within the curriculum for health disciplines where the use of learning using the simulation technique could be deployed. To support this process, throughout 2010 HWA has worked in partnership with Universities and relevant accreditation bodies to:

- seek national agreement within each discipline on aspects of curricula to be delivered via SLE;
- seek endorsement by the relevant national accreditation bodies to support this approach.

Given the breadth of health disciplines, HWA has prioritised the professions to be targeted in this phase of the project. Criteria used to prioritise professions included:

- size of the discipline – targeting disciplines with larger student numbers would help to ensure that economies of scale are maximised for greater gains;
- disciplines that are anticipated to require the greatest increase in enrolments – it is assumed that simulation could provide the greatest benefit in disciplines that could potentially experience the biggest increase in enrolments;
- disciplines that could potentially make greater use of simulation to meet the objectives of clinical placements;
- opportunities for inter-professional practice or shared use of space and resources.

Using the above criteria, the following disciplines were identified as the priority for this project, and contractors were appointed to lead work for each discipline: (NB. Many contractors were collaborative partnerships with multiple Universities and only the lead university is documented below):

1. Clinical Psychology - Edith Cowan University
2. Medicine – Monash University
3. Midwifery – University of Queensland
4. Nursing - Edith Cowan University
5. Occupational Therapy – University of Queensland
6. Oral Health (including Dentistry) - University of Queensland
7. Paramedicine - Edith Cowan University
8. Pharmacy - University of Newcastle
9. Physiotherapy - University of Queensland
10. Radiation Science - University of South Australia
11. Social Work - Queensland University of Technology
12. Speech Pathology - University of Queensland

Contractors were required to work with higher education providers, professional Councils and accreditation bodies to undertake the following tasks in relation to identified health disciplines:

- explore existing curricula for simulation activity;
- establish criteria for identifying where simulation can expand capacity;

- identify where commonality and differences exists in simulation use for each profession;
- explore potential opportunities for consistent approaches within each profession with simulation experts;
- seek national agreement on aspects of professional entry curricula that can be delivered via SLE and that will contribute to expanding clinical training capacity;
- work across professions to identify commonalities across professions, and thus identify opportunities for interprofessional learning.

Contractors were required to follow a project methodology comprising the following stages:

Stage 1

Mapping of Simulated Learning Programs (SLPs) currently provided at each accredited Australian Universities where education for the identified discipline is delivered. Mapping should focus on SLPs that meet clinical placement objectives. Note: this did not include simulation programs used by Health Services for professional development purposes.

Analysis of information from the 2009 survey undertaken by the National Health Work Taskforce (NHWT) regarding current use of SLPs in the clinical training of students and the potential future use.

Stage 2

Research opportunities for expanded use of SLPs to achieve learning outcomes of clinical placements using national and international examples and supported by evidence where available.

Stage 3

Identify curricula elements that could be delivered via SLPs by accredited Australian universities where education in identified health disciplines is provided. These curricula elements should meet clinical placement objectives and therefore contribute to increased clinical placement capacity. For example, this could include curricula elements such as patient assessment and communication skills.

Stage 4

Seek national agreement from each accredited higher education provider which provides education on the following:

- The curricula elements identified in stage three that could be integrated into the curricula;
- Any perceived barriers to this curriculum being recognised by the universities for clinical training purposes;
- The likely impact on clinical training days required in the course should these curricula elements be delivered through SLPs;
- The likely timeframes for implementation should these curricula elements be adopted.

Stage 5

Seek national agreement from the accreditation bodies on the following:

- the curricula elements identified in stage three meeting the accreditation standards for all Australian universities where identified health discipline education is delivered;
- any perceived barriers to these curricula elements being adopted by Australian universities where identified health discipline education is delivered;

- that these curricula elements may replace the traditional delivery of clinical training through clinical placements;
- the likely timeframes for the adoption of curricula elements.

The key deliverable for each contractor was a report outlining the findings of the project and documenting national agreement to the use of SLEs in curriculum by coordinators of discipline programs at universities throughout Australia, professional councils and accreditation bodies, as relevant.

As part of this project, the University of Melbourne was also engaged to conduct a literature review to examine the use of simulation in interprofessional learning.

Results Overview

The summary of results outlined in this report provides only a snapshot of the detail provided to HWA by each profession. The areas deemed most important for inclusion in this report are:

- the curricula elements by profession;
- the barriers to implementation;
- the use of interprofessional learning; and
- the key recommendations for each profession.

The findings from the project demonstrated the significant volume of simulation techniques that are universal across most or all professions, with the acknowledgement that some are unique to individual professions. The following provides an overview of those universal areas under the four key areas

Curricular Elements that could be delivered via SLEs

Contractors were asked to identify the areas of the curricula deemed by the participating schools as the most conducive to the adoption of learning though simulation techniques and the areas where using simulation would most closely meet clinical placement objectives. A wide range of curricula elements were documented across the professions from patient assessment (both physical and mental), to skills development boxes to develop hand and eye dexterity, and manual skills. Often the elements were linked to competencies and skills already determined by the profession as those that were required by students for safe clinical practice. The identified elements that spanned all professions were the behavioural skills areas such as communication and teamwork.

Most professions stated that simulation was a necessary adjunct to clinical placement by either preparing students more effectively for time in the clinical environments or for teaching the skills required for clinical placements in a more structured manner than the clinical environment can offer being dependent on patient condition. All modalities of simulation technique were mentioned with some professions seeing the use of virtual worlds and web based modalities as the key to better preparation of students for the real world.

There was agreement that "one size does not fit all" within and across professions and the simulation modality that would be used most effectively was dependent on a range of factors including the objectives of the learning experience, geographic location, skill of simulation educators, and access to equipment. Low technical equipment such as part task trainers were seen as vital to the learning process, as a fully immersive scenario, depending on the elements to be learned. All professions concluded that learning would be enhanced through better access to programs using simulation.

Barriers to implementation

Contractors were asked to identify perceived barriers that might prevent the development and uptake of simulation and the sustainability of the technique. Common themes that emerged across professions included the limited access to SLE's with appropriate staffing and equipment, the paucity of skilled simulation educators and technicians, the logistical difficulties to enable scheduling of simulation activities within the curriculum and the absence of a rigorous evidence base for the technique.

Other barriers included the low fidelity of some simulation equipment, the lack of realism, which may be a challenge for some students, as well as alignment with accreditation guidelines for some professions. Most professions however thought that these barriers may be overcome by a series of initiatives. This work is invaluable to understanding the current climate and challenges to the integration of simulation into curricula.

Identifying opportunities for Interprofessional Learning (IPL) in simulation

IPL is widely being adopted as a preferred method for education in the health professions. There are commonalities in perceptions of the opportunities and challenges in implementing IPL activities within simulation projects and programs across disciplinary groups.

All professions determined that IPL and simulated learning were seen as beneficial in generating opportunities for students to learn in environments outside of traditional settings. Co-location was seen as a way to increase IPL however, concerns over the use of space was seen as a challenge by most.

As part of this project, a contractor was engaged to conduct a literature review to examine the use of simulation in interprofessional learning.

The accounts given after the completion of these projects reflect enthusiasm for simulation and for IPL by stakeholders and acknowledgement of the potential to integrate the two. Reflection on the opportunities for IPL in the range of professions provided by researchers and educators indicates willingness, with the associated challenges of scheduling and space requirements.

Recommendations

Contractors were asked to make recommendations for their professions. Although some themes were consistent across professions regarding recommendations, it is important to note that the process of embedding the recommendations by profession is unique and each profession had a distinct view on how the recommendations should be implemented. The recommendations can be split into two broad groupings. Firstly, issues which are related to the simulation environment and secondly, the educational approaches deployed.

Common recommendations regarding the simulation environment include:

1. investment in human resources including training of educators and technicians and the provision of recurrent funding for staffing simulation programs;
2. promotion of collaboration within university schools, across multiple campuses and between schools;
3. increased geographical access to programs for all students;
4. engaging in site visits to centres to ascertain site readiness;
5. investing in enhancing current programs;
6. encouraging interprofessional learning by using simulation as the catalyst;
7. maintenance of standards in simulation through the adoption of certification and accreditation programs; and
8. simulation programs which are underpinned by strong governance and strategic business planning.

Common recommendations regarding the educational approaches include:

1. the development and maintenance of a case bank within professions and across professions;
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These recommendations provide valuable guidance for future investment in simulation techniques.

Results by profession

This next section describes the results found by the 12 participating professions under the three headings of:

1. curricula elements where simulation techniques are best deployed;
2. barriers to implementation;
3. recommendations.

Curricular elements where simulation techniques are best deployed:

1. Clinical Psychology

- Evidence-based treatments and therapies
- Cognitive-behaviour therapy (CBT)
- Behavioural therapies
- Family and systemic approaches
- Individual/couple/family therapy (evidence based treatments)
- Group based treatments (evidence based):
  - mental state assessments;
  - suicide and risk assessment;
  - psychology test administration;
  - psychometric assessments; and
  - interviewing and micro counselling skills.

2. Dentistry and Oral Health

- Virtual worlds for students to interact with others both locally and globally
- Virtual microscopy to augment or replace traditional light microscopy
- 3D software for dental anatomy and dental radiology
- "Skills development boxes" to bridge the identified gap before students use phantom head simulators, targeted to manual dexterity, hand-eye coordination, and mirror vision. Such units, yet to be developed, would enhance greatly the efficiency of existing curriculum time devoted to using phantom heads; and
- Haptic simulation units to accelerate skills progression and to enhance training so as to reduce surgical misadventure.

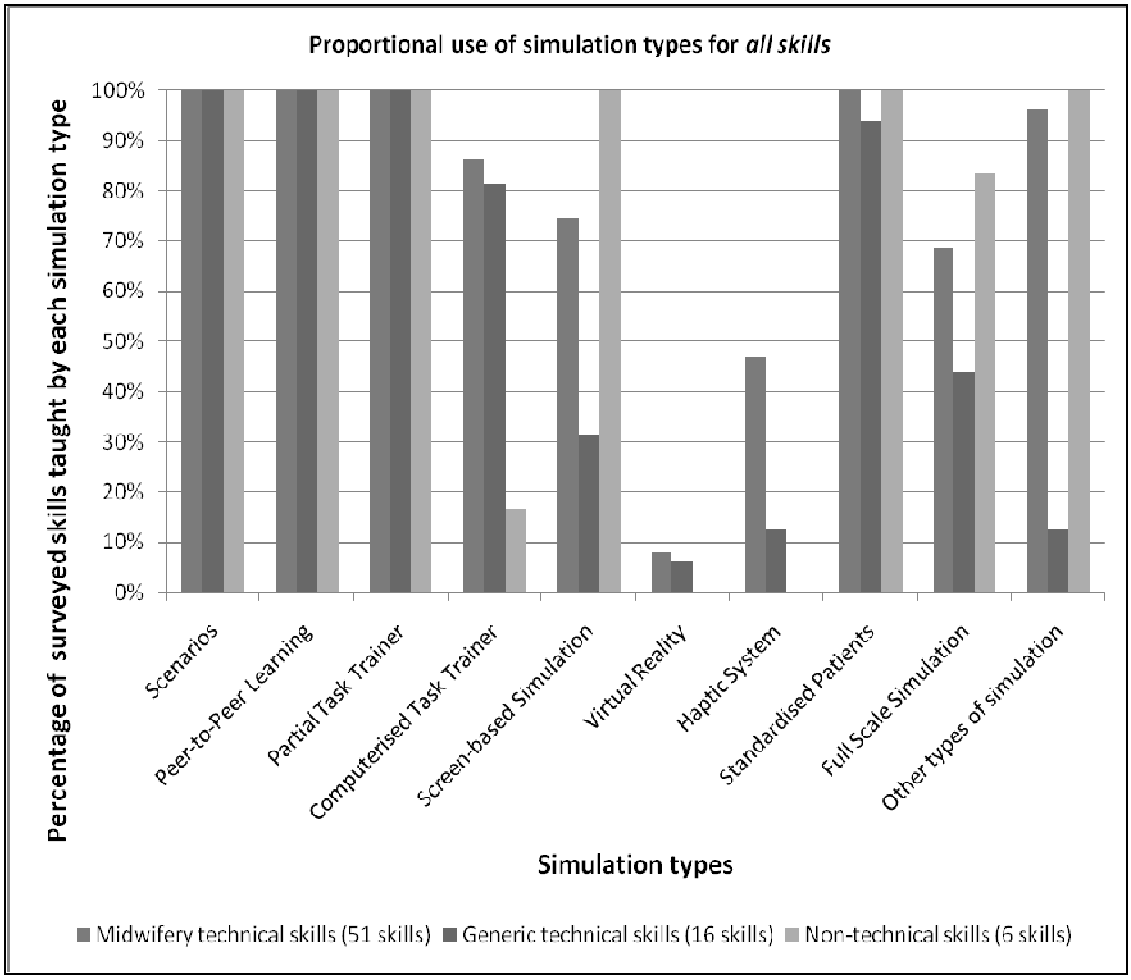
3. Medicine

- Communication
- Teamwork skills
- Professional skills
- Recognising and managing emergencies and the critical patient
- Basic clinical and procedural skills
- Diagnosis/clinical reasoning/decision-making
- Patient safety

- Inter-professional learning
- History taking
- Prescribing/applied pharmacology
- High risk clinical scenarios (i.e. situations where the patient is endangered)
- Fluid, electrolyte & blood product management
- Ordering and interpreting investigations and integrating with other clinical skills
- Subspecialties – ENT, ophthalmic skills, child health, obstetrics and gynaecology
- Rare events

4. Midwifery

In midwifery there are 51 midwifery technical skills, 16 generic technical skills, and 6 non-technical skills where the following simulation modes may be deployed.



5. Nursing

Competency areas:

- medications and IV products;
- clinical monitoring and management;

- communication and documentation;
- clinical interventions;
- teamwork and multidisciplinary team dynamics.

Skills:

- basic life support;
- ECG;
- bed making;
- vital signs;
- IM/SC/IV injections;
- documentation (incl. prog notes/charting);
- IV therapy;
- medication administration;
- inhaled medications/oxygen therapy;
- bed bath.

6. Occupational Therapy

- Co-worker communication
- Communication skills
- Information gathering
- Service provision
- Professional behaviour
- Self management skills
- Documentation
- Service evaluation

7. Paramedicine

Competency areas:

- operates within a safe practice environment: applies infection control procedures which minimise risks to patients and those treating them;
- formulates and delivers clinical practice to meet health and social care needs within the context of the environment: conducts appropriate diagnostic or monitoring procedures, treatment, therapy or other actions safely;
- develops and maintains professional relationships: effectively communicates throughout the care of the patient;
- identifies and assesses health and social care needs in the context of the environment: analyses the situation, gathers appropriate information and selects and uses appropriate assessment techniques;
- formulates and delivers clinical practice to meet health and social care needs within the context of the environment: formulates specific and appropriate patient care and treatment actions.

Skills:

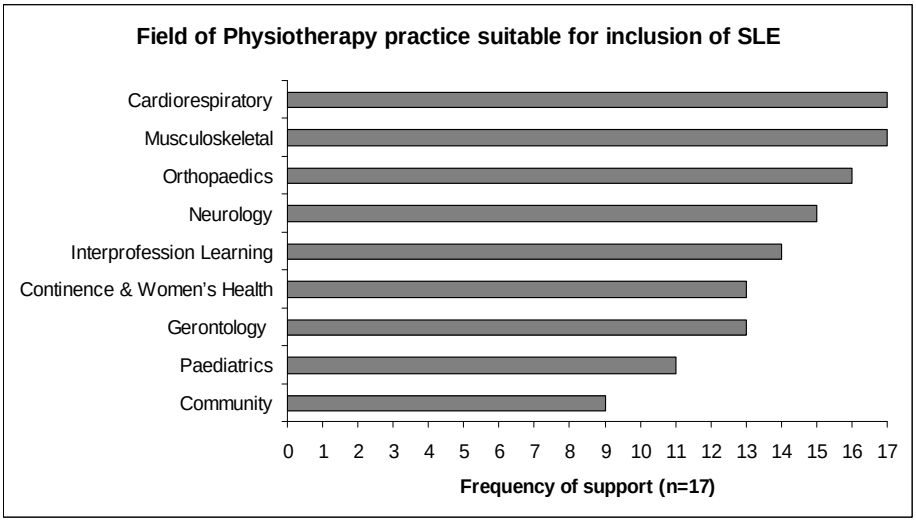
- inhaled medications/oxygen therapy;
- manual handling;
- medication administration;
- oral medication preparation and administration;

- spinal precautions and spinal injury management;
- IV therapy;
- vital signs;
- basic life support;
- cardiac arrest management.

8. Pharmacy

- Dispensing, including preparation and optimal use of medicines
- Communication
- Interprofessional learning and interaction
- Cultural training and awareness, including rural and remote healthcare delivery

9. Physiotherapy



Professional and technical skills:

- development of communication, interviewing skills and professional behaviours ;
- development of assessment and management skills;
- development of clinical reasoning skills and management planning;
- development of manual handling and physiotherapy technical skills;
- development of teamwork.

10. Radiation Sciences

Medical Imaging

- Upgrading of existing SLEs with expanded suites of imaging phantoms, digital radiography facilities, advanced imaging software and comprehensive image libraries would facilitate the development of clinical skills of patient assessment, general radiography, digital radiography, Image interpretation, peer mentoring, quality assurance, professional, ethical and safe work practices, team work, problem solving, critical thinking and patient care and clinical management.
- To meet the curricula elements of fluoroscopy, operating theatre radiography, emergency radiography and routine computed tomography, which are not easily accessed by students in the clinical environment, the development of existing

technologies to develop new simulators (including video demonstrations, virtual reality, and remote laboratories) should be investigated.

Radiation Therapy

- The foundation curricula elements of treatment simulation, treatment imaging, treatment planning, and treatment verification could be met with the installation of a fully immersive virtual linear accelerator (VERTTM) at Australian Universities.

Nuclear Medicine

Option 1

Install working gamma cameras and other working imaging and ancillary equipment in Australian universities, using small animals and phantoms to simulate real patients and meet the curricula elements of data acquisition, data analysis, and data archiving.

Option 2

Investigate technology from all vendors which can be applied to development of new simulators including video demonstrations, computer assisted tutorials, artificial intelligence, virtual reality, remote laboratories, scan image databases, and upgrading of image processing software.

Medical Sonography

- Skills in transducer manipulation, instrumentation and performing examinations can be developed if up to date scanning equipment combined with the use of body part phantoms for lower level skills, and live scanning and standardised patients for higher level skills is introduced into university courses where possible.
- Image interpretation skills can be developed with online tutorials and exercises which can be shared between Universities and clinical tutors through shared image databases.
- To meet the curricula elements of understanding the clinical question, professional, ethical and safe work practices, manual handling, communication, teamwork, critical thinking and care and clinical management simulation with virtual reality or worlds, video, actors and role play can be developed.

Interdisciplinary Radiation Science

- Investigate sharing of resources across the universities delivering Radiation Science programs: virtual reality programs/virtual worlds, software to develop computer assisted learning programs.
- Investigate sharing of video and video playback resources across all health disciplines within Universities.
- Develop a comprehensive radiation, science image library that can be shared across all universities delivering Radiation Science and other health discipline education programs.

11. Social Work

Curriculum Elements and Technologies

	LMS	Colla-borative Techno-logies	Content Creation Solutions	3D Virtual Environ-ments	Gaming Solutions
Influence of socio-political and economic factors on individual need	✓	✓	***	*	*
Social work ethics	✓	✓	***	*	**
Introductory knowledge, practice skills and values: • to enable identification and appropriate response to people with mental health problems and mental disorders • regarding Aboriginal and Torres Strait Islander cultures, cross cultural practice and child protection • regarding all methods of social work intervention	✓	✓	**	***	***
Practice skills, including interpersonal skills, communication skills (oral for counselling, written for case noting, and report writing), reflective and critical thinking and analysis, data collection and management, and advocacy, negotiation and mediation.	✓	✓	*	***	***
Skills to make assessments and decide on interventions, and to make judgements and recommendations	✓	✓	*	***	***
Critical analysis of the structure of society and related systems, interpretation of processes that facilitate and constrain change, and the evolution of systems, and the application of empowering and non-oppressive practice	✓	✓	***	*	*
Field practice offering experience with individuals, groups and communities across different fields of practice, settings, client groups and geographical locations	✓	✓	*	***	***
Relevant knowledge from other disciplines	✓	✓	***	*	*
Understanding of society's development and organisation and how these contribute to the politico economic distribution of resources	✓	✓	***	**	**
Knowledge of the individual including human behaviour and development, personality development, life-cycle stages, family and social networks, physical and mental health, disability, vulnerability and resilience, and the social construction of these concepts	✓	✓	***	**	***

12. Speech Pathology

Improving clinical skills and preparing students for workforce placement:

- communication;
- professional behaviour;
- assessment;
- clinical reasoning;
- history taking;
- planning treatment;
- implementing treatment;
- evaluating treatment.

Barriers to implementation

All professions stated that direct costs were a barrier to implementation.

Most professions reported that limited human and physical resources, lack of recurrent funding, and the difficulty of logistics and scheduling surrounding organisation of simulation programs was a barrier. The uptake of simulation techniques by some educators was a problem and the paucity of regional area staff were all barriers to implementation. Lack of equity of access was documented by most professions and time to develop simulation programs was an issue as was the adequate training of staff.

Others reported challenges including having sufficient dedicated simulation venues. Limited professional collaboration, lack of realism and student attitudes toward simulation was seen as a barrier by some professions. Some key approaches to address barriers to implementation included the development of shared resources, support for the use of standardised patients and more simulation research to be undertaken.

In one profession the limited access currently to technology-based teaching methods means that their use has not been rigorously evaluated in teaching at higher education levels, particularly the emerging technologies such as gaming and interactive 3D worlds. Staff and students will need skills in both the setting up and maintenance of technology-based SLEs, and this will need to be met by a combination of training and interactive solutions, which make these tasks easier and more obvious to new users.

Recommendations

1. Clinical Psychology

The data in this report provides a valuable snapshot of the state of simulation in Clinical Psychology. The level of participation was minimal and the data is limited in the extent to which they reflect current application of SLEs within Clinical Psychology in Australia. It is vital that additional research is conducted to develop a more comprehensive picture of simulation activity within Clinical Psychology programs in Australian universities.

- Develop strategy to incorporate site visits
- Invest appropriately in human resources
- Provide appropriate financial resources
- Ensure resources are shared/enhance collaboration
- Enhance interprofessional learning (IPL)
- Implement appropriate level of research/evaluation
- Ensure equity of access to SLEs and their potential
- Credentialing of instructors and accreditation of simulated learning programs
- Potential for Clinical Psychology in training simulation debriefers

2. Dentistry and Oral Health

- ADC framework be used as a basis for embedding novel simulation methods into dental and oral health curricula.
- Future HWA support be provided to develop and implement "skills development boxes" which can be deployed at scale to all dental schools to bridge the skill gap for junior students in dentistry and oral health before they commence phantom head work, particularly in restorative dental procedures.
- The following measures be deployed as standard parts of curricula, to increase the depth of learning and provide a platform for professional development during the dental course and beyond.
- Haptic simulation units be deployed in dental schools to enrich clinical skills, particularly in the area of training in more complex procedures where they can accelerate skills progression and help avoid surgical misadventure.
- Deployment of haptic simulators to large placement clinics where many students are located is recommended to allow students to enrich their skills outside of rostered clinic time.
- Dental schools collaborate with other health professions to maximize opportunities for inter-professional learning.

3. Medicine

The first set of recommendations, relate to the educational approaches taken to SLEs.

Use of an SLE should be:

- matched to the particular learning need 'fit for purpose';
- follow sound pedagogical principles, as outlined in the literature synthesis; and
- integrated into curriculum and evaluated.

The second set of recommendations, relate to the simulation-based learning environment itself.

The SLE should be:

- matched to the particular learning content 'fit for purpose';
- staffed by appropriately trained staff;
- sustainable both in terms of workforce and infrastructure; and
- underpinned by strategic/business planning.

Final recommendations include:

1. funding rounds to be sensitive to the diverse contexts across Australian medical school curricula. (For example, the needs of a school with pressures accessing ENT clinical placements will be different from a school, which has ready access to ENT environments);
2. logistical, geographic and administrative factors to be taken into account in any funding arrangement, which promotes equitable access to SLEs. (For example, it is impossible for some medical schools to share simulation centre resources with other medical schools due to geographical distance?);
3. formal articulation of healthcare-university shared resource arrangements. (For example, formal business arrangements outlining access to facilities);
4. on-going support to promote dialogue and exchange across medical schools regarding simulation based education;
5. on-going support to critically research SLEs, to ensure use of simulation is optimal and underpinned by evidence.

4. Midwifery

SLEs have traditionally been included in midwifery education and a substantial range of activities are already embedded into Australian midwifery program curricula. In particular, simulated learning is essential when:

- there is a proven necessity for practice in a safe setting (such as for obstetric emergencies);
- there is a long history of simulated learning prior to clinical experience; or
- changes to practice have reduced opportunities to gain experience in clinical practice (e.g. vaginal examination).

Priority areas that could be supported by the SLE National Project and mechanisms to facilitate adoption include the following (not in any priority order):

- develop more realistic, high fidelity, midwifery simulation models incorporating innovations for example, simulations that combine standardised patients (SPs) with models/part task trainers, such as birthing suits;
- develop additional simulation material including scenarios, on-line interactive cases and virtual reality environments and ensure interprofessional learning elements form part of this material where appropriate;
- develop an electronic national repository (and information exchange) to distribute simulation resources;
- support the employment of trained technicians to assist in the delivery of SLEs, both within academic programs and where simulation centres are established;

- provide access to a cohort of trained standardised patients (SPs) available to all institutions operating within a geographical area;
- evaluate the SLE resources available in each state and territory and base future funding on equitable availability, functionality and ease of access to SLEs;
- provide training and development programs for educators and academics working in or developing SLEs, with topics including scenario development and delivery, equipment operation and new technologies such as virtual reality;
- promote embedding simulated learning in curriculum design, and provide expertise-in-simulation support;
- support further research into SLEs to investigate the impact of curricula elements on clinical learning, clinical practice, graduate outcomes and health outcomes;
- recognise that with a woman-centred, holistic approach embedded in midwifery practice, many learning objectives could be difficult to meet through simulation.

5. Nursing

- Develop strategy to incorporate site visits
- Invest appropriately in human resources
- Provide appropriate financial resources
- Ensure resources are shared/enhance collaboration
- Enhance inter-professional learning
- Implement appropriate level of research and evaluation
- Ensure equity in access to SLEs and their potential
- Credentialing of instructors and accreditation of SLPs
- SLEs delivering on some core capabilities development

6. Occupational Therapy

- Development of Occupational Therapy-relevant shared resources: national scenario/resource bank
- Supporting use of standardised patients
- Education and capacity building for clinical educators and academics in the use of simulated learning activities
- Development of Occupational Therapy-relevant SLEs
- Research in the use of simulation in Occupational Therapy curricula
- Equity
- Flexibility of simulation according to local and individual curricula needs

7. Paramedicine

- Develop strategy to incorporate site visits
- Invest appropriately in human resources
- Provide appropriate financial resources
- Ensure resources are shared/enhance collaboration
- Enhance interprofessional learning
- Implement appropriate level of research and evaluation
- Ensure equity in access to SLEs and their potential
- Credentialling of instructors and accreditation of centre

8. Pharmacy

Recommendation 1:

Given the current, and anticipated expansion of, use of simulation in pharmacy school curricula, funding be made available to assist with the development and delivery of pharmacy-specific simulated learning programs within the universities and their clinical teaching facilities.

Recommendation 2:

To ensure efficiencies and promote the uptake of innovative practices in teaching and learning, Australian pharmacy schools be encouraged to collaborate in the development and evaluation of new simulated learning programs and, where feasible, share developed resource materials.

Recommendation 3:

Areas of focus for new Simulated Learning Programs in pharmacy include communication skills (encompassing interprofessional communication across the health care team and communication with consumers), clinical skills development, cultural training, and rural and remote health delivery.

9. Physiotherapy

- Development of a SLP resource of patient cases for physiotherapy student education for use by all Universities to embed SLP in physiotherapy curricula
- Standardised patient training centres
- Provision of standardised patients
- Simulated Learning Environments
- Development of simulation hardware and software
- Development of software and online resources
- Training for clinical educators
- Recurrent funding

10. Radiation Sciences

Medical Imaging

- Upgrading of existing SLEs with expanded suites of imaging phantoms, digital radiography facilities, advanced imaging software and comprehensive image libraries would facilitate the development of clinical skills of patient assessment, general radiography, digital radiography, Image interpretation, peer mentoring, quality assurance, professional, ethical and safe work practices, team work, problem solving, critical thinking and patient care and clinical management.
- To meet the curricula elements of fluoroscopy, operating theatre radiography, emergency radiography and routine computed tomography, which are not easily accessed by students in the clinical environment, the development of existing technologies to develop new simulators (including video demonstrations, virtual reality, remote laboratories)should be investigated.

Radiation Therapy

- The foundation curricula elements of treatment simulation, treatment imaging, treatment planning, and treatment verification could be met with the installation of a fully immersive virtual linear accelerator (VERTTM) at Australian universities.

Nuclear Medicine

Option 1

Install working gamma cameras and other working imaging and ancillary equipment in Australian universities, using small animals and phantoms to simulate real patients and meet the curricula elements of data acquisition, data analysis, and data archiving;

Option 2

Investigate technology from all vendors which can be applied to development of new simulators including video demonstrations, computer assisted tutorials, artificial intelligence, virtual reality, remote laboratories, scan image databases, and upgrading of image processing software.

Medical Sonography

- Skills in *transducer manipulation, instrumentation and performing examinations* can be developed if up to date scanning equipment combined with the use of body part phantoms for lower level skills, and live scanning and standardised patients for higher level skills is introduced into university courses where possible.
- Image interpretation skills can be developed with online tutorials and exercises, which can be shared between universities and clinical tutors through shared image databases.
- To meet the curricula elements of understanding the clinical question, professional, ethical and safe work practices, manual handling, communication, teamwork, critical thinking and care and clinical management simulation with virtual reality or worlds, video, actors and role play can be developed.

Interdisciplinary Radiation Science

- Investigate sharing of resources across the universities delivering Radiation Science programs:
    - virtual reality programs/virtual worlds;
    - software to develop computer assisted learning programs.
- Investigate sharing of video and video playback resources across all health disciplines within universities.
- Develop a comprehensive radiation, science image library that can be shared across all universities delivering Radiation Science and other Health discipline education programs.

11. Social Work

- The expansion of non-technology based SLEs in the social work curricula not be resourced by the National Project due to their limitations and high relative cost;
- Significant and broad-scale development of technology based SLEs across the social work curricula be undertaken and evaluated;
- Interactive 3D, gaming media and transmedia approaches be included in the development of SLEs;
- Specific areas of the curriculum be prioritised including skills development, interdisciplinary learning, and support for field education placements;
- There should be further exploration of the uses of these technologies and resources for other health disciplines;
- A national approach be taken to the development of technology based SLEs, including involvement of key stakeholders and experts;

- Consideration be given to making such teaching and learning resources widely accessible to social work educators and programs.

12. Speech Pathology

- Development of case bank
- Maintenance of case bank
- Development of SLE modalities
- Evaluation of SLE modalities
- Funding for SLE development
- Funding for implementation of SLEs
- Funding for research
- Policy governing access to SLE resources
- Equity and ease of access to Speech Pathology resources

Conclusion

In the context of national health reform, the sustainability of the health workforce is a topic of much discussion nationally as well as globally. Stakeholders and educators have been encouraged to consider new and innovative ways of training the future health workforce in order to address recognised shortages, particularly those concentrated in 'hard to fill' domains, including rural health care and non-acute settings. Strains on the health system and workforce present challenges in providing capacity for placements and in providing students with essential training with their multidisciplinary peers. A range of educators and researchers are increasingly acknowledging the opportunity for training students from a range of disciplines together in learning programs using simulation techniques.

This report provides information against which national funding may be allocated by HWA under the National Partnership agreement on Hospital and Health Workforce Reform. Funding decisions will also be informed by existing and emerging programs and future workforce projections. It is intended that this information be used to map the resources required for implementation of SLEs. This process will include an assessment of existing sites and facilities to ensure that any new enhancement or new programs will achieve the best outcomes.

At the time of writing this report HWA is considering how national funding will be allocated to ensure equity of access to programs using simulation techniques for the training of the current and future workforce.