Simulation in Physiotherapy Clinical Training
Final Report

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Executive Summary

The national simulation project has changed the face of Australian Physiotherapy training by developing and supporting the integration of high-fidelity simulation into 16 of the 19 Australian Physiotherapy programmes. The project involved close collaboration between the Universities, with support from professional bodies. This initiative has seen a major transformation in Physiotherapy educational practice across Australia and has provided innovative leadership amongst the Allied Health professions, nationally and internationally.

The importance of this initiative lies in the cross-profession implementation of a clearly defined and profession-specific simulation-based learning model that has been integrated into the majority of Physiotherapy courses. This strategy included the development of 45 nationally-agreed simulated patient scenarios, which covered baseline clinical competencies in all core practice areas. Students engaged with professional role-play actors and high fidelity mannequins portraying simulated patients, and replicated normal patient assessment and management in authentic clinical environments, during a 5-day simulation unit. Applying lessons learned from previous multi-centre research projects, support was provided to up-skill physiotherapy educators with no prior experience in simulation training through manuals, videos and use of tailored NHET-Sim educator programmes. As a result, more than 300 educators throughout Australia are now experienced in many aspects of clinical simulation, helping to ensure its long term sustainability.

The project also provided support for Universities to enable them to access and equip suitable simulated learning environments to enable delivery of simulation training for physiotherapy students. This injection of resources into equipment, scenario development and staff training has resulted in a significant improvement in the capacity to utilise simulation training across all of the participating Universities.

A major research trial and a survey of all Physiotherapy Schools provided the underpinning evidence for the implementation of the national simulation project. The prior projects also provided a strong collaborative groundwork within the profession that was further developed in the current project. An indication of the complexity of the project is the fact that 20 contractual agreements and more than 37 ethics approvals were required to cover all of the organisations involved. This has been a highly collaborative project in which the project team has facilitated close cooperation between all participants.

The magnitude of the project is reflected in the fact that 1790 Physiotherapy students across Australia participated in the project, completing 13,219 days of simulation training across three main practice areas. This amounted to more than 99,000 hours of simulation training. The project team analysed data from more than 15,000 questionnaires and interviewed 220 individuals during the project evaluation.

The response from students and educators was unreservedly positive. Students reported that simulation significantly improved their clinical confidence and supervisors reported that students were better prepared to interact safely with patients when they entered the clinical setting. All groups highly valued the learning opportunities provided during the simulation units. Students’ clinical competence was enhanced as a result of their participation in the simulation units.

By implementing simulation nationally, the project built capacity for clinical training and reduced the demands on clinical facilities to provide student training. This releases capacity for other aspects of
clinical education. While the costs of delivering simulation training are clearly significant the project has provided a better understanding of those costs and Universities are now exploring ways to utilize this valuable educational modality while managing some of the inherent costs.

This initiative has been extremely successful in terms of meeting the overall project expectations. It was completed on time and on budget, achieving more than 97% of the target number of simulation training days. The project facilitated a major positive transformation in the perception of simulation training amongst Physiotherapy students and educators, meaning that the majority of Physiotherapy Schools in Australia will continue to include simulation as part of their courses. The project has also resulted in Australia being recognized as a leader in this field by the profession internationally.

The project team would like to express our thanks to Health Workforce Australia for having the vision to support such a major project and providing the resources to enable the profession to make a major advance in its educational practices in a very short period of time.
Chapter 1: Literature Review

1.1 Background
Physiotherapists promote and deliver health care and rehabilitation to Australians of all ages. Clinical fieldwork education within a hospital or other healthcare setting has always been an integral part of the education of physiotherapy students [1,2]. To meet the current national shortage of physiotherapists there has been an expansion of the number of physiotherapy programmes in the last 15 years from six universities offering six physiotherapy programmes to the current 19 Universities offering 41 physiotherapy programmes [3]. The resultant dramatic increase in the number of students seeking clinical fieldwork placements has placed a strain on clinical facilities to cater to this demand [1,4]. This change has been coupled with recent variations in the way hospitals manage patients, which has further restricted student’s access. These changes include reduced lengths of stay for hospital inpatients, “Hospital-in-the-home” programmes and privatisation of hospital outpatient clinics [5]. Patients who do have extended stays in the hospital setting are often the very ill or higher risk patient, making them less suitable as a patient for students to ‘practice’ on [6,7,8,9]. All these factors have resulted in major challenges for educational institutions trying to educate future health professionals.

Consequently, educational institutions are now seeking alternative educational methods to supplement the traditional clinical immersion programmes. One such alternative is the use of simulated learning programmes. Simulation can be used to replace or amplify real experiences with guided experiences. They are often immersive in nature and evoke or replicate substantial aspects of the real world in a fully interactive fashion [10]. One of the first uses of a simulated learning programme within a medical training programme was reported by Barrows and Abrahamson in 1964 [11,12]. This programme used actors to role-play patients, referred to as “simulated patients”. More recent advances in technology have seen the expansion of simulated learning programmes to incorporate high-fidelity simulated mannequin patients and virtual reality systems [13].

1.2 Benefits of Simulated Learning Programmes
For the purpose of this report, a simulation learning programme is defined as a programme of educational activities in which students interact with a simulated patient (SP) presented by a role-play actor or a simulated patient in the form of a high-fidelity mannequin such as SimMan®.

Simulation allows students to immerse themselves physically into the clinical environment, allowing them to apply their theoretical knowledge in a setting close to what they will encounter in the real world. This form of active experiential learning has driven the increasing acceptance of simulation within clinical teaching programmes [14]. There have been many studies citing the benefits of simulation within healthcare education [15,16,17]. The success of simulated learning programmes have been defined by outcome measures such as improvement in clinical skills [18], personal improvements in confidence and communication [19,20], decreased training time and improved patient safety and reduced errors [21]. Hayden et al. [22] highlighted the success of simulation as a teaching tool in the education of nursing students due to its student-centred focus rather than the more traditional patient-focussed clinical learning experience.

From a pedagogical perspective, simulation offers the opportunity to create a clinical programme using cases that are tailored to match curriculum objectives. This is particularly important, as a typical Australian physiotherapy clinical fieldwork placement lasts for just five weeks. In such a short time frame, students may often experience a limited number and variety of cases. A simulated
learning programme provides the opportunity to expose students to a wider variety of cases, which can be tailored to ensure core standards are met. The use of high-fidelity simulation has also allowed students to be exposed to rare and higher risk scenarios – something that may not be possible in a traditional setting. Simulated learning programmes enable Universities to standardise the learning experience [24] ensuring that all students have an opportunity to be exposed to the same cases to help them achieve competency. Within this safe environment there is also an opportunity for repeated practice utilising specific simulated teaching strategies, to ensure students achieve competency [24,25].

Both simulation supervisors and students involved in the simulation programmes have described the experience as beneficial to student learning [24,26]. The opportunity in a simulated learning programme to practice clinical skills without risk has been cited by many students as one of the key advantages of this form of training. Students have also reported improved confidence levels as they feel they can safely make mistakes and practice within a simulation environment without causing harm to a patient [24,27]. The feedback received from the SPs was well received by students and rated by them as of equal or greater value than the feedback provided by their supervisors [28,29]. In a recent meta-analysis of the value of simulation in nursing education, simulation was found to be more effective than traditional forms of nurse training in development of clinical and psychomotor skills [30].

1.3 Impact on Clinical Training

Of particular interest to the physiotherapy project consortium was the potential for simulation to address the current clinical fieldwork placement shortage. Abrahamson et al. [12] found that simulated learning decreased the time needed to teach medical students to intubate a patient when compared to traditional methods of training. Other advantages cited by the authors included reducing risk exposure to patients, resulting in improved safety. The authors concluded that the potential benefits of reduced training time and less risk to patients’ safety warranted further use of simulation, not only in the field of medicine but in other healthcare professions as well. This is certainly becoming more commonplace today with several other health care programmes now using high-fidelity simulation as part of their training, including dentistry [31] occupational therapy [23], speech therapy [32], pharmacy [2006] and dietetics [34].

In a traditional hospital setting, staff members become the clinical educators responsible for supervising students during interactions with a patient. At times finding enough staff members to adequately supervise students can be difficult [35]. Supervisors may choose less “at risk” patients to accommodate students when limited supervision is available [36]. In a simulated learning programme, such issues can be addressed. McGraw and O’Connor [7] explored the issue of a reduction in the number of clinical educators available to supervise students due to competing financial pressures and issues of staff availability. They found that in a simulation programme, even where the ratio of teachers to students was smaller (1½:10) than in the traditional fieldwork setting (3:10), students still reported higher levels of satisfaction with the level of supervision and performance feedback. This was attributed in part to staff being able to construct meaningful feedback around a known case and the benefit of SP feedback. When the SP is used as part of the teaching team to provide feedback on communication to students staff members are able to focus on providing the more technical clinical feedback. Clinical educators felt this was a more effective use of their time [25].

1.4 Simulated Learning Programmes in Physiotherapy

For many years simulation in physiotherapy centred on role-play with peers or clinical educators, written and video problem-based case study learning activities, low-fidelity mannequins or part-task
trainers. There are descriptions of the use of simulation in the fields of musculoskeletal [15], cardiorespiratory [37,38,39,40], paediatric [41] and neurological [42] physiotherapy.

The use of SPs played by professional actors rather than students role-playing with each other, has added a new dimension to simulated learning programmes in physiotherapy. The actors expand upon the role of being a “body to practice on” by also taking on the personality and physical characteristics of a patient. The SPs can provide a unique insight into a patient’s perspective on the interaction that has just occurred. This real-time feedback to the students and the subsequent debrief session reviewing that interaction, is one of the most valuable aspects of the simulation programme [36].

More recently, studies have demonstrated comparable clinical outcomes between physiotherapy students educated in a simulation unit compared to those educated in a traditional clinical fieldwork setting [43,44]. This Australian multi-centre randomized, controlled trial (RCT) involved seven universities across four different states and investigated simulation in two core practice areas. This RCT demonstrated that between 20% and 25% of a four or five week clinical fieldwork placement can be successfully conducted in a simulated unit, with students achieving very comparable educational outcomes. The results indicated that simulated learning programmes can be introduced successfully as a component of physiotherapy clinical education and have the capacity to increase clinical education opportunities for students. The traditional clinical fieldwork immersion model (students treating ‘real’ patients in a ‘real’ clinical setting) is a fundamental and irreplaceable component of physiotherapy student clinical education. However it is not necessarily the only model of education.

There are some key components to a successful simulated learning programme. Both Blackstock et al. [44] and Watson et al. [43] noted the importance of developing high quality simulated patient scenarios with full background information for students, appropriate equipment and training materials for actors so that the simulation environment had high levels of authenticity. In the current project considerable emphasis was placed on developing high quality materials to support each scenario. The timing of simulation training and its interaction with experiential learning in the traditional fieldwork setting is also an important consideration. Blackstock et al. [44] reported improved self-reported competence and longer retention of confidence in students who had experienced cardio-respiratory simulation interspersed within their traditional clinical fieldwork placement, compared with students whose simulation was experienced as a block at the start of the clinical placement. However, Watson et al. [43] found no difference between the two models for musculoskeletal practice. For the purposes of the current project it was decided to retain both timing options. In addition, a further timing model involving a stand-alone clinical placement was also considered, a model that had been successfully trialed at the University of Queensland [45]. This “UQ model” offers an introductory simulation unit for early-stage students, enabling them to experience cardio-respiratory, neurological and musculoskeletal scenarios in both ward and rehabilitation settings, before progressing to traditional clinical fieldwork placements. There is currently insufficient evidence to determine if one timing model is superior to the others.

1.5 Measuring Outcomes
Previous studies in physiotherapy have used two primary questionnaires to evaluate simulation training in physiotherapy students [43,44]. The Assessment of Physiotherapy Practice (APP) was developed in accordance with the practice standards as set by the Australian Physiotherapy Council [46] and has been shown to be a reliable outcome measure of student clinical competence across all key clinical areas and in both clinical and research contexts [43,44,47,48]. A questionnaire evaluating student opinion of simulation training has also been previously used and found to show good reliability (Cronbach’s alpha for each question ranging from 0.72 to 0.90) [43,44]. These two previous studies used a combination of descriptive analyses of APP and questionnaire data as well as
parametric and non-parametric statistical analyses, dependent on data normality. A similar approach was taken in the current project.

References
42. Echternach JL. (2000): The use of standardized patients in teaching the neurological examination in physical therapy students. *Physical Therapy* 80(s42)
Chapter 2: Developing the Evidence Base for Simulation Training in Physiotherapy

Over the past decade there have been a series of major research projects in Australia that have greatly enhanced our knowledge and understanding of the role of simulation based learning in clinical education in physiotherapy. The following highlights the major projects that have been completed.

2.1 Controlled Trials

The push to develop evidence related to simulation training in physiotherapy in Australia commenced almost a decade ago when a multi-university team received funding from the Australian Research Council for a major controlled trial of simulation training as a component of clinical education.

Two major multicentre controlled trials were concurrently conducted in the period between 2009 and 2010 with six universities participating as trial centres. Simulated learning programmes were trialled for the care of patients with musculoskeletal and cardiopulmonary disorders. Each trial involved a comparison of educational outcomes for students completing a four-week clinical fieldwork placement incorporating one week of simulation training, compared to students completing a full four-week clinical fieldwork placement without simulation. Simulation training was either structured as a one-week block at the beginning of the placement or as five days of simulation training interspersed through the first two weeks of a four-week placement. Educational outcomes for all students were assessed using a modified Assessment of Physiotherapy Practice instrument (APP) [1,2] that was used to assess student performance in two viva voce examinations with ‘real’ patients after four weeks of placement. In total 719 students from six Universities participated in the trial. They were stratified based on previous academic performance and randomly allocated to either the simulation placement or the traditional placement.

In the musculoskeletal trials for this study [3], there was no difference in educational outcomes between the simulation and traditional clinical fieldwork placements for either timing model (Figure 1).

Scores (mean +/- standard error) for each domain of the Assessment of Physiotherapy Practice (APP) tool, comparing simulation-trained students (SLE) with traditional clinical fieldwork trained students (Trad): (a) results for week 1 block timing model; and b) results for interspersed timing model [3].
Figure 1: Musculoskeletal trial APP scores

For the cardiopulmonary trial there was no difference in outcomes when the simulation training was incorporated into the first week of the placement but when simulation was interspersed throughout the placement there was a statistically significant difference (p =0.01) which favoured simulation (Figure 2). Students who completed simulation training as part of the placement achieved higher APP scores than students who completed a traditional clinical fieldwork placement [4].

Scores (mean +/- standard error) for each domain of the Assessment of Physiotherapy Practice (APP) tool, comparing simulation-trained (SLE) with traditional fieldwork trained students (Control): RCT1 - results for week 1 block timing model; and RCT2 - results for interspersed timing model [4].

Figure 2: Cardiopulmonary trial APP scores

Both musculoskeletal and cardiopulmonary trials clearly demonstrated significant improvements in student confidence across the four-week placement period, with most of that increase in confidence occurring during the simulation programme (Figure 3, Table 1). Students viewed the simulation training experience very positively and rated the value of simulation very highly.
a) Simulation-trained students’ change in self-rated confidence at the start of simulation (Time 1), at the end of the simulation unit (Time 2) and at the end of their clinical fieldwork placement (Time 3).

![Graph showing confidence ratings](Image)

b) Non simulation-trained students’ change in self-rated confidence at the start of their clinical fieldwork placement (Time 1) and at the end of the placement (Time 3).

![Graph showing confidence ratings](Image)

Figure 3: ARC study - change in self-rated confidence for a) simulation-trained students (Sim); b) Non simulation trained students (Trad)
Table 1: Percentage increase in student confidence scores

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<td>(musculo)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sim students</td>
<td>13.4%</td>
<td>17.6%</td>
<td>19.8%</td>
</tr>
<tr>
<td>(cardio)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trad students</td>
<td>-</td>
<td>12.8%</td>
<td>-</td>
</tr>
<tr>
<td>(musculo)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trad students</td>
<td>-</td>
<td>9.9%</td>
<td>-</td>
</tr>
<tr>
<td>(cardio)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentage increases in confidence scores according to key skills areas for simulation-trained students (Sim) and non-simulation trained students (Trad), from start of their unit (Time 1) to the end of the simulation unit (Time 2) and / or from Time 1 to the end of the clinical fieldwork unit (Time 3).

These trials remain the largest studies (in terms of student numbers) to have been completed by any health discipline evaluating educational outcomes from placements incorporating simulation training. They clearly demonstrated that clinical placements incorporating student interaction with simulated patients for up to 25% of the placement time could achieve at least equivalent educational outcomes to traditional clinical placements.

2.2 University Surveys

In 2010 the consortium received $99,500 in funding from Health Workforce Australia for a study evaluating ‘The use of Simulated Learning Environments in Physiotherapy Curricula’. The study involved two rounds of questionnaires completed by representatives of the 17 Physiotherapy Schools that were delivering entry-level physiotherapy courses in Australia at that time.

Survey 1 was completed by 16 of the universities and it evaluated student numbers, types of simulation currently used in the curriculum, the use of simulated learning programmes by other disciplines in the University and barriers and enablers related to the potential to increase in use of simulation training. At that time over 4,500 students were enrolled in physiotherapy courses and approximately 1,800 students were completing clinical placements. Analysis of the data showed that 15 of the 16 Universities reported some use of simulation in their pre-clinical programmes but it was generally low-fidelity and based on student role-play activities and the use of low-fidelity mannequins. Only three universities employed trained role-play actors as simulated patients and only two universities made use of high-fidelity mannequins. Cardiopulmonary and musculoskeletal physiotherapy were the main practice areas in which most universities utilised simulation. There were a range of perceived barriers to greater utilisation of simulation training within physiotherapy education. These included: lack of access to simulation facilities; lack of funding (and time) to develop simulation scenarios; lack of trained actors; lack of equipment (including high-fidelity mannequins); lack of technical support; and lack of trained clinical educators. Some universities also expressed concern about resistance to the use of simulation training by some staff and students and concerns about a potential lack of clinical realism.

The survey research team proposed a new model of physiotherapy education (Figure 3) incorporating simulation training in the transition phase between early pre-clinical training involving peer role-play and a period of supervised practice with real patients. Fundamental to the proposed models was an agreement to develop a bank of clinical case scenarios that could be accessed by all universities.
**Figure 4: A new model for physiotherapy education, incorporating clinical simulation**

The survey research team also proposed two models for the timing of simulation units within courses. Model 1 involved embedding high-fidelity simulation scenarios into pre-clinical courses using a master class format and Model 2 involved devoting some component of clinical fieldwork placement time to simulation training. This second model envisaged four different timing sub-models for simulation training. These were: i) the development of a 3-4 week introductory clinical placement; ii) replacing the first week of a placement with a simulation unit; iii) interspersing simulation throughout a clinical placement; and iv) developing an advanced capstone placement for later stage students that would include complex cases, challenging safety issues, complex communication or cultural issues and significant professional or ethical issues.

**Survey 2** (completed by 17 universities) showed strong levels of agreement for the value of both models although there was variation in the support for embedding simulation into clinical fieldwork placement using the different timing sub-models, presented as Model 2. The majority of universities indicated that it would be feasible to implement their preferred simulation timing model within a period of two years if the necessary resources were available. There was agreement that simulation training could be used across most areas of physiotherapy and in inter-professional placements. There was also agreement that clinical fieldwork placement capacity might be increased by 10-20% with increased use of simulated learning programmes. The report, which was supported by the Council of Physiotherapy Deans Australia and New Zealand (CPDANZ) and the Australian Physiotherapy Council (APC), recommended a number of priority items that were required to support simulation training. These included: establishing a consortium to develop case scenarios; establishing access to trained simulated patients; providing suitable access to simulation environments including equipment necessary for physiotherapy treatments; development of mannequin software to provide physiotherapy appropriate cases; development of other software resources; provision of training for physiotherapy educators to maximise the benefits of simulation training; and the provision of recurrent funding to assist with the costs of delivering simulation based placements. The report was submitted to Health Workforce Australia in early 2011. Information gathered during this project provided the foundation for the subsequent implementation project.

### 2.3 Development Project

In 2012 a consortium was established with representatives from all of the Universities to explore opportunities to implement simulation training across all of the physiotherapy courses in Australia. An interim proposal was submitted to HWA, which resulted in initial funding for the consortium to develop a detailed and fully costed proposal for the implementation of simulated learning programmes as a component of clinical fieldwork education across all physiotherapy courses.
That project involved an extensive six-month consultation process to develop a detailed proposal for the implementation of simulated learning programmes and for a comprehensive evaluation project. This evaluation would include both quantitative and qualitative elements to evaluate the impact of simulation training across different placement timing models and different practice areas. The project proposal allowed individual universities flexibility in terms of selecting from three different timing models for simulated learning programmes, four different practice areas in which to implement simulation and the number of students for which they provided simulation placements. The programmes were standardised in terms of the simulation scenarios used, placement timetabling, educational methods and the level of funding provided per student.

The fully costed project plan identified that funding was needed to assist with the development of simulation scenarios, the provision of equipment for simulation environments, costs of access to simulation environments, costs of funding professional actors, costs of funding simulation supervisors and costs of appointing a research assistant at each university to assist with running the placements and gathering data from students and supervisors. These were the key financial barriers identified in the previous surveys. In addition, funding was requested for a comprehensive evaluation project. The linkage with HWA was also used to facilitate access to the HWA funded NHET-Sim project to provide training for staff engaged in facilitating simulation based placements. This addressed another perceived barrier from the previous research. The project was funded by HWA and commenced in September 2013.

References
Chapter 3: Implementation Methodology

3.1 Project Overview
The project aimed to embed simulation training into pre-registration physiotherapy clinical units across Australia in a manner that could be sustained beyond the life of the project. The scope of the project was wide, aiming to establish widespread understanding of simulation training, as well as providing the materials, physical/human resources and human expertise needed to successfully implement high-fidelity simulation.

Led by the national project management team based at Curtin University 16 of the 19 Australian Schools of Physiotherapy collaborated to plan and implement a programme of simulation units. Each unit was designed to include a number of standardized elements, as well as more flexible elements that ensured that each University could customize their units sufficiently to be able to embed them sustainably into their existing programme. By May 2015, almost 1800 students, more than 400 staff and more than 300 actors had participated in 143 five-day simulation units across 25 different sites in five different states.

3.2 Project Organisation

3.2.1 Key Personnel
The project was led by the national coordination team based in Perth with the aim of facilitating a strong collaboration between all project participants, underpinned by ongoing support from stakeholder professional organisations. Figure 4 illustrates the project management structure.

![Diagram](image)

**Figure 5: Key national and local project personnel**

3.2.1.1 National Personnel

*National Project Lead and Project Manager*

The project was led by Professor Tony Wright and Dr Penny Moss from Curtin University. As Project Lead, Prof Wright took overall responsibility for the project implementation, contract and financial management and liaison with external stakeholders. As Project Manager, Dr Moss was responsible for all aspects of administrative and pedagogical planning, training and day to day implementation, in particular regarding liaison with participating Universities and with National Research Officers.
**National Research Officers**

Dr Kate Watson and Mr Stephen Rue had responsibility for aspects of the evaluation and reporting of project outcomes. Dr Watson was based in Brisbane and took responsibility for all ethics submissions in addition to providing support for University Research Officers during implementation and assisting with administrative tasks. Mr Rue was based in Tasmania and took responsibility for the qualitative evaluation of the project, organizing and running all focus groups via teleconference, analyzing transcripts and reporting qualitative outcomes.

**National IT Advisor**

An IT advisor was also employed to assist the national Lead and Manager in designing and implementing software with which to deliver evaluation questionnaires. This advisor also assisted in the ongoing management of data collection and processing.

### 3.2.1.2 Participating University Personnel

The 16 Universities who collaborated in the project are shown below. All but 3 Australian University Physiotherapy programmes were full participants in the project. The Universities of Newcastle and Canberra chose not to participate due to their involvement in other simulation projects and changes in their teaching programmes. Macquarie University and the University of Otago in New Zealand maintained observer status.

<table>
<thead>
<tr>
<th>Participating Universities</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Australian Catholic University</td>
<td>Monash University</td>
</tr>
<tr>
<td>Bond University</td>
<td>University of Melbourne</td>
</tr>
<tr>
<td>Charles Sturt University</td>
<td>The University of Notre Dame Australia</td>
</tr>
<tr>
<td>Central Queensland University</td>
<td>The University of Queensland</td>
</tr>
<tr>
<td>Curtin University</td>
<td>The University of South Australia</td>
</tr>
<tr>
<td>Flinders University</td>
<td>The University of Sydney</td>
</tr>
<tr>
<td>Griffith University</td>
<td>The University of Western Sydney</td>
</tr>
<tr>
<td>James Cooke University</td>
<td></td>
</tr>
<tr>
<td>LaTrobe University</td>
<td></td>
</tr>
</tbody>
</table>

**Project Liaison Officers**

Each University nominated at least one senior academic as their Project Liaison Officer (PLO). Each PLO took overall responsibility for ensuring implementation of the project within their particular University, in collaboration with the national team. This involved responsibility for all aspects of planning (decision-making about simulation unit placement within the curriculum, number of units, student year groups and numbers and liaison with all stakeholders to embed the unit in the clinical calendar), budget management, appointment of administrative and supervisory staff and actors, equipment, facilities booking, timetabling and final implementation with students. PLOs attended the monthly Project Management Group teleconference meeting.

**Local Research Officers**

A local Research Officer was appointed at each University for the duration of that University’s involvement in delivering simulation units. This position was given day to day responsibility for many of the logistical aspects of project implementation. This included purchasing equipment, organising scenario resources, organising and training actors, organising supervisor training, setting up simulation scenarios, and ensuring that each 5 day simulation placement ran smoothly. Project Research Officers met by teleconference each month.

**Local Simulation Supervisors and Role-play Actors**

Each University was funded to appoint academic or clinical staff to supervise students during each 5-day simulation unit. These staff were experienced in supervising the core practice area of their
particular unit. All staff were provided with specific simulation training, either via the NHET-Sim programme or via the Project Manual and other reading. Each University was also funded to train and employ role-play actors as simulated patients. These actors were sourced from professional organisations wherever possible, although several of the rural Universities found that they needed to employ semi-professional actors due to the lack of professional actors in their area.

### 3.2.2 Project Committee and Working Group Structure

A structure of committees and working groups was established to ensure high levels of collaboration and to oversee all aspects of the project (Figure 5). All meetings of all groups used teleconference facilities.

![Figure 6: Project committee structure](image)

#### 3.2.2.1 Project Oversight Committee

The Project Oversight Board included representatives from key stakeholders, comprising 2 representatives from Health Workforce Australia, 2 from the Council of Physiotherapy Deans of Australia and New Zealand (CPDANZ), 2 from the Australian Physiotherapy Council (APC) and 1 from the Project Management Group. This Board met on a six monthly basis and received regular reports from the project Lead and Project Manager regarding the ongoing progress of the project. The Board provided high-level guidance to assist with maintaining good progress towards the project objectives. In addition, the project Lead also provided feedback to CPDANZ and Physiotherapy Board of Australia meetings.

<table>
<thead>
<tr>
<th>Project Oversight Board Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Angela Chang - HWA</td>
</tr>
<tr>
<td>Prof Sandy Brauer - CPDANZ</td>
</tr>
<tr>
<td>Dr Margaret Potter - APC</td>
</tr>
<tr>
<td>Prof Tony Wright – Project Group</td>
</tr>
</tbody>
</table>

#### 3.2.2.2 Project Management Committee

The Project Management Committee was composed of at least one senior collaborator from each University (Project Liaison Officer (PLO)) led by the national management team. This committee met via teleconference on a monthly basis since early 2013 and was the key mechanism by which close collaboration was maintained. All developments were discussed and all major decisions made collaboratively at these meetings.
### Project Management Committee Members

**National Team**
- Prof Tony Wright
- Dr Penny Moss
- Dr Kate Watson
- Mr Stepehn Rue

**Project Liaison Officers**
- Pamela Teys - Australian Catholic University
- Kellie van der Swan - Bond University
- Tanya Palmer - Central Queensland University
- Dr Rosemary Corrigan - Charles Sturt University
- Anne Furness / Alan Reubenson - Curtin University
- Dr Christine Redmond - Flinders University
- Assoc Prof Liisa Laakso - Griffith University
- Dr Anne Jones - James Cook University
- Dr Felicity Blackstock - La Trobe University
- Rob LoPresti / Tamara Clements - Melbourne University
- Dr Prue Morgan - Monash University
- Assoc Prof Jo Connaughton - The University of Notre Dame, Australia University

**Observers**
- Dr Allison Mandrusiak - The University of Queensland
- Dr Shylie Mackintosh - The University of South Australia
- Prof Jenny Alison - The University of Sydney
- Prof Lucy Chipchase - The University of Western Sydney
- Dr Cathy Chapple - The University of Otago
- Prof Catherine Dean - Macquarie University

### 3.2.2.3 Project Working Groups

The Project Management Group established two working groups to advise on key aspects of the project. These were the Scenario Development and Evaluation Working Groups, formed from volunteer members of the Project Management Group and others co-opted for their specific expertise. The Scenario Development Group provided advice in relation to the development and review of simulation scenarios. The Evaluation Working Group advised on the development of the evaluation proposal and specific research questions that might be addressed during the project. This group also advised during data analysis and report generation in the later stages of the project.
3.2.2.4 Research Officer Group

Local Project Research Officers (RO) met by teleconference each month, usually immediately after the Project Management group meetings. This meeting ensured that ROs were updated on any project developments and provided an opportunity for them to discuss problems and collaboratively problem-solve.

3.3 Project Stages

The project was planned and implemented through two distinct phases although these phases did overlap due to the staggered implementation of simulation placements at different universities around the country. The Preparatory Phase commenced in September 2013 and involved all aspects of budget planning and contract negotiation, submission of ethics applications, detailed unit planning for each University, development of all required materials and organization of training for staff implementing the units. During the Implementation Phase, from January 2014 to May 2015, each University carried out the simulation units that they had planned.

3.3.1 Preparatory Phase

3.3.1.1 Budgeting and Contracts

Budgets

Each University received a proportion of the total HWA funding. However, in order to simplify the process and reduce central financial administrative time, a funding model was developed that ensured equity of access for each University to everything required to run their simulation units successfully. However, there was considerable variation between universities in the amount of simulation to be undertaken and in pre-existing expertise, equipment and access to appropriate facilities. The funding model for division of project implementation funds therefore aimed to balance individual needs with standardized elements. The intent was to significantly build capacity in each of the participating Universities.

The components of the funding model were: facility booking costs, local RO time, capital equipment costs, and unit running costs. The cost of booking an appropriate venue for the simulation units to be run (ward or rehab setting) was highly variable between universities and so could not be standardized but was instead based on predicted requirements. All local RO funding was based on a standard non-academic hourly rate. Since there was considerable variation between universities in the amount of planned simulation, the total number of RO weeks / full time equivalent (FTE) funded was calculated taking into account the timing model used (UQ model required intense RO input and so was funded as 1.0FTE, in contrast to the more intermittent Monash model which was funded as 0.5FTE). Equipment funding was calculated based on the number of basic sets of re-useable equipment required in each core practice area for the number of students per unit for each University. For example, for a ward-based cardiorespiratory unit one set of equipment would include everything needed for one medical scenario (bed, linen, medical equipment, specialist therapeutic equipment). For a rehab scenario this would include a plinth and specialist therapeutic equipment. Average national costs for purchasing each piece of equipment was included in the equipment set cost. Running costs for the units planned by each University were calculated in three component parts, each part using a standardized algorithm. Simulation supervisor costs were based on a 1:4 supervision model for the total number of 1-week simulation units planned. An average academic pay rate was funded for a standard 37.5 hour week. Actor costs were also based on an average pay rate, with the total number of actor hours per simulation week calculated from 5-day timetables created by the national Manager for each core practice area and for different numbers of student participants. Additional funding for consumable equipment items such as masks, tape, dressings or tubing was also provided based on total numbers of actors per simulation week.
Sub-Contracts
Once funding division had been completed satisfactorily, sub-contracts were negotiated and signed between the legal departments of Curtin University and each of the participating universities. In return for their portion of funding, each University agreed to complete at least 90% of their planned simulation days with at least 90% planned student participation. Collection of evaluation data was also part of the contractual obligations, although a specific number of participants in data collection was not a requirement.

3.3.1.2 Simulation Unit Planning
In order to optimize sustainability, the simulation units needed to be standardized enough to allow for meaningful evaluation but sufficiently flexible to allow each individual university to embed units into their existing clinical programme. The simulation units that were developed therefore included both standardised and non-standardised elements.

Standardised Elements
All simulation units were composed of 5-days of full-time simulated clinical time, run in a similar manner to a ‘real-life’ clinical placement. The experience was immersive so that students were provided only with the medical notes or hand-over information that would be available in an equivalent ‘real-life’ setting. Students were supervised by clinical supervisors experienced in the particular core practice area of the simulation unit and funding was provided to ensure that each University could staff the units at a 1:4 clinical supervision level. All clinical supervisors were provided with training in simulation techniques and were required to follow a standardised daily timetable.

Timetabling was an important element that ensured adherence to key simulation components. All students started on the first simulation day working in groups of four with a supervisor and the first simulated patient in order to develop confidence in the simulation process. Over the five days the actor: student ratio size gradually reduced so that by day 5, students had the opportunity to work individually with a simulated patient. The timetable was organised so that all students saw the same 8 patients in total over the week and each day included at least one group debriefing session where students could discuss their varying approaches to the same patient.

The employment of professional role-play actors as simulated patients was another vital element to this clinical simulation project. All actors were provided with sufficient training to enable them to simulate both the personal and clinical attributes of their patient. To ensure fidelity, a different actor played each different patient. If a patient was to be seen both in hospital and then after discharge home, the same actor played the patient on both occasions. Actors and students were kept separate and did not interact socially outside of the simulation scenarios. A bank of 45 simulation scenarios were developed specifically for this project and all universities selected their simulated patient cases from this resource (see section below).

Maintenance of authenticity was a key requirement of each participating university, achieved through use of an appropriate physical setting, availability of appropriate equipment and medical resources and authenticity of actors. The local Research Officer ensured that all equipment was available and the patient was set up realistically: for example, tubes/ taping/ bruising or “scope sites” etc marked appropriately; all medical notes, case notes, letters, X-rays etc looked realistic with dates and location information on them appropriate to the time and place. Students were expected to read and add to medical notes/ file records and to complete an appointment system where appropriate as per traditional practice.

Alongside high levels of realism, each University trained their simulation supervisors to apply a number of specific teaching and learning techniques in order to add specific educational value to the simulation learning programme rather than just mimicking the real-life setting. “Time-Outs”
could be used by supervisors, students or peers to pause the scenario. This enabled students to review or get assistance from a peer with clinical reasoning or with an assessment or treatment approach. Supervisors could also use it as a “Teaching moment” although they were encouraged to avoid a didactic approach. “Time-In” could be called when the student was happy to continue. “Rewind” and “Replay” could be used to reinforce a change in approach or for a student to repeat a procedure / line of questioning. Fast-tracking a scenario could also be applied, so that a student had the opportunity over 5 days to see how a treatment can be progressed over a timeline of weeks or months. Finally, supervisors had the opportunity to work closely with the actor to modify the set scenario for individual students, dependent on their level of understanding. This might include increasing the level of challenge for a student by getting the simulated patient to deteriorate between morning and afternoon sessions or by emphasizing an element such as communication on which a student needed to focus.

**Non-standardised elements**

In order to ensure that simulation units could be embedded into the individual programme for each University there needed to be a range of flexible elements.

Simulation training was implemented across the participating universities using three different **timing models**:

1. For the “Sydney Model” students experienced the five simulation days as a one-week block at the start of their 5-week fieldwork placement. The core practice area of the simulation unit was intended to match that of the placement.
2. The “Monash Model” was designed as an integrated timing model, whereby students integrated their 5 simulation days across the 5 weeks of their fieldwork placement, perhaps as 1 day per week on simulation and 4 days in the fieldwork placement. Again, the core area of the simulation unit matched that of the placement
3. The “UQ Model” involved a stand-alone 3-week simulation unit, with all students rotating between 5 day units in each of the three core practice areas.

Each University also selected from the **three core areas** of cardio-respiratory, neurological and musculoskeletal practice for each simulation unit. Within the set of scenarios for each core area there were options for hospital ward-based and outpatient rehabilitation-based cases.

In addition, each University decided individually on their capacity to run simulation, generally related to the extent of previous experience. There was consequently considerable variation in *numbers of students participating* and in numbers of simulation units run, with some universities only able to complete a few units with small student numbers and other universities able to run simulation units across an entire year group of students. There was variation also in the *stage of learning* of the students involved in the units, depending on where simulation fitted most comfortably in each existing curriculum.

### 3.3.1.3 Development of Resource Materials

The simulated patient scenarios used in this project were developed and written specifically for the programme and all universities selected from this bank of 45 cases. Scenario development occurred in a very structured manner. The range of conditions and patient problems was determined following consultation with the Scenario Working Group, with the aim of ensuring that core physiotherapy graduate clinical competencies were covered and that students were suitably prepared for their concurrent or subsequent ‘real-life’ placement. Three Scenario Development teams, one for each core practice area, were then recruited from expert clinicians, each with a team leader and with the national Manager coordinating across all teams.
## Scenario Development Teams Members:

<table>
<thead>
<tr>
<th>Team</th>
<th>Member</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardio team</strong></td>
<td>Dr Laura Browning (Lead), Ms Alison Blunt, Dr Meg Harrold</td>
<td>Cardio-Resp specialist, Melbourne University Advanced Practice PT Cardio-resp/Critical Care, Princess Alexandra Hospital, Brisbane, Lecturer, ACU, Brisbane, Cardio-Resp / ICU specialist, Lecturer, Curtin University</td>
</tr>
<tr>
<td><strong>Neuro team</strong></td>
<td>Ms Briana Bates (Lead)</td>
<td>Deputy Director, Physiotherapy Royal Adelaide Hospital</td>
</tr>
<tr>
<td></td>
<td>Ms Liezel Plumbe</td>
<td>PhD student, University of Queensland; Lecturer, University of W.Sydney</td>
</tr>
<tr>
<td></td>
<td>Ms Kathryn Vick</td>
<td>Senior Clinician – Allied Health Education and Training, Barwon Health, Education and Training</td>
</tr>
<tr>
<td><strong>Musculo team</strong></td>
<td>Ms Jane Coffee (Lead), Mr Peter Lawrenson, Ms Karen Richards, Dr Joanne Bullock-Saxton</td>
<td>Lecturer, University of South Australia, Sports Physiotherapist / Clinical Educator, University / Musculoskeletal Clinical Specialist, Curtin University, Musculoskeletal Physiotherapist, Clinician, Australian Catholic University</td>
</tr>
</tbody>
</table>

These teams were formed with the specific aim of involving a mix of clinicians from around the country so that the scenarios would have as broad an application as possible. Teams collaborated via email and weekly telephone conferences, using digital sharing resources such as the University AARNET or Dropbox. A unified approach to scenario formatting was taken. Each scenario included an actor script, a simulation supervisor guide, photographs or videos of the set-up and equipment required. In addition, a large amount of physical resources were created to improve the authenticity of each scenario. This included all possible medical resources at different time-points in the scenario, such as bed charts, medical notes, blood tests, reports, appropriate X-Rays and MRIs, even read-outs for medical monitors, patient labels to personalize medical notes and patient wrist identification bands. In addition to the role-play simulation scenarios a small number of scenarios appropriate for Intensive Care cases were also developed by the cardio-respiratory team. Rather than using an actor, these scenarios make use of a computer-controlled high-fidelity mannequin such as a SIMMAN (Laerdal Medical). These scenarios included software programmed specifically for the case example. Each scenario included 2-3 scripted sessions with the student. A very significant amount of work and expertise was therefore required to develop such detailed documentation, videos and equipment requirements for each of the scenarios.

All of the scenarios also included within their documentation the capacity to extend the basic clinical scenarios to introduce other issues such as communication problems, safety hazards and cultural issues. These variations were used by educators to individualise learning: according to the differing cultural contexts around the country; or to provide additional challenges for students working at more than basic clinical competence; or to provide additional points of comparison during debriefing. Equally all scenarios can easily be modified to challenge students with a simulated patient fall if students needed a tangible reminder about basic safety and handling rules. It is a unique way of ensuring that students are more work-ready, having received a more consistent exposure to key patient presentations than has ever been possible before.

Once completed, the scenarios were reviewed by additional expert clinicians. The resources have been updated and improved by the Curtin Coordination team following feedback by actors and staff during 2014/2015 and are available to all universities via AARNet. The process of developing
scenarios therefore became one of benchmarking, with strong debate about differences in practice around the country. Ultimately the developed scenarios reflect nationally-agreed best-practice across 45 core patient presentations.

Tables 2a-2c below show the scenarios for each core practice area. Both acute (hospital ward-based) and rehabilitation cases were included for each core practice area, often with a single simulated patient having an acute scenario and a later post-discharge rehabilitation scenario. This provided students with the opportunity to see a simulated patient post-discharge, sometimes months down the track, an opportunity almost never available during a ‘real’ clinical placement.

### 3.3.1.4 Training

#### Project Manual

In order to provide all participants with equal access to the basic principles of role-play simulation, key simulation educational techniques (as described above) and information about how to run a simulation unit, a Project Manual was developed by the National team. This included information about the decision-making needed and a timeline of all the many tasks for simulation unit preparation and the person responsible for each. Figure 6 shows the timeline provided in the Manual. A print and digital copy of the Manual was provided to each PLO at the Melbourne Training Workshop (see below) and also made available to all project participants via the University Cloud-based AARNET system.

#### Training Workshop

A face-to-face two-day training workshop in Melbourne was organized for early December 2013 for as many of the PLOs and local ROs that could attend. More than 40 staff attended, including some clinicians. The workshop covered all aspects of the project: its aims, how to run units, detailed discussion of simulation scenarios, as well as evaluation processes.

#### NHET-Sim

The project provided an opportunity for collaboration with the HWA-funded National Health Education and Training in Simulation (NHET-Sim) initiative. This group provided both online and face-to-face training in simulation theory and practice in each of the main cities as well as in rural areas. The NHET-Sim training was used to provide local ROs and simulation supervisors with the background necessary to manage simulation facilitation. In addition a number of actors also completed some of the introductory training modules to help them understand the aims of the simulation units. All NHET-Sim training was free of charge and completion of units enabled participants to claim up to 24 hours of Continuing Professional Development.

### 3.3.2 Implementation Phase

Implementation of the simulation units started with the first Curtin University unit in early January 2014, followed by the Universities of Queensland and Sydney. Throughout 2014 and into mid 2015 the simulation units were rolled out at each University. Figure 6 illustrates the variation in timing, spread and model of simulation units completed by each University.
Figure 7: Spread of implementation of simulation units through 2014 and 201
Table 2: Bank of 45 benchmarked patient scenarios for: a) cardiorespiratory; b) neurological and c) musculoskeletal practice areas

All acute cases unshaded, rehabilitation cases shaded apricot.

### 2a) Cardio-respiratory patient scenarios

<table>
<thead>
<tr>
<th>Cardiorespiratory Condition</th>
<th>Patient Name</th>
<th>Age</th>
<th>Learner Level</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Pneumonia</td>
<td>Mavis Moore</td>
<td>Late 60s</td>
<td>Beginner</td>
<td>Introductory Case with focus on cardiorespiratory assessment</td>
</tr>
<tr>
<td>2 Exacerbation of COPD</td>
<td>Jim Johnson</td>
<td>60s</td>
<td>Intermediate</td>
<td>Additional follow up session with patient worsening (Case 9) = Adverse event</td>
</tr>
<tr>
<td>(Also Case 9 below)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3a Suppurative Lung Disease</td>
<td>Nick Baker</td>
<td>Early 20s</td>
<td>Intermediate</td>
<td>2 case options available - adolescent with either Cystic Fibrosis or Bronchiectasis (rural/indigenous patient). Both cases include teaching airway clearance techniques, addressing compliance and communication issues</td>
</tr>
<tr>
<td>(Cystic Fibrosis Option)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Outpatient)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3b Suppurative Lung Disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Bronchiectasis Option)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Exercise Rehabilitation</td>
<td>Barry Fletcher</td>
<td>Middle aged</td>
<td>Beginner</td>
<td>Pre-programme assessment (including exercise testing and questionnaires). Case includes a follow up session with exercise programme</td>
</tr>
<tr>
<td>(Outpatient)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Thoracic surgery</td>
<td>Barbara Bobrowski</td>
<td>Mid 50s</td>
<td>Intermediate</td>
<td>Postoperative pulmonary complication</td>
</tr>
<tr>
<td>6a, b, c Abdominal Surgery</td>
<td>Luciano Bagnoli or Lam Nguyen</td>
<td>Late 50s / early 60s</td>
<td>Beginner or Intermediate (with interpreter)</td>
<td>Focus on pre-operative assessment and education and minimisation of postoperative complications Additional complexity as patient with minimal English and working with interpreters: Vietnamese or Italian Patients post cardiac surgery. Includes Phase 1 cardiac rehab &amp; education.</td>
</tr>
<tr>
<td>(3 options: English-speaking, non-English speaking Italian, non-English speaking Vietnamese)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Cardiac Surgery</td>
<td>Christine Clark</td>
<td>Mid 60s</td>
<td>Beginner</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Condition</td>
<td>Name</td>
<td>Age Range</td>
<td>Learner Level</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------</td>
<td>-----------</td>
<td>--------------</td>
</tr>
<tr>
<td>8</td>
<td>Chest trauma</td>
<td>Doreen Brown</td>
<td>Mid 60s</td>
<td>Intermediate</td>
</tr>
<tr>
<td>9</td>
<td>Exacerbation COPD (same as Case 2 above)</td>
<td>Jim Johnson</td>
<td>60s</td>
<td>Advanced</td>
</tr>
<tr>
<td>10</td>
<td>Emergency laparotomy and pulmonary complications</td>
<td>Eunice Watkins</td>
<td>65</td>
<td>Advanced</td>
</tr>
<tr>
<td>11</td>
<td>Aspiration pneumonia following drug overdose</td>
<td>Isabelle Baynton</td>
<td>40</td>
<td>Advanced</td>
</tr>
<tr>
<td>12</td>
<td>Multi-trauma</td>
<td>Marg Baynton</td>
<td>62</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jasper Burhop</td>
<td>24</td>
<td>Advanced</td>
</tr>
</tbody>
</table>

2b) Neurological patient scenarios: acute cases unshaded, rehabilitation cases shaded apricot.

<table>
<thead>
<tr>
<th>Neurological Condition</th>
<th>Name</th>
<th>Patient age range</th>
<th>Learner Level</th>
<th>Focus / Summary of scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guillain-Barré Syndrome (acute presentation) – admission to HDU</td>
<td>Cheryl Pritchard</td>
<td>55-65 years</td>
<td>Intermediate</td>
<td>GBS onset after URTI, Severe limb, trunk weakness, Respiratory involvement, Deteriorating</td>
</tr>
<tr>
<td>Basal ganglia hemorrhage – 1 day post admission</td>
<td>George Price</td>
<td>70-80 years</td>
<td>Advanced</td>
<td>Dysphasic, Left hemiplegia, Risk of aspiration. Bariatric ideally - heavy manual handling</td>
</tr>
<tr>
<td>L4-S1 lumbar fusion – 1 day post surgery</td>
<td>Mark Griffiths</td>
<td>40-50 years</td>
<td>Beginner</td>
<td>Identify &amp; adhere to post op orders Educate patient re lifestyle factors &amp; lumbar care</td>
</tr>
<tr>
<td>Multiple Sclerosis (recent diagnosis) – 1 day post admission</td>
<td>Anna Hogan</td>
<td>35-45 years</td>
<td>Intermediate</td>
<td>Ataxic gait, Right side weakness and reduced coordination, Face sensation and visual Δs Emotional, dealing with Dx</td>
</tr>
</tbody>
</table>
5 Frontoparietal haemorrhage – 7 days post admission
Jan Thomas
58-68 years
Intermediate
Left sided neglect, Left upper limb weakness
Safety issues: footwear, bed brakes, supervising unpredictable client

6 Parkinson’s Disease – 1 day post admission
Howard McMillan
65-75 years
Beginner
Recent recurrent falls++ Fear of being placed in residential care Safety issues: high falls risk, footwear, home environment

7 Guillain-Barré Syndrome
(chase of Case 1, 6 months later)
Caryl Pritchard
55-65 years
Beginner
High level balance dysfunction
Hand therapy, Return to work goals

8 Subarachnoid haemorrhage
(Same as Case 2, 18 months later)
George Price
70-80 years
Advanced
Dysphasic, Right hemi & pain. Wants to improve upper limb function, Falls risk

9 Multiple Sclerosis
(Same as Case 4 above, 7 years later)
Anna Hogan
40-55 years
Intermediate
Using wheelchair, but would like to be able to walk with a 4WW, Right lower limb weakness, Upper limb and trunk tremors, Falls risk, Relationship issues

10 Acquired Brain Injury – 2 years post injury. Potential home visit
Coco Khalil
19-25 years
Advanced
Issues with higher level balance and coordination. Would like to improve run and dance. Concentration issues. Drug and alcohol issues.

11 Cerebellar stroke 18 months ago
Kenny Perkins
30-50 years
Beginner
Dysarthritic, ataxic gait, high falls risk

12 Spinal cord injury – 4 months post
Luke Cross
30-40 years
Advanced
T4 ASIA Some mild LL spasticity
Working towards independent transfers and ADL’s

2c) Musculoskeletal patient scenarios: acute cases unshaded, rehabilitation cases shaded apricot.

<table>
<thead>
<tr>
<th>Musculoskeletal Condition</th>
<th>Name</th>
<th>Patient age range</th>
<th>Learner Level</th>
<th>Focus / Complexity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ACL Day 1 post op (younger)</td>
<td>Carly Watson</td>
<td>17</td>
<td>Beginner</td>
<td>Anxious</td>
</tr>
<tr>
<td>2 ACL Day 1 post op (older)</td>
<td>Mary Beatty</td>
<td>40</td>
<td>Beginner</td>
<td>Over enthusiastic, older patient</td>
</tr>
<tr>
<td>3 Bilateral TKR 2/7 post op</td>
<td>Margaret Nolan</td>
<td>55-65</td>
<td>Advanced</td>
<td>Day 1 &amp; Day 5</td>
</tr>
<tr>
<td>4 # Distal Tib/fib</td>
<td>Chloe Smart</td>
<td>20-25</td>
<td>Intermediate</td>
<td>Domestic abuse</td>
</tr>
<tr>
<td>#</td>
<td>Condition</td>
<td>Therapist</td>
<td>Age Range</td>
<td>Skill Level</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------------------</td>
<td>--------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>5</td>
<td># NOF Day 2 post op</td>
<td>Dora Drabble</td>
<td>60-75</td>
<td>Beginner</td>
</tr>
<tr>
<td>6</td>
<td># NOF Day 2 post op (Different person)</td>
<td>Doreen Rancic</td>
<td>70s</td>
<td>Intermediate</td>
</tr>
<tr>
<td>7*</td>
<td>Rotator Cuff repair Day 1 post op</td>
<td>Susan Forest</td>
<td>60-65</td>
<td>Beginner</td>
</tr>
<tr>
<td>8</td>
<td>Acute Cervical Radiculopathy</td>
<td>Daniel Reeves</td>
<td>45-60</td>
<td>Advanced</td>
</tr>
<tr>
<td>9</td>
<td>Cervical Head ache/whiplash</td>
<td>Paul Nader</td>
<td>25-40</td>
<td>Intermediate</td>
</tr>
<tr>
<td>10</td>
<td>Chronic Low back pain</td>
<td>Dianne Smith</td>
<td>60-70</td>
<td>Advanced</td>
</tr>
<tr>
<td>11</td>
<td>Acute low back pain</td>
<td>Carmen Pall</td>
<td>23-35</td>
<td>Beginner</td>
</tr>
<tr>
<td>11</td>
<td>Colles’ # 2/52 post POP off</td>
<td>Laura Post</td>
<td>50-70</td>
<td>Beginner</td>
</tr>
<tr>
<td>12</td>
<td>Barton’s # 2/52 post RO splint</td>
<td>Janet Nurse</td>
<td>50-55</td>
<td>Advanced</td>
</tr>
<tr>
<td>13</td>
<td>Early hip OA</td>
<td>Rebecca Mills</td>
<td>40</td>
<td>Beginner</td>
</tr>
<tr>
<td>14</td>
<td>Knee OA</td>
<td>Theo Jones</td>
<td>65-75</td>
<td>Beginner</td>
</tr>
<tr>
<td>15</td>
<td>Patello femoral pain syndrome</td>
<td>Sarah Johns</td>
<td>20-30</td>
<td>Beginner</td>
</tr>
<tr>
<td>16</td>
<td>Recurrent ankle sprain (Acute on chronic)</td>
<td>Saba Mikala</td>
<td>18-28</td>
<td>Intermediate</td>
</tr>
<tr>
<td>17 (Same as 3)</td>
<td>Bilateral TKR 6/52 post op</td>
<td>Margaret Nolan</td>
<td>55-65</td>
<td>Intermediate</td>
</tr>
<tr>
<td>18</td>
<td>Rotator Cuff repair 6/52 post op</td>
<td>Susan Forest</td>
<td>55</td>
<td>Beginner</td>
</tr>
<tr>
<td>20 (same as)</td>
<td>ACL 2/52 post op</td>
<td>Carly Watson</td>
<td>17 or 40</td>
<td>Beginner</td>
</tr>
</tbody>
</table>
Chapter 4: Evaluation Methodology

4.1 Overview

Although the main aim of this project was to implement simulated learning programmes in a sustainable manner, an important secondary aim was to evaluate the impact of this implementation on clinical training outcomes. This evaluation was achieved with the use of a combination of quantitative, questionnaire-based, and qualitative, focus group-based, methodology. However, it must be noted that, although the methodology was clearly structured for both types of evaluation, this could not be a scientifically controlled study due to the necessary flexibility of the implementation process. Although the main elements of simulation implementation were standardized, such as scenario content, level of fidelity, use of professional actors, staff: student ratios, some flexibility needed to be provided in some other elements in order to ensure maximal involvement across Physiotherapy schools. Table 3 outlines the main standard and flexible elements, described in more detail in Chapter 3. Since they are of particular interest for Physiotherapy clinical training, differences in outcomes between timing models and core practice areas have been particularly explored in both quantitative and qualitative analyses.

Table 3: Main standardised and variable elements for each simulation unit

<table>
<thead>
<tr>
<th>Standard elements</th>
<th>Variable Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1 simulation unit = 5 days (37.5 hours)</td>
<td>• Timing model</td>
</tr>
<tr>
<td>• Supervisor: student ratio (1:4)</td>
<td>- Sydney</td>
</tr>
<tr>
<td>• Actor: student ratio (1:4 – 1:1)</td>
<td>- Monash</td>
</tr>
<tr>
<td>• Specific scenarios</td>
<td>- UQ</td>
</tr>
<tr>
<td>• Specific simulation techniques</td>
<td>• Core practice area</td>
</tr>
<tr>
<td>• Actor and supervisor training</td>
<td>- Cardiorespiratory</td>
</tr>
<tr>
<td></td>
<td>- Neurological</td>
</tr>
<tr>
<td></td>
<td>- Musculoskeletal</td>
</tr>
<tr>
<td></td>
<td>• Student stage of learning</td>
</tr>
</tbody>
</table>

4.2 Quantitative Evaluation

4.2.1 Aims and Objectives

4.2.1.1 Primary Objectives

The project aimed to evaluate the implementation of simulation learning programmes embedded in Physiotherapy clinical training across 16 accredited Australian Physiotherapy programmes. Although limited to some extent by the initiative’s focus on inclusive implementation rather than strictly standardized methodology, the primary objectives stated in the Evaluation Plan were to:

1. Investigate whether embedded role-play simulation (as described in section 3.3.1) improved the efficiency and effectiveness of clinical training;
2. Explore whether simulation training was able to increase total physiotherapy clinical placement capacity.
4.2.1.2 Secondary Objectives

The associated key secondary objectives therefore were to:

1. Evaluate the opinion of students and staff as to whether simulation training was a valuable clinical learning strategy;
   a. Did this vary according to core practice area (cardio-respiratory, neurological or musculoskeletal);
   b. Did this vary according to simulation unit timing model (“Sydney” - pre-fieldwork placement 5-day simulation block; “Monash” – 5 simulation days integrated throughout the fieldwork placement; “UQ” – stand-alone 15-day introductory simulation unit comprising 5 days in each core area.

2. Evaluate the opinion of students about whether a 5-day clinical simulation unit improved their clinical confidence in key clinical skill areas:
   a. Evaluate changes in student self-reported confidence in key clinical areas;
      i. Did this vary according to core practice area;
      ii. Did this vary according to timing model.

3. Evaluate the opinion of simulation supervisors about whether a 5-day clinical simulation unit improved students’ clinical competence in key clinical skill areas:
   i. Did this vary according to simulation unit timing model.

4. Evaluate the clinical competence of simulation-trained students at the end of the 5-day simulation unit using the Assessment of Physiotherapy Practice (APP) tool.
   ii. Did this vary according to core practice area;
   iii. Did this vary according to timing model.

5. Evaluate whether simulation-trained students demonstrated levels of clinical competence different to that of students who had not undertaken simulation.

6. Evaluate whether students who have undergone a 5-day simulation unit demonstrate improvements in their response to safety / emergency clinical situations. ¹

7. Evaluate whether there is a difference in benefit from simulation training (confidence and competence) between students for whom English is an additional language compared with students whose first language is English.

8. Evaluate whether simulation-trained students demonstrate a greater readiness to start their clinical fieldwork placement than students who have not undergone simulation training?

9. Identify the number of student clinical placement days released as a result of using simulation.

10. Investigate the difference in cost between 5 days of clinical placement and 5 days of equivalent simulation training.

¹ The results for this objective will be deferred until early 2016 due difficulties in accessing the very large amount of data.
4.2.2 Participants
The quantitative study involved 3 different groups of participants from each University: students, simulation supervisory staff and clinical fieldwork staff.

4.2.2.1 Inclusion / Exclusion Criteria
Students: The key inclusion criterion for students was allocation to a simulation unit. There were no exclusion criteria
Simulation supervisors: Similarly, the key inclusion criterion was appointment to a clinical supervision position in one of the simulation units.
Clinical fieldwork supervisors: Inclusion criteria were allocation to fieldwork supervision of students who had completed a simulation training unit. This may have been a clinical placement that followed on from simulation training (Sydney timing), one that ran concurrently to simulation training (Monash timing) or one that ran as a subsequent and separate placement (UQ timing).

4.2.2.2 Recruitment & Consent
Student participants were recruited by local Research Officers (RO), who were not involved in academic teaching or grading. All students participating in simulation were given an initial introduction to the unit by the local RO at the start of Day 1. This included information about participation in the evaluation of the study. Each student was provided with an information sheet. If they chose to participate, they were either given a paper consent form to sign or indicated their consent to participate on an initial page on the iPad application.
Simulation supervisory staff participants were recruited similarly by the local RO and completed either paper or electronic consent forms.
Clinical fieldwork supervisor participants: slightly different recruitment processes had to be used in different parts of the country due to the requirements of different ethics committees.
• In some areas, direct contact between the project staff and potential participants employed by healthcare providers was not permitted and so a generic letter was written, inviting participation. This letter and an attached information sheet was emailed to all associated supervisory clinicians by the University Clinical Coordinator (the person in regular contact with clinical supervisors).
• In other areas, project staff were permitted to email clinical supervisors directly, including an information sheet.
All staff who volunteered to participate chose either to complete paper versions of consent forms and questionnaires or used a specially designed password-protected website to access an electronic version of the consent form and questionnaire.

4.2.3 Outcome Measures
Questionnaires were used to evaluate the impact of simulation on the confidence and competence of students in the clinical setting. Student and staff opinion of the value of simulation was also evaluated. All confidence and opinion surveys were based on those previously used in a randomized control trial (Watson et al., 2012; Blackstock et al., 2012). Some minor changes were made for the specific purposes of the current project.

4.2.3.1 Student Confidence and Opinion of Simulation Questionnaires
a) Student Confidence
Students were asked at the start and at the end of their 5 days of simulation to rate their self-perceived levels of confidence in 14 professional and clinical skill areas (Table 4). Students selected from a 5-item Likart scale ranging from 1 (“not at all confident”) to 5 (“very confident”). For the
purposes of analysis, these 14 areas were grouped into 4 broader skill areas: Communication; Assessment, Hypothesis, Goals; Treatment; Hazards & Limitation Awareness. Differences between student values at Day 1 and Day 5 were analysed. For students completing a “UQ model” unit composed of 3 simulation units, the pre and post questionnaire data from the first 5-day rotation only was included for analysis.

Table 4: Professional and Clinical Skill areas for which students were asked to rate their confidence levels on Day 1 and Day 5 of their simulation unit.

<table>
<thead>
<tr>
<th>Student Clinical Confidence Questionnaire</th>
<th>Communication</th>
<th>Assessment, Hypothesis &amp; Goals</th>
<th>Treatment</th>
<th>Hazards &amp; Limitation Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel confident that I can:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Communicate effectively with patients verbally</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Communicate effectively and professionally with other clinicians (eg writing reports, letters)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Write effective SOAP / medical notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Provide effective written information for patients</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. Conduct an efficient and thorough subjective assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Conducting an efficient and thorough physical assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Accurately interpret my assessment findings to make a clinical hypothesis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Set appropriate goals in collaboration with the patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel confident about:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Select appropriate treatment / interventions as a result of my assessment &amp; hypothesis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Performing treatments &amp; interventions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Progressing interventions appropriately for a particular patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Identifying safety hazards in a particular clinical situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Responding quickly and appropriately to safety hazards</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I feel confident that I am aware of my own limitations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Student Opinion of Simulation
At the end of the post-simulation questionnaire, students were asked their opinion of the simulation unit they had experienced:

i. Overall ratings. They were asked to rate on visual analogue scales: a) the overall value of the simulation unit to clinical learning; b) the overall usefulness of the simulation unit in bridging the gap between theory and clinical practice (0 indicated no value / usefulness and 10 indicated maximum value/usefulness).

ii. Effect on specific clinical skills. They were asked more specifically if they agreed/disagreed that simulation had been useful in developing the key clinical skills of communication, assessment, clinical reasoning and treatment effectiveness. Students indicated their level of agreement on a 5-point Likart scale was used from “Strongly Disagree” (5) to “Strongly Agree” (1).

iii. Usefulness of specific simulation strategies. They were asked whether they agreed/disagreed that particular simulation strategies (such as repetition, Time-Outs, debriefing) were useful to clinical learning. A similar 5-point Likart Scale (“Strongly Disagree” (5) to “Strongly Agree” (1)) was used.
4.2.3.2 Simulation Supervisors Opinion of Simulation

At the end of the 5-day simulation unit, simulation supervisors were given a single questionnaire asking their opinion about:

a) Impact of simulation unit on student competence:
Simulation supervisors were asked whether they felt that the clinical competence shown by simulation-trained students in the same 14 skill areas shown in Table 4 was equivalent to their usual expectations of students at a similar stage of learning. A 5-point Likart Scale (“Much Stronger” (5) to “Much Weaker” (1)) was used.

b) Opinion of simulation
Supervisors were also asked their opinion of the simulation unit they had just participated in. The same questions were asked as described above for students:

i. **Overall ratings:** VAS (0-10) ratings for overall value and usefulness of simulation.

ii. **Effect of specific clinical skills:** 5-point Likart scale to indicate agreement / disagreement

iii. **Usefulness of specific simulation strategies:** 5-point Likart scale to indicate agreement / disagreement

4.2.3.3 Assessment of Clinical Competence:
The Assessment of Physiotherapy Practice (APP) tool was used to evaluate clinical competence. This outcome measure is currently used across Australian entry-level Physiotherapy courses as the standard tool to assess clinical competence. It has been shown to be a valid and reliable assessment tool for an individual student’s clinical competence [1,2]. The student’s competence with regard to a series of 20 statements is scored between 0 and 4, relative to the training stage of the student. Since there were differences between Universities in the total number of skill areas assessed, mean grade rather than total score was used for analysis. In addition, mean grades for professional skills (communication, evidence-based practice) and clinical skills (subjective assessment, prioritizing, goal-setting) were also calculated (Table 5).

a) APP score at end of simulation unit
Post-simulation competence was assessed by simulation supervisors on Day 5 of the simulation unit. Each simulation supervisor completed APP forms for each of the 4 students they had supervised. For students completing a “UQ model” three APP scores were recorded but only the values for the values for the first simulation unit were included in the analysis.

b) APP score at the end of the associated clinical unit
All entry-level students are routinely assessed for their clinical competence by their clinical supervisor at the end of each clinical fieldwork placement by being given an APP score. Routinely scored APP data was collected for simulation-trained students at the end of the fieldwork placement associated with their simulation unit (for Monash and Sydney model students) or at the end of their first post-simulation fieldwork placement (for UQ model students).

c) APP scores for non simulation-trained students
In order to evaluate whether simulation-trained students exhibited similar levels of clinical competence once on a traditional clinical fieldwork placement, APP data from students who had not completed simulation was collected for each University. This de-identified data was collected via University clinical placement coordinators (ethical approval given for this) who selected non simulation-trained students at the same stage of training who had completed an equivalent clinical placement (placement type and timing within the academic year). It must be noted that data from 2 Universities could not be included due to lack of comparative data: University of Queensland had no equivalent non-simulation trained students for the previous 7 years; CSU was recently accredited and so had no prior clinical placement data.
Table 5: Assessment of Physiotherapy Practice items, showing sub-division into Professional (Qs 1-5 and 19) and Clinical (Qs 6-18 and 20) Skill areas.

<table>
<thead>
<tr>
<th>The student:</th>
<th>Professional Skills</th>
<th>Clinical Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Demonstrates understanding of patient rights &amp; consent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Shows evidence of commitment to learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Ethical, legal &amp; culturally sensitive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Teamwork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Effective verbal &amp; non-verbal communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Accurate record-keeping skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Applies evidence-based practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Appropriate patient / client interview</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Appropriate measurement methods used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Appropriate physical assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Appropriate interprets assessment finding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Identifies &amp; prioritises problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Sets realistic goals with patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Selects appropriate intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Performs interventions appropriately</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Is an effective educator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Monitors effect of intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Progresses intervention appropriately</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 Undertakes discharge planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Identifies adverse events &amp; minimizes risk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2.3.4 Clinical Fieldwork Supervisor Opinion

This questionnaire asked clinical placement supervisors to rate globally the clinical competence of the group of students who had undergone simulation training in comparison to their usual expectations of students at a similar stage of training. It then asked supervisors to rate their opinion of simulation training. The questions were identical to those for the Simulation Supervisor Post-Simulation Questionnaire.

4.2.4 Procedures

4.2.4.1 Timing of outcome measure completion

Figure 8 illustrates the timing of outcome measure completion. Students completed their questionnaires at the start of Day 1 and the end of Day 5 of simulation. Student undergoing a UQ placement of 3 simulation units completed all questionnaires on Day 1 and Day 5 of each week. Only the data from week 1 was used for analysis in this study. Simulation supervisors completed their APP forms and opinion questionnaire at the end of Day 5 of simulation. Clinical fieldwork supervisors completed their APPs and opinion questionnaires on the final day of placement. All evaluation tasks were provided in electronic form, via iPad delivery for students and simulation supervisors and via a project website for clinical fieldwork supervisors.
<table>
<thead>
<tr>
<th>Participant Group</th>
<th>Simulation Unit</th>
<th>Clinical Fieldwork Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student</strong></td>
<td>1st simulation day</td>
<td>5th simulation day</td>
</tr>
<tr>
<td></td>
<td>• Pre-simulation Confidence Questionnaire</td>
<td>• Post-simulation Confidence &amp; Opinion Questionnaire</td>
</tr>
<tr>
<td></td>
<td>• HEAT Task 1</td>
<td></td>
</tr>
<tr>
<td><strong>Simulation Supervisor</strong></td>
<td></td>
<td>• Individual student simulation unit APP</td>
</tr>
<tr>
<td><strong>Clinical Fieldwork Supervisor</strong></td>
<td></td>
<td>• Individual student clinical fieldwork APP</td>
</tr>
</tbody>
</table>

**Figure 8: Timing of outcome measure completion**

### 4.2.4.2 Electronic data collection procedures
In order to manage the large number of completed questionnaires that were anticipated, an iPad-based digital system of questionnaire delivery and upload was developed for the project. A dedicated IT advisor was employed throughout the project to develop the iPad App, to train and support local ROs, to manage data upload and saving of data to a dedicated secure Cloud-based database and to provide support in downloading and managing final data.

### 4.2.4.3 Development of iPad delivery system
All questionnaires were converted from paper into digital format so that they could be delivered, completed and uploaded into a central database as electronic data. An application was developed by the project IT advisor, in consultation with the National Team, using FileMaker-Pro and Filemaker-Go software. This application was designed for use on mini iPads, so that each participant selected their University, their name (or student’s name) and the questionnaire or task. Fail-safe mechanisms were included to ensure that no questionnaire questions could be missed and that no participants could inadvertently complete the wrong questionnaire.

### 4.2.4.4 Data collection – supply of ipads and data collection procedures
Data collection was coordinated by the Project Manager and supported by the Project IT Advisor. A bank of 130 iPad minis were purchased for the project and rotated around each University as simulation units were rolled out through the year. iPads were allocated at a ratio of between 1:2 and 1:4 per student. A spreadsheet containing all potential student and simulation supervisor participant names was provided before the start of each simulation unit. These names were added to the Filemaker programme for that particular University. Once programmed, the iPads were couriered to that University in time for the start of their units. At each University all data collection and iPad management was controlled by the local RO, each of whom was individually trained by the Project
Manager and IT Advisor. Much of the problem-solving shared at monthly RO teleconference meetings revolved around iPad and University wifi issues. In some cases, wifi blocking by University IT systems meant that paper questionnaires had to be used instead. These were then sent by mail to the National team for manual input into the database.

4.2.4.5 Data upload and storage
At the end of each simulation unit, the local RO uploaded the questionnaires from the FileMaker-Go application to a Cloud-based central database. All data were automatically encrypted before uploading and each participant was automatically assigned a 30-digit ID number to guarantee linkage of questionnaire data in the overall database. The Project IT Advisor took responsibility for managing this database and ensuring that all data had been correctly uploaded. No other team member had complete access to this database.

4.2.5 Data Management and Analysis
Once all Universities had completed their units and uploaded all of their data, it was extracted from the database by the Project Manager and IT Advisor and converted into an Excel spreadsheet for easier management. The Project Manager then cross-checked all data, screened for omissions and obvious errors and ensured that data were aligned (eg a student pre and post sim data). All data from each University were stored in an individual folder containing spreadsheets for each questionnaire type. Student pre and post simulation confidence data was then combined into a single spreadsheet. Finally a master spreadsheet for each questionnaire type was created, containing all data from all Universities. Each of these master spreadsheets was then converted to an SPSS file for analysis.

SPSS v21 was used to analyse all quantitative data, with alpha set at p<0.05. Where data were found to be normally distributed they were analysed using parametric statistics. All data from all Universities were analysed together. In addition to descriptive statistics, the following analyses (Table 6) were used to investigate key questions:

<table>
<thead>
<tr>
<th>Key Questions</th>
<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>Was simulation considered valuable?</em></td>
<td>Descriptives</td>
</tr>
<tr>
<td>a) Was there a difference between core areas?</td>
<td>One-way ANOVA</td>
</tr>
<tr>
<td>b) Was there a difference between timing models?</td>
<td></td>
</tr>
<tr>
<td>2. <em>Did simulation improve student confidence levels?</em></td>
<td>Independent t-test</td>
</tr>
<tr>
<td>a) Was there a difference between core areas?</td>
<td>One-way ANOVA</td>
</tr>
<tr>
<td>b) Was there a difference between timing models?</td>
<td></td>
</tr>
<tr>
<td>3. <em>Did simulation supervisors consider that simulation improved student competence?</em></td>
<td>Descriptives</td>
</tr>
<tr>
<td>a) Was there a difference between timing models?</td>
<td>One-way ANOVA</td>
</tr>
<tr>
<td>4. <em>What was the clinical competence of simulation-trained students at the end of their simulation unit (APP)?</em></td>
<td>Descriptives</td>
</tr>
<tr>
<td>a) Was there a difference between core areas?</td>
<td>One-way ANOVA</td>
</tr>
<tr>
<td>b) Was there a difference between timing models?</td>
<td></td>
</tr>
</tbody>
</table>
5. Did simulation-trained students demonstrate levels of clinical competence different to that of students who had not undertaken simulation (APPS)?
   a) Was there a difference between core areas?
   b) Was there a difference between timing models?

   Independent t-test
   One-way ANOVA

4.3 Qualitative Study

4.3.1 Aims and Objectives

The overall aim of the qualitative evaluation was to complement the quantitative evaluation data with descriptive data regarding the thoughts, ideas and perceptions about the simulation experience of students, simulation supervisors, actors, fieldwork supervisors, and fieldwork administrators.

Although questions were tailored to each participant group in their specific focus group sessions, the key objective of the qualitative evaluation was to investigate the following issues:
   a. What are the perceived benefits of simulation training?
   b. Is simulation training perceived to be an alternative or an additional learning opportunity?
   c. Is simulation training more beneficial for certain students than for others (stage of training, those whose first language is not English)?
   d. What are the perceived problems with simulation training? Could these be solved?
   e. How do actors and supervising staff contribute to student learning and could this be changed / improved?
   f. What are the real costs of students attending traditional clinical placements and how does this compare with the real costs of simulation training?
   g. Do the benefits of simulation training justify the potential cost?

4.3.2 Participants

Recruitment for participation in the focus group data collection was voluntary but limited to the specific requirements of each focus group. For example, a series of focus groups recruited student participants who had undergone simulation training, a different series of focus groups consisted of supervisory staff, another of actors and a final group consisted of clinical administrators. For all participant groups recruitment aimed to ensure a balance between Universities, areas of the country and as far as possible between timing models and core practice areas.

A total of 219 volunteers from all but one University participated in the focus groups: 105 students, 48 simulation supervisors, 26 fieldwork supervisors, 15 clinical administrators and 22 role-play actors. Table 7 illustrates the number of different focus group participants recruited according to simulation unit timing model for each University.

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Simulation supervisors</th>
<th>Fieldwork supervisors</th>
<th>Clinical administrators</th>
<th>Actors</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney Model</td>
<td>21</td>
<td>7</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>43</td>
</tr>
<tr>
<td>Monash Model</td>
<td>34</td>
<td>16</td>
<td>14</td>
<td>8</td>
<td>13</td>
<td>85</td>
</tr>
<tr>
<td>UQ Model</td>
<td>50</td>
<td>25</td>
<td>6</td>
<td>4</td>
<td>6</td>
<td>91</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>105</strong></td>
<td><strong>48</strong></td>
<td><strong>26</strong></td>
<td><strong>15</strong></td>
<td><strong>22</strong></td>
<td><strong>219</strong></td>
</tr>
</tbody>
</table>
4.3.3 Procedures
Initial focus groups utilised Skype, and were recorded and transcribed. Several issues arose out of this procedure. The Skype sessions, with multiple participants at multiple sites, proved to be operationally very difficult. The difficulties were primarily around technical faults that significantly compromised the flow of communication, and the quality of transcription available. Additionally the stagger in obtaining ethics approval at multiple sites nationally meant that mixed groups could not be organised. A decision was made to utilise recorded teleconferences with multiple groups until the data exhibited consistent themes. On-line notes on each focus group were taken, summated and stored as a hard copy and electronically.

4.3.4 Data Analysis
All focus group transcripts and notes were analysed for major themes by the National RO responsible for qualitative evaluation. NVivo software was initially used to extract major themes.

4.3.5 Ethics Procedures
Due to the complex nature of this project ethical approval was required from the ethics committees of all participating Universities as well as from health departments and hospital ethics committees in certain locations. Ethical approvals for the larger quantitative study was sought first, due to earlier start dates, with ethical approvals for the qualitative study sought subsequently as an amendment. In order to expedite approvals in a relatively short time-frame, ethical approval was initially sought for the entire study from Curtin University Human Research Ethics Committee (HREC), using a National Ethical Application Form (NEAF) entitled “Embedding Simulation in Clinical Training in Physiotherapy: evaluation study”. Subsequent ethics submissions were then rolled out to each participating University, either as a reciprocal approval using the previous Curtin approval, or new approval, depending on each institution’s requirements. The timing of these applications was staged according to the start date of simulation implementation for each University through 2014 and into 2015. Initial ethical approval was granted by Curtin University HREC for the quantitative evaluation for an period of 4 years (23/1/2014 to 23/01/2018). Table 8 lists the quantitative and qualitative approvals for each University in chronological order.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Quantitative Approval Number</th>
<th>Qualitative Approval Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curtin University</td>
<td>NEAF HR07/2014</td>
<td>NEAF HR126/2014</td>
</tr>
<tr>
<td></td>
<td>2013/1015</td>
<td>2013/1015</td>
</tr>
<tr>
<td>University of Sydney</td>
<td>HREC 2014000052</td>
<td>HREC 2014000052</td>
</tr>
<tr>
<td></td>
<td>1341020</td>
<td>1341020</td>
</tr>
<tr>
<td>University of Queensland</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Melbourne</td>
<td>405/2014/02</td>
<td>405/2014/02</td>
</tr>
<tr>
<td></td>
<td>H10532</td>
<td>N10532 (Approved amendment)</td>
</tr>
<tr>
<td>Charles Sturt University</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Western Sydney</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bond University</td>
<td>NEAF RO 1786</td>
<td>RO 1786 (Approved amendment)</td>
</tr>
<tr>
<td>Monash University</td>
<td>HR 14163L</td>
<td>HR 1463L (Approved amendment)</td>
</tr>
<tr>
<td>Institution</td>
<td>Method</td>
<td>Approval</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Flinders University</td>
<td>Reciprocal NEAF (HR07/2014)</td>
<td>L2 approval</td>
</tr>
<tr>
<td>Griffith University</td>
<td>AHS/09/2014</td>
<td>AHS/09/2014 Approved amendment</td>
</tr>
<tr>
<td>University of South Australia</td>
<td>0000033038</td>
<td>0000033038 Approved amendment</td>
</tr>
<tr>
<td>The University of Notre Dame Australia</td>
<td>014 025F</td>
<td>014025F Approved amendment</td>
</tr>
<tr>
<td>James Cook University</td>
<td>H5673 NEAF HR07/2014</td>
<td>NEAF H5862 Amendment approved based on Curtin</td>
</tr>
<tr>
<td>La Trobe University</td>
<td>308-14, LR13.2014</td>
<td>Amendment approved based on Curtin</td>
</tr>
<tr>
<td>Australian Catholic University</td>
<td>2014 196Q</td>
<td>2014 196Q (Approved amendment)</td>
</tr>
<tr>
<td>Central Queensland University</td>
<td>H14/12-254 (12/12/14)</td>
<td>H14/12-254 Approved amendment</td>
</tr>
</tbody>
</table>

### 4.3.6 Ethical Issues

A number of ethical issues needed to be considered within the structure of the evaluation methodology. In particular for students there needed to be a clear differentiation between the compulsory nature of participation in academic course-work simulation unit activities and voluntary participation in the evaluation of the project. As a result, all recruitment to both the quantitative and qualitative evaluation studies was done by the local Research Officer (RO) who was not involved in any academic grading. The method of data collection via password-protected iPads was selected so that only the local RO would have access. It was made clear to all student volunteers that the academic staff involved in unit teaching and grading were blind to their participation in the evaluation of the project and that they the right to withdraw from the evaluation without explanation or penalty, and to continue in the simulation unit. Australian Physiotherapy Practice (APP) assessment was completed for each student even if this was not part of their academic grading for the simulation unit. All students were given the right to see this grading but assured that it would not influence their actual grading. The data gathering process created by the National management team ensured that all data was encrypted and uploaded to a secure Cloud-based database, only accessible by the project IT advisor and the National Manager. Each student was allocated a 30-digit ID code so that data could be de-identified once uploaded and all iPads were cleared of data once returned to Curtin.

### References


Chapter 5: Quantitative Evaluation Results

5.1 Participants & Total Completions

Sixteen Universities from 5 different states participated in the evaluation component of the project. 25 separate simulation sites were used, including both University and Hospital locations. A total of 1790 individual students completed 143 simulation units (5 days per unit). Table 9 shows a break down of student and simulation unit numbers by core practice areas. This amounted to more than 13,000 simulation days or 99,000 simulation hours completed. More than 400 staff were involved in simulation supervision and more than 300 actors employed across the country.

Table 9: Breakdown of student and simulation unit numbers by timing model and core practice area

<table>
<thead>
<tr>
<th></th>
<th>Sydney Timing Model</th>
<th>Monash Timing Model</th>
<th>UQ Model All</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cardio</td>
<td>Neuro</td>
<td>Musc</td>
<td>Mixed</td>
</tr>
<tr>
<td>No. units</td>
<td>14</td>
<td>9</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>No. students</td>
<td>200</td>
<td>14</td>
<td>50</td>
<td>169</td>
</tr>
</tbody>
</table>

5.2 Results:

1430 students consented to participate in the quantitative evaluation of the project, a response rate of 80%. Questionnaires were received from 326 simulation supervisors and 90 clinical facility supervisors.

5.2.1 Objective 1: Opinion of simulation:

Evaluate the opinion of students and staff as to whether simulation training was a valuable clinical learning strategy

5.2.1.1 Did students and simulation supervisors think that the simulation unit was valuable?

a. Overall ratings:

   Overall ratings were very high from both students and staff (Figure 9): value of simulation to clinical learning was rated on average between 8.4 and 8.5/10 and usefulness in bridging the theory-practice gap was rated on average between 8.6 and 8.8/10.
b. **Effect on specific clinical skills:**

There was a high level of agreement from both staff and students that simulation had been valuable in developing specific clinical skills (Figure 10). Both groups agreed most strongly that simulation had been valuable in developing communication and assessment skills.

![Bar chart showing level of agreement on the value of simulation in developing specific clinical skills](image)

**Figure 10: Level of agreement about the value of simulation in developing specific clinical skills**

---

**c. Usefulness of specific simulation strategies:**

There was also a high level of agreement about the usefulness of specific simulation learning strategies, with all strategies rated at between Agree and Highly Agree by both groups (Figure 11). Both staff and students agreed most highly that working with peers on the same patient and being able to take “Time-Outs” were particularly useful strategies in their clinical learning.
Figure 11: Levels of agreement about the usefulness of specific simulation learning strategies

5.2.1.2 Did opinion of simulation training vary according to core practice area?
Data regarding core practice areas was not captured for staff so only analysis of student data has been completed. Although the intention had been for all Universities to select from one of the 3 core practice areas for each of their simulation units, 3 universities found that it was more practical to run a mix of the cardio-respiratory, neurological and musculoskeletal scenarios. Comparison has therefore been made between 4 areas: cardio-respiratory, neurological, musculoskeletal and mixed).

a. Overall ratings:
Cardiorespiratory simulation units were rated significantly higher than neurological, musculoskeletal or mixed practice areas for both value and usefulness questions (Figure 12). Mixed practice area units received the lowest ratings for both questions: for value to clinical learning although this difference was statistically significant when compared with all other core practice areas (p<.001, p=0.041, p=0.021 respectively); for usefulness in linking theory to practice this was only statistically significantly different when compared with cardio (p=0.004).
Figure 12: Visual analogue scales for overall value and usefulness of simulation, comparing core practice areas

b. Effect on specific clinical skills:
There were also statistically significant differences between core areas when students were asked to rate their agreement about the value of simulation to specific clinical skills (Figure 13). For all skills, there was a higher levels of agreement as to the value of cardio units whilst there was a consistently lower level of agreement about mixed units.
c. Usefulness of specific simulation strategies:
A similar pattern was also seen for students’ levels of agreement as to the usefulness of specific simulation strategies, with students who experienced the mixed areas units tending to have a lower level of agreement about the usefulness of each of the strategies. Students from cardiorespiratory units tended to have the highest level of agreement (Figure 14).

Figure 13: Students’ level of agreement about the value of simulation in developing specific clinical skills, comparing core practice areas

Figure 14: Students’ level of agreement as to the usefulness of specific simulation learning strategies, comparing core practice areas
5.2.1.3 Did opinion of simulation training vary according to timing model?

a. Overall ratings.

Students: There was a significant difference in student VAS ratings for both value and usefulness of simulation between timing models (Figure 15a). Independent t-tests showed that students who experienced the UQ stand-alone unit rated the first 5 days of simulation significantly higher than those who experienced both the Monash and the Sydney model (p<0.001). The Monash model was rated as significantly lower than the other two timing models (p<0.001).

Supervisors: However, there was no significant difference between timing models from simulation supervisors in ratings for value or usefulness (p=0.687 and p=0.121) (Figure 15b).

![Graph showing student VAS ratings for overall value and usefulness of the simulation unit]

b) Simulation supervisor VAS ratings for overall value and usefulness of the simulation unit.

Figure 15: Visual analogue scale ratings comparing timing models
b. **Effect on specific clinical skills:**

**Students:** Students reported high levels of agreement that 5 days of simulation improved specific clinical skills (Figure 16a). Those students who experienced the UQ introductory unit (data from the first 5 days only) reported significantly higher levels of agreement than students who experienced either of the other timing models.

**Supervisors:** Supervisors also reported high levels of agreement about the value of simulation to development of key clinical skills, although this was at a slightly lower level than for students (Figure 16b). There were no significant differences between timing models, although supervisors from the Monash unit tended to report a slightly lower level of agreement for all skills.

![Graph showing student levels of agreement](image)

**Figure 16:** Student and staff levels of agreement about the value of simulation in developing specific skills, comparing timing models

b) **Staff levels of agreement.**

![Graph showing staff levels of agreement](image)

---

c. **Usefulness of specific simulation strategies:**
**Students:** Students also reported high levels of agreement that the simulation strategies were useful to their learning (Figure 16a). Once again there were significant differences between timing models, with UQ model students tending to report the highest levels of agreement, with the exception of mistake-making, which was rated most highly by Monash model students.

**Supervisors:** Levels of agreement about the usefulness of simulation strategies followed a similar pattern for supervisors (Figure 16b), with staff from UQ units generally reporting the highest level of agreement about usefulness.

### a) Student levels of agreement.

![Graph showing student levels of agreement](image-url)

**Figure 17:** Student and staff agreement for the usefulness of specific simulation strategies

### b) Staff levels of agreement.

![Graph showing staff levels of agreement](image-url)

**5.2.2 Objective 2: Student self-reported confidence:**

Evaluate the opinion of students about whether a 5-day clinical simulation unit improved their clinical confidence in key clinical skill areas
Students were asked at the start and at the end of their 5 days of simulation to rate their self-perceived levels of confidence in 14 professional and clinical skill areas. Students selected from a 5-item Likert scale ranging from 1 ("not at all confident") to 5 ("very confident"). For students completing a "UQ model" unit of 3 simulation weeks, only the data from the first 5-day rotation was included for analysis. 1412 complete student datasets were available to analyse. Data was normally distributed, allowing parametric statistics to be applied.

5.2.2.1 Did simulation improve student self-reported confidence?

Paired t-tests showed that there was a significant increase in confidence across all clinical skill areas by the end of 5 days of simulation (p<.001 for all) (Figure 18). Confidence increased by 20%-27% for communication, assessment/analysis and treatment skills, although only 13% for self-reported confidence in identification and management of hazards (Figure 19).

![Figure 18: Change in student self-reported confidence between Day 1 and Day 5 of simulation](image)

![Figure 19: Percentage increase in student self-reported confidence from Day 1-Day 5](image)
5.2.2.2 Was there a difference between core areas in student confidence?
There were no significant differences in percentage change in confidence between core practice areas for assessment, treatment or hazards and limitations awareness clinical areas (Figure 20). However, students experiencing a mixed practice area approach reported a significantly lower increase in confidence in communication skills following their simulation unit. This result may have been driven by data from one University (n=94) where students participated in simulation later in their final year.

![Figure 20: Percentage change in confidence comparing core practice area units](image)

5.2.2.3 Was there a difference between timing models in student confidence?
There was a significant difference in confidence change between models, with students who underwent the UQ model (predominantly penultimate year students experiencing their first clinical placement) reporting the greatest improvement in confidence. Students undergoing the Sydney model (5-day block at the start of a core area-matched placement) reported the least improvement in confidence across all areas. The greatest difference between models in confidence change was seen in communications and in treatment skills (up to a 10% greater improvement in confidence for UQ model students compared with Sydney model students (Figure 21).
5.2.3 Objective 3: Supervisor opinion of student competence.

Evaluate the opinion of simulation supervisors about whether a 5-day clinical simulation unit improved students’ clinical competence in key clinical skill areas:

5.2.3.1 What were simulation supervisors’ opinion of student competence?
Simulation supervisors were asked at the end of the 5-day simulation unit whether they felt that the clinical competence shown by simulation-trained students was equivalent to their normal expectations of students at a similar stage of learning. Figure 22 shows that supervisors reported that simulation-trained students were generally slightly better than comparable students across all clinical areas.

Figure 22: Simulation supervisors’ opinion of the clinical competence of simulation-trained students
5.2.3.2 Was there a difference in supervisors’ opinion of student competence between timing models?

There was no significant difference in supervisors’ opinion of student competence between timing models as far as assessment/hypothesis/goals, treatment or hazard and limitations awareness was concerned (Figure 23). There however was a small but statistically significant difference for communication skills, where UQ model students were rated significantly lower than for Sydney or Monash model students.

![Figure 23: Supervisors' opinion of student competence, comparing timing models](image)

5.2.4 Objective 4: Clinical competence of students at the end of the simulation unit

Evaluate the clinical competence of simulation-trained students at the end of the 5-day simulation unit using the Assessment of Physiotherapy Practice (APP) tool.

Student competence was evaluated with the Assessment of Physiotherapy Practice tool in which competence in up to 20 professional and clinical skill areas is graded on a scale of 0 to 4. Post simulation competence was assessed by simulation supervisors on Day 5 of the simulation unit. For students completing a “UQ model” unit, the data from the first 5-day rotation only was included for analysis.

5.2.4.1 Mean overall APP competence

The mean overall APP competency grade after 5 days of simulation was 2.43 (SD 0.76) or 60.8% of the maximum possible. Professional skills were rated slightly higher at 2.57 (SD 0.84) or 64.3% of the maximum possible grade and Clinical skills slightly lower: mean 2.29 (SD 0.80) or 57.3% of the maximum possible grade (Figure 24).
5.2.4.2 Was there a difference between core areas in student competence at the end of the 5-day simulation unit?

As above, comparison has therefore been made between 4 practice areas (cardio-respiratory, neurological, musculoskeletal and mixed). There was a statistically significant difference in post-simulation unit APP grades between core practice areas, with the greatest difference between cardio and mixed practice areas for mean overall, professional and clinical skills grades (Figure 25).

5.2.4.3 Was there a difference between timing models in student competence at the end of the 5-day simulation unit?

Data for Bond University was excluded from the models analysis because the timing of their simulation units did not conform sufficiently to any of the compared models. UQ model APP data for the end of the
first 5 days of simulation was included in the analysis. When timing models were compared there was a statistically significant difference between timing models for APP grades marked at the end of 5 days of simulation. Both mean Professional and Clinical grades were significantly lower for students who experienced the UQ model.

![Graph showing mean APP grades, comparing timing models](image)

**Figure 26: Mean APP grades, comparing timing models**

5.2.5 Objective 5: Clinical competence of simulation-trained students compared with non simulation-trained students

Evaluate whether simulation-trained students demonstrated levels of clinical competence to that of students who had not undertaken simulation.

In order to evaluate whether simulation-trained students exhibited similar levels of clinical competence once on a traditional clinical fieldwork placement, comparable APP data from students who had not completed simulation was collected. APP data was collected for simulation-trained students at the end of their associated clinical fieldwork placement. For UQ model students, this was collected at the end of their first clinical placement following their simulation unit. End-placement APP data was then collected for the same number of non-simulation trained students at the same stage of training who completed an equivalent clinical placement (placement type and timing within the academic year). Data from 2 Universities could not be included in this analysis due to lack of comparative data: University of Queensland had no non-simulation trained students; CSU had no previous clinical placement data.

The APP grades of simulation students at the end of the traditional clinical placement linked to simulation (or for UQ model students, the first placement following simulation) were compared with those of equivalent students who had not completed simulation. A statistically significant group difference was found between simulation and non-simulation students for mean overall APP grade and Professional skills grade but not for Clinical skills grade (Figure 27). Simulation-trained students were graded higher than non simulation-trained students. However, given that the maximum difference in grade between groups was 0.2/4 (5%) this is a relatively inconsequential difference.
5.2.6 Objective 6: Were safety / emergency responses improved?

Evaluate whether students who have undergone a 5-day simulation unit demonstrate improvements in their response to safety / emergency clinical situations.

Although the data to answer this question has been collected, difficulties in exporting the large amount of data produced, has meant that management and analysis has had to be deferred. The result for this aspect of evaluation will be forwarded as an addendum in early to mid 2016.

5.2.7 Objective 7: Did students with English as an additional language benefit similarly?

This question was explored and data regarding English as an additional language was sought from each University. However in practice it was found very difficult to identify reliably this particular group of students. Although it was possible for many Universities to identify those students who had International status, this did not necessarily mean that English was an additional language. Equally, there are local students for whom English is not the language most frequently spoken at home or with friends. It was felt by the collaborators that asking for the subjective denoting of ESL status by staff at each University was equally unreliable. Ultimately therefore this objective has not been able to be answered by the data.
5.2.8 Objective 8: Did simulation–trained students demonstrate greater readiness to start clinical fieldwork placement?

When this objective was set, it was anticipated that clinical fieldwork supervisors would be best placed to compare the readiness to start of simulation-trained students compared to normal. However, in practice there were several practical difficulties with this. The primary problem was that, in contrast to the previous ARC-funded RCT, clinical fieldwork supervisors did not necessarily know which of the students they were supervising had completed simulation units and which had not. This therefore nullified meaningful comparison. Many clinical fieldwork supervisors noted on their questionnaire that they were unable to answer this question and so no data exists to analyse.

However, this remains an interesting question for future investigation. Anecdotally, a clinical supervisor associated with Curtin was involved in UQ model simulation unit supervision and then was incidentally able to observe those students when on clinical placement and compare them with students who had not experienced an introductory simulation unit. This supervisor commented that the simulation-trained students were clearly able to be left to work independently with their patients in the first week of their placement. In contrast, students who had not experienced simulation training (and who fulfilled the normal expectation of clinicians) remained relatively dependent on their clinical supervisor in that first week and could not be left to work independently until at least the second week of placement.

If a further study were to reinforce this anecdotal suggestion, it would provide additional support for both the educational benefits of simulation and also as a means to reduce clinician burden when supervising students in the first week to 10 days of their clinical fieldwork placement. This is likely to translate into economic benefits for clinical facilities.

5.2.9 Objective 9: Identify the number of student clinical placement days released as a result of using simulation.

Project PLOs were asked this question at the end of the simulation project, replying in emails to the Project Manager. Their answers have been grouped and summarized below according to timing model. There have been varying responses to this question. For some Universities, the introduction of simulation has definitely released a significant number of clinical placements and so increased clinical capacity. For other Universities, although potentially the simulation unit has increased clinical capacity, in practice this could not be sustained due to other factors. The timing model appears to have been a strong predictor of sustainability. Table 10 illustrates the clinical weeks saved by the HWA project in 2014 and the approximate actual ongoing clinical capacity created (2015 onwards).

5.2.9.1 UQ model

For most of the Universities who chose to replace an introductory clinical placement with the UQ model, there has been a clear increase in clinical capacity that will have long-term impact. For every student who completes a UQ model unit, between 90 and 110 hours of clinical training time per student is released (3 weeks of 30-35 hour weeks). The University of Queensland has been running a 3-week introductory clinical simulation unit for their entire cohort for a number of years, meaning that each year approximately 160 placements no longer need to be sourced. At the University of South Australia, 1800 hours of clinical capacity or 20 x 3-week placements per year has been created as a result of the HWA simulation project. At Curtin University, the HWA project immediately released 60 x 3-week placements, or more than 6,000 clinical hours. At ACU, almost the entire student cohort completed 3 weeks of simulation as a replacement for a clinical placement and so a total of 110 placements have
been released into the clinical communities of Brisbane and Sydney. For James Cook University however, the simulation unit could only be implemented as an additional rather than replacement clinical unit and so did not impact on clinical capacity at all.

**5.2.9.2 Sydney model**

The Sydney model, whereby one simulation week replaces the first week of a placement, also had an impact on clinical capacity in so much as it releases a week of clinician time back into the system. At Sydney University, the entire cohort of students now experiences a replacement week of simulation at the start of their core neurology and cardiorespiratory placements. This means that in 2014, 416 weeks of clinical placement have been released back into the system across one year, thereby having a significant impact on clinical capacity. Flinders similarly found that the saving of 73 weeks of clinical placement was sufficiently useful to be worth continuing in the academic programme. However, although the HWA project created a total of 115 weeks of clinical capacity for Charles Sturt and Central Queensland Universities, this will not be sustained. This will be discussed in more detail in Chapter 8 (Future Plans) but was largely due to resistance from clinicians to missing out on the first week of a placement with students. This demonstrates that an apparent increase in clinical capacity needs to translate into release of time that is perceived by the clinician end-users to be useful.

**5.2.9.3 Monash model**

The Monash model also released 1/5 of a clinical placement, amounting to a total of 626 weeks of increased clinical capacity during the HWA project. However, many Universities found that the intermittent nature of the released time in this model meant that the clinical capacity created was largely a matter of reducing clinical burden rather than translating into additional capacity for other placements. For several other Universities however, the Monash model was specifically applied to enable uptake of clinical placements that would otherwise have been inadequate. For example, at Curtin University, private practices that could only sustain a 4-day per week placement were made viable by the addition of simulation days. At The University of Notre Dame Australia, addition of simulation days targeted to key neurology patient scenarios enabled otherwise generic aged care placements to be converted to core neurology placements, thus significantly increasing clinical capacity. Notre Dame University was also able to utilise placements in which the lack of a full time staff member would otherwise have limited the viability of the placement.

<table>
<thead>
<tr>
<th>Timing Model</th>
<th>Clinical weeks released during HWA project</th>
<th>Approximate ongoing clinical capacity created</th>
</tr>
</thead>
<tbody>
<tr>
<td>UQ Model</td>
<td>1130 weeks (390 individual placements)</td>
<td>1100 weeks (380 individual placements)</td>
</tr>
<tr>
<td>Sydney Model</td>
<td>604 weeks</td>
<td>490 weeks</td>
</tr>
<tr>
<td>Monash Model</td>
<td>626 weeks</td>
<td>270 weeks</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2360 weeks</td>
<td>1860 weeks</td>
</tr>
</tbody>
</table>

**5.2.10 Objective 10: Investigate the difference in cost between 5 days of clinical placement and 5 days of equivalent simulation training.**

This issue proved to be very difficult to address. In discussions with representatives from many Universities around the country it was apparent that it is extremely difficult to cost clinical training in any standardized manner. There are many hidden costs associated with clinical training and many
different models for addressing those costs. Some Universities make direct payments for student placements and while these payments reflect the cost to the University they do not necessarily reflect the actual cost of providing that service by the clinical facility. Some placements are provided at no cost to the University but again this does not reflect the actual cost for the clinical facility. Some Universities have standardized contracts that cover almost all of their placements while others have different contractual arrangements with different providers. In some cases some component of supervision is provided directly by University appointed staff. In addition almost none of the costing models incorporate the value of the service provided by the students and/or any supervisory staff employed by the Universities. It was apparent that identifying the real costs of clinical education is a major project in its own right and beyond the scope of the current project.

5.2.10.1 Modelling the real costs of simulation
The project management group therefore refocused this aspect of the current project to identify variations in the real costs of simulation training using role play actors in different States. Even this objective was subject to a number of significant limitations. Firstly, the cost of access to simulation environments is highly variable. Multidisciplinary simulation facilities are very varied in their fee structures. In some cases Universities are required to pay a flat daily fee for access to a facility whereas in other cases the fees vary based on the number of students involved in simulation or the length of time for which the facility is required. Some Universities have their own simulation facilities and may not make a direct charge for access. In addition, in the current project, many Universities were able to use adapted University spaces that were reconfigured to provide a ward-like or clinic-like simulated learning environment at no additional cost beyond the cost of key equipment. Equipment costs are an additional variable although in this case many major items of equipment were funded through the Project funding so equipment was not an ongoing cost.

In view of these various limitations it was decided to develop a relatively basic model based on actor costs, supervisory staff costs and consumable costs to determine variations in the costs of delivering standardized simulation units between different States and in some cases between regional and metropolitan areas within States. The aim was to provide an understanding of costs, an indication of the likely variation in costs across the country and some basic data that managers could use to evaluate the costs of simulation units in comparison to the costs of traditional clinical education where those costs are identifiable by an individual University. All costs quoted include GST.

5.2.10.2 Model 1
Three basic models were developed. The first was a model in which groups of four students were included in the simulation unit with 1 supervisor and with each student managing 8 simulated patient cases over the course of a week, culminating in each student working one to one with a simulated patient on the last day of the placement. This model reflected the parameters used in the current project. The data, shown in Figure 28, indicate that there was a two-fold variation in the cost of providing a five day simulation unit using this costing model from a low of $4,982 in regional Queensland to a high of $10,463 in metropolitan Sydney. The average cost was $7,946 for 5 days reflecting a cost per student of $1,986.

5.2.10.3 Model 2
The second model was based on groups of 6 students with 1 supervisor working with 8 simulated patients over the course of a five-day unit. Changing the supervisory ratio results in a small reduction in overall cost with a low of $4,820 in regional Queensland and a high of $10,070 in metropolitan Sydney and a national average cost of $7,695. Nevertheless this reflects a substantial reduction in per student cost to $1,282.
5.2.10.4 Model 3
A third model was developed with a reduced number of simulated patient cases (6), students interacting with simulated patients on a 1:2 basis on day 5 and a student/supervisor ratio of 1:6. This model was considerably less expensive ranging from a low of $3,714 in regional Queensland to a high of $7,397 in metropolitan Sydney. The national average cost was $5,985. This represents an average cost per student of $997 for one week of simulation training.

![Chart](image)

**Figure 28: Recurrent costs comparing three different models of simulation training, including supervisor salary, actor fees and consumable costs**

It is clear that there are considerable variations in actor costs around the country ranging from a low of $32.50 per hour to a high of $78.60 per hour with an average cost of $50.27. In some cases there may also be additional agent fees to pay. Actor costs and space rental costs are the main additional costs associated with delivering a simulated learning programme. If these costs can be effectively managed and the number of cases that students work with is carefully managed then the cost of delivery becomes more realist.
Chapter 6: Qualitative Evaluation Results

6.1 Key Aims
The project aimed to evaluate the capacity of integrated role-play simulation to improve the efficiency and effectiveness of clinical training, as well as its ability to expand clinical training opportunities by increasing traditional placement capacity.

A detailed qualitative study was carried out using focus group methodology to gather opinions from several key groups. The focus groups were tailored to each participant group but similar issues were addressed with all participants: students, supervisory and clinical staff, actors, and administrative staff. Due to the challenges of organizing and running focus groups from 5 states via Skype and teleconference technology, the size of each focus group was determined by practical convenience. In some cases (for example, administrators) individual phone interview was used, although the same series of questions provided the structure for the discussion.

6.2 Results:

6.2.1 What are the perceived benefits of simulation training?

6.2.1.1 Students
31 focus groups were conducted involving 109 students, with varying numbers of students per focus group. Students were universally positive about their simulation experience. Irrespective to the timing model used or the area of practice, students reported that they found simulation to be an effective, engaging and highly relevant learning experience.

There were consistent themes that were common to the student focus group discussions. These included the specific advantages students identified in the simulation environment that made the experience a unique and valuable learning tool. Students recognised that the environment was tailored to facilitate their learning, and as such they had access to resources, personnel, and techniques that enabled the gradual progression of their competencies, in an environment that was perceived as less pressured and more conducive to learning.

Supportive learning environment
For approximately half of the students who participated in a focus group the simulation unit was their first clinical placement. The majority of student focus group participants reported an initial anxiety approaching their simulation placement. In the main this was a general anxiety around placement ‘performance’, however it was also about a lack of knowledge of simulation as such, and the expectations of them in that environment:

“We were...going into the unknown, we didn’t really actually know what we were actually meant to be doing” (S4).

Most students reported that very quickly after they commenced their simulation placement, their anxieties decreased. Their perceptions changed and they began to recognise that simulation was a very different learning experience. There was a perception that simulation was a safe environment and a recognition that the learning environment facilitates exploration, and that ‘mistakes’ can be
part of that learning, without being seen as indicative of poor performance. There was also a recognition that the simulated patients were part of the resources available for them to learn, and that they could not be inadvertently harmed by them.

The simulation supervisor’s approach allowed students to become more relaxed in simulation over the first few days. The approach reinforced that simulation was a learning environment where students were not expected to know everything, that tasks and time frames could be manipulated to facilitate their learning, and that the emphasis of the placement was on gradual improvement in knowledge and skills as opposed to pass/fail assessment.

“...we got thrown in straight away, but we didn’t have the pressure of being marked or judged straight away...I felt it got me over my fear about having the whole placement”. (S1)

The unifying theme of their perceptions was that the initial learning tasks in simulation, although daunting (i.e. first contact with a simulated patient), were manageable and engaging. This was because the learning task could be broken down as required (e.g. concentrate on ‘subjective assessments’), the supervisor set the scene by explaining the task and they could seek help immediately if required.

“You flounder a bit...but it’s a safe environment, so you learn by having to do that...but it still shakes you up a bit”. (S15)

Students acknowledged that while they knew the simulation environment was not real, for the majority of students it felt real, at least initially. As one student commented;

“It was real if you wanted it to be real”. (S19)

Positive engagement with simulated patients
Every student focus group referred to the value of direct engagement with simulated patients. Students in approximately two thirds of the focus groups (mainly undergraduate) reported that they found it initially daunting to be faced with a real person. Students were able to engage with the simulated patient in a gradual way, learning a lot from the engagement itself. They also had the opportunity to receive feedback from the simulated patient and without exception all students commented favourably on that opportunity.

“With patients you were forced to adapt and adjust, which was very different to practicing on each other”. (S4)

“...I got feedback from real patients...even though they were actors...they’re still people, and they are able to give you their true ideas of what you are like as a person interacting with them, not just a physio...”. (S1)

The skill of the simulated patients was consistently identified by students as the major contributor to making the simulation feel ‘real’. For the majority of students, this direct interaction with patients, of differing ages, differing ‘conditions’, and presenting with different personal characteristics, was a very new experience. The expectation that they engage with patients from day one was also challenging.

Students in over three quarters of the focus groups commented on the immediate relevancy of having hands-on experience with a range of conditions. This was particularly so in cardiorespiratory, where students gained experience in managing a complex environment (e.g. tubes and equipment attached to the SP), however students consistently noted the value of the broad exposure to patients and conditions simulation enabled.
The majority of universities organised their simulation unit so that experience with ‘subjective assessments’ was the starting point for students. Almost 100% of the undergraduate students report that talking to patients was the most difficult, and ultimately the most useful skill they developed during simulation. The students noted that their first contacts with simulated patients highlighted the implications and limitations of ineffective patient communication. Nearly all the students had only practised on each other, and as such their communication reflected a shared understanding.

Students spoke about gradually getting better at communicating with patients, learning to shift their engagement from questioning, to having a conversation. Additionally, the opportunity to obtain feedback from simulated patients was identified by all students as an enormously valuable tool unique to simulation. Students noted that as their communication improved, they could enhance the engagement in gaining information, clarification, or starting to build a clinical picture. Moreover these same students made reference to their changing perception of ‘patient’ to ‘person’ i.e. gaining an increased awareness of the individual as a person, who can experience pain, or fear, or displeasure! Patients could be unpredictable, “I didn’t know patients would be rude like some of the actors, but my supervisor said it definitely happens in the real world”. (S5)

**Learning facilitation techniques**

Every focus group was able to identify specific techniques they found unique and useful in the early part of their simulation placement. With regard to the advantages of simulation and their learning experiences in simulation, there were recurring themes that were raised in focus groups:

- The opportunity to access feedback from multiple sources (different simulated patients, different supervisors, peer learning). Students from every university commented on how positive and encouraging the educator feedback had been.

“...we had an amazing couple of tutors, they were specialists....and you could ask them for any clarification”. (S1)

- The opportunity to practice and to be able to repeat tasks multiple times following feedback.

- The opportunity to immediately seek assistance i.e. calling a ‘time-out’.

“...being able to pause and ask questions...it was especially helpful for developing your subjective skills, and also the likes of manual handling...”. (S2)

- The opportunity to engage with different patients, in different scenarios and environments.

- The manipulation of scenario complexity (up or down) to facilitate the pace of learning (e.g. ‘fast forward’ a scenario).

- The gradual acceleration in learning opportunities (e.g. moving from a small group of students to a pair of students and then starting to see patients alone).

**Growth in competency**

In every student focus group, students reported that as they settled into the simulation placement, utilising the learning opportunities simulation could provide (e.g. feedback, practice, reflection etc.), they improved in their competencies, particularly their ability to interact with patients.

Students noted that as their engagements with patients became more efficient and focused, they were able to turn their attention to more technical skills. In over half of the focus groups, students mentioned a dawning ability to be able to approach their practice with less apprehension and more considered planning. The majority of students mentioned some aspect of starting to piece together the different parts of effective assessment and treatment;

“I’d never really put everything together, and being able to do so multiple times was a really good confidence boost....helped me with my planning of sessions, and getting the flow”. (S1)
In the focus groups there were multiple references to aspects of ‘putting it all together’, and ‘learning changes’ over time. Several students recognised this as an emerging development of their ability to undertake clinical reasoning. Associated with this (or perhaps driven by it), in just about every focus groups students made a reference to the growth in their confidence, and the impact of this on their competence.

“The more confident you are, the better your treatment techniques are...if you feel confident, and your hands are firm, and your patient feels relaxed and confident, I think your treatment will have a better outcome...and I think the simulation definitely helps with that confidence, as well as the competency...” (S2)

Students indicated that their competencies and confidence continued to build during the simulation placement. This included a growing awareness of professional role and behaviours (time management, self-directed learning, communication skills), as well as improving knowledge and increased technical competency.

The preparation and readiness for placement meant that in the latter part of their simulation unit students were seeking a different experience in simulation. The emphasis became more on maximising opportunities to practice and develop technical skills. As students started to utilise applied practice with more focus, they were able to identify changes to the simulation environment that reflected and facilitated the acceleration of their learning:

- Smaller student groups and ideally opportunities to see patients alone.
- Increased opportunities for peer learning within the student group.
- Obtaining specific simulated patient feedback.
- Obtaining targeted, individual supervisor feedback.
- Manipulating the complexity of the scenario e.g. use of ‘fast-forward’ to decrease time frames.

The majority of students felt that the simulation placement was an excellent preparation for subsequent fieldwork placements. For some students this related to the specific clinical competencies they had acquired (e.g. treatment of a neurological patient), for others, often undergraduate students, it referred more to generic skills they felt they took from simulation into their placement (e.g. communication skills).

It was clear from the themes that emerged during focus group discussions that all students perceived simulation as a beneficial learning experience and that they could identify specific ways in which the simulation experience contributed to their learning.

6.2.1.2 Simulation Supervisors

48 simulation supervisors were involved in feedback. Simulation supervisors had a clear perception of why simulation offered a unique contribution to their clinical education programme and how they could shape that learning experience to develop the personal and professional competences of students. Irrespective of the model used or the area of practice there was agreement amongst simulation supervisors that simulation, as a learning tool, was enormously valuable. They were very clear on their objectives in running simulation and what it could offer students as a learning experience that was different to a standard fieldwork placement i.e. the advantages of simulation. Supervisors were able to identify the learning context they sought to create in simulation and there
was agreement amongst supervisors on the broad principles of this context (e.g. student focused environment). Moreover they were able to discuss the techniques they utilised to promote student learning and identify these as unique advantages provided by the simulation environment.

**Supportive learning environment**

There was agreement from the vast majority of supervisors that simulation was an extremely useful educational tool that offered unique opportunities and advantages for student learning. One supervisor commented, 

“...simulation is expensive, and you need to be clear on what you’re trying to do with it”. (A1)

The application of simulation that all simulation supervisors identified as particularly valuable, and one they all sought to foster, was the opportunity for students to ‘explore-practice-consolidate’. In that sense supervisors were in agreement that a simulation placement was about student ‘learning’, not ‘passing’.

The majority (80%) of supervisors viewed the simulation programmes as primarily facilitating student’s decision-making abilities. They also recognised that simulation facilitated the instatement of rudimentary and preparatory core skills (e.g. communication, professional behaviour, spoken and written skills, basic treatment options) and the attainment of technical skills (e.g. manual handling). The emphasis in simulation was therefore on challenging the students, promoting their ability to learn, whilst ensuring a learning environment that supported and facilitated their exploration.

Simulation supervisors recognised that some students did not initially think that simulation could contribute to their learning as much as a placement with ‘real’ patients. The supervisors noted that student’s perceptions changed once in simulation, and that the value of the simulation experience was that the student, when confronted by the actual condition on placement, could manage it, based on the exposure and gradual training experienced in simulation. In that sense, regardless of the student’s year of training (GEM, 2nd/3rd year undergraduate) simulation model or area of practice, simulation supervisors regarded simulation as a useful transition to future fieldwork placements. Within this context, supervisors clearly identified that learning in the simulation environment could be manipulated to tailor the experience for the needs of different student groups.

A few simulation supervisors made reference to the concept that students recognised simulation as a safe environment where patients could not be harmed (SCE14). Most supervisors made reference to simulation as an effective tool for getting students to push their boundaries (e.g. ‘risky’ procedures), which supervisors identified as enhancing the student’s learning and encouraging their creativity. Within the simulation environment students have the luxury of being suboptimal and the opportunity to learn from their mistakes. Supervisors regard those opportunities as pivotal to learning that creates a richer and more honest experience for the students (SCE7). Simulation supervisors agreed that structured supervisor feedback was pivotal in this process, and that in addition peer feedback and simulated patient feedback were very powerful tools to improve student insight and encourage student learning.

**Positive engagement with simulated patients**

All the supervisors who took part in the focus groups praised the skill and value of the actors in their simulation placements. Starting the students on tasks such as subjective assessments enabled them to directly engage with a ‘patient’. Over time supervisors noted how quickly students improve in confidence, and develop their ‘professional patter’. Confidence in a sense is an individual thing,
however supervisors noted that simulated patient feedback can assist both the under-confident and the over-confident.

Simulation supervisors noticed that over time the simulated patients got the feel of what they (supervisors) were trying to accomplish with students and were excellent at offering specific feedback on verbal and non-verbal aspects of the student’s treatment. In particular, they were able to highlight to students the need to use appropriate and precise language.

“I could tell you were doubting yourself on that part…”
“You were talking like a dead fish…I didn’t feel encouraged at all”.
“You were trying to encourage me to do that but you were nowhere near me”
“I felt confident when you were doing that”. (SCE1)

In the simulation environment the students quickly understood that such feedback is objectified, and not an attack on them as a person. Supervisors could clearly identify the value and importance of this feedback for student learning.

**Learning facilitation techniques**

Simulation supervisors discussed creating a learning environment that was consistent with their rationale for simulation. Amidst differences in how programmes were run across universities, supervisors were in agreement that simulation provided a unique learning opportunity in a safe environment, that could be controlled to make it student focused. Simulation supervisors from every university commented that they had seen students respond exceptionally well to the techniques available in simulation. To that end they saw their role as providing both support and challenge, and simulation allowed them to do both,

“The trick is to find the balance between learning & teaching..”(SCE9).

Simulation supervisors recognised that the majority of students had had very limited clinical exposure, especially students in their early years of training. In that context they were careful to initially introduce learning tasks that were manageable to students grappling with the new environment.

“We haven’t tried to break them with over-complex scenarios, rather we’ve sought to challenge them. If they sink a bit, we let them, knowing it’s not going to harm anyone.” (SCE2)

Simulation supervisors were able to identify the advantages simulation offers in setting the initial learning environment, supporting the students, and shaping the student’s development of fundamental skills.

“We’ve wanted them to focus on the fundamentals rather than drown in the complexities, especially since this was their first rotation. They will get the complexities in the real world” (SCE2).

Supervisors were very clear on the feedback opportunities that could be used in simulation and how important it was to carefully apply those opportunities to maximum effect. There were however differing viewpoints on when and how to offer feedback. All the supervisors agreed that ideally feedback embeds specific content into the patient engagement. Many simulation supervisors recognised that it can be difficult to keep interrupting the student (‘time outs’), as this can embarrass the student or impede the flow of a session the student is driving. Simulation supervisors who also work as fieldwork supervisors commented they learned not to immediately stop a student to correct an observed assessment or treatment error (SCE9). Other regarded the ability to immediately ‘pause and discuss’ as most effective when working with students as a group. In this context the students
can compare their techniques in areas such as questioning or assessment. Supervisors felt that this feedback, utilising the group dynamic, can be very powerful (SCE5).

Simulation supervisors in every focus group acknowledged that with groups it is very difficult to provide individual feedback, especially in terms of providing individual learning objectives. Moreover, supervisors commented that when giving group feedback, content can often ‘wash over’ some students. Additionally, some students, particularly those in the early years of their training, find it difficult to identify their own learning gaps, although as several supervisors commented, within simulation this is an opportunity to encourage students to identify the areas they most need to work on.

Supervisors also noted that student’s feedback requirements and preferences change during the simulation placement. As students’ progress, and perhaps break into smaller groups, the challenge, as one educator put it, is to create, “...balance between teaching in a large group, and supervising in a smaller group” (SCE9).

Simulation supervisors also noted that students wanted more specific input on technical aspects of practice, including more demonstrations to observe and practice. Several supervisors commented that in simulation, time is a luxury, as they don’t have to rush students’ learning. They recognised that simulation techniques such as replay and rewind provides a lot of practice opportunities for the students, from simple tasks such as taking a history, to more complex technical tasks they would probably not normally have an opportunity to try. Moreover this practice is within the context of clinical reasoning, and exposing students to a broad variety of patients and conditions in a very short period of time. Supervisors also commented on the value in simulation of being able to tailor the complexity of the patient, and the information in the scenario, to the students’ learning needs.

At least half the supervisors remarked that irrespective of the model or area of practice, students’ engagement with simulation flags as the placement progresses. The ability to respond to this circumstance by manipulating the complexity in the simulation environment, or adding variables such as fast forward and accelerated timeframes was identified by supervisors as a valuable tool.

In some models (i.e. Monash), there is the potential of being able to match the student’s specific learning requirements with the needs identified on placement (e.g area of practice). In that case the supervisor can hand pick a scenario and specifically brief a simulated patient to provide the student with the opportunities and repeated practice needed to address particular limitations.

**Growth in competency**

Amidst the many variations between university programmes, all supervisors offered positive comment on the value of simulation with reference to student growth and development. Within the variation between student groups (i.e. masters/undergraduate etc), supervisors agreed that stimulation assisted students to demonstrate development of skills well suited to subsequent fieldwork placement:

- Students worked hard in simulation, and needed to be very organised.
- Students demonstrated improvement in clinical reasoning.
- Students gained an understanding of their strengths and weaknesses (insight).
- Students demonstrated gains in their communication skills.
- Students improved in flexibility and adaptability as they learned to treat patients as they presented on the day.
6.2.1.3 Simulated Patients (Actors)

22 actors were involved in feedback. All of the actors who participated were in agreement that simulation was an enormously valuable learning tool for the students. The value of simulation, as the actors perceived it, was in the student’s response to the feedback actors could offer. Based on their observations (and the student reports), this feedback was very useful in shaping both the personal and professional competencies of students.

Supportive learning environment

The actors identified the student’s gradual progress in communication skills as a major contribution to accompanying improvements in the more technical skills (e.g. manual handling). They witnessed first-hand students improving their skills in a very short period of time, progressing from nervous novices to emerging professionals. As one actor remarked;

“Some students have a beautiful way about them, and make you feel you are in kind, capable hands”. (SP2)

Actors were able to detail specifically the techniques they utilised to provide the student with a realistic, relevant and robust engagement. Many of the students participating in the simulation placement had only ever practiced their skills on each other. Actors recognised that and understood that the students were nervous in their first days on placement. Many of the students had not previously been required to touch strangers, and in particular men and women who were considerably older than them. Moreover, the students were suddenly dealing with a very realistic portrayal of a patient who is hurting, or unwell, or may be depressed and vulnerable. One actor commented;

“When you are close to someone who is feeling fearful, it’s very easy for that fear to transfer to you” (SP3).

The actors felt that often a student’s initial struggles reflected a lack of confidence generally. Many actors felt that managing this initial unease was the student’s first ‘lesson’ in simulation i.e. in dealing with the emotions of patients, students had to also deal with their own, and be able to function in a new environment. They saw it as part of their role to encourage students through this initial uncertainty and to assist them in recognising that they were in an environment where the focus was on assisting their development.

Positive engagement with simulated patients

The actors identified that an important advantage of simulation, was that students experienced the immediate consequences of their actions e.g. imprecise instructions, or incorrect technique, leading to a patient falling. Moreover, actors could vary their ‘presentation’ to increase the complexity (and the learning opportunity), the students are exposed to. All actors agreed that they were quite capable of changing the atmosphere instantly, and did so if the learning task required it. The feedback that actors were able to provide, both in and out of character, was identified by actors as a pivotal learning tool available in simulation. This feedback provided the students with immediate, highly relevant information;

“...it’s not an upper limb, it’s an arm!” (SP1).

Actors commented that they felt it was important, and added learning value to the student, to provide feedback to students on varying personal aspects of their engagement; how students presented, how they were dressed, cleanliness, interest shown etc.
Observing the students gradually improving their ‘communication’ skills was identified by all the actors as underpinning gains in all of their professional and personal competencies. One actor expressed it as allowing ‘relationships’ to develop in a ‘cerebral’ learning environment. (SP6) The actors noted that it was apparent in the student’s initial communication efforts that they were not aware of, and did not know how, to appropriately engage with a patient. The feedback actors were able to give students was a powerful teaching tool, as evidenced in the gains actors observed in students. The feedback related to both the student’s physical skills (manual handling), and their verbal engagement with the patient:

“You didn’t feel strong enough, and I didn’t feel safe” (SP3)
“Talk to me like I am your grandmother...have a conversation with me, do not give me instructions” (SP2)

The students learn to develop a professional ‘patter’ that is polite, reassuring and clear. This skill underpins the entire engagement with a patient, and is a skill they can take into future placements and clinical practice.

**Learning facilitation techniques**

The actors saw particular value in the fact that students could immediately apply the learning in repeating the task. This repetition was identified as another important advantage of simulation:

“I am the sort of person who only learns to do something when I do it. I think this may be true for a lot of people”. (SP3)

A number of actors felt that at times there were too many interruptions to sessions (time outs), which could alter the flow of the session.

**Growth in competency**

Actors were able to recognise the very rapid growth in student’s performance during simulation and they derived a great deal of satisfaction from being able to support and encourage this process. They clearly saw the value of a strong partnership between the simulation supervisor and the simulated patient to support this process.

### 6.2.2 Is simulation training seen as an alternative or an additional learning opportunity?

#### 6.2.2.1 Students

Students considered that simulation training was a unique and valuable learning tool. They recognised that the learning environment was designed to facilitate their learning and to support their progression. They also recognised that they had access to resources, personnel, and techniques that enabled the gradual progression of their competencies, in an environment that was perceived as less pressured and more conducive to learning.

The majority of students felt that a simulation placement was an excellent preparation for fieldwork placements to follow. In that sense they considered simulation an additional learning opportunity not a direct alternative to a traditional placement. It was particularly the case that many final year students reported that they were ready for ‘real’ patients. They felt they were already confident with ‘subjective assessments’ and were anxious to experience as much treatment with ‘real’ patients as they could. Students were able to identify a number of ways in which the simulation scenarios could be improved to create a ‘busier’ more realistic simulation environment: for example, more interruptions, less time with patients, greater complexity. They identified the opportunity to
accelerate the complexity of simulation as the placement progresses. They also saw the opportunity to create a multi-disciplinary experience or a ‘team’ experience (e.g. hand-over) as a way to make the experience more like a traditional placement.

### 6.2.2.2 Simulation Supervisors

There was general agreement amongst simulation supervisors that simulation, as a learning environment, was ideal in providing a ‘bridge’, or transition, that facilitated student’s learning towards clinical competency. Simulation supervisors from each of the three simulation models (Monash, UQ, Sydney) commented that simulation functions very well as an introduction to the clinical environment, and more specifically, as a pre-placement activity. CEs felt that simulation could facilitate students gaining the fundamentals and the nuances and complexities could then be experienced on fieldwork placement. To that end, whilst they considered simulation to be a very valuable part of the clinical programme they did not consider it to be a replacement for fieldwork placements.

### 6.2.2.3 Clinical Administrators

15 clinical administrators participated in feedback. The overwhelming majority regarded simulation as an excellent ‘introduction’ to clinical placement to students, and in that sense offered a learning environment which is simply not available on placement. They felt that simulation could offer a scaffolding of learning in support of a fieldwork placement. The majority felt that simulation provided a training alternative when placement sites in a given area of practice were not available. This meant that entire cohorts could continue their clinical education. It also meant that placements that were available could be used more creatively in unison with simulation. With reference to accreditation requirements, administrators noted that simulation can assure student exposure to the requisite areas of practice.

### 6.2.3 Is simulation training more beneficial for certain students than for others (stage of training, those whose first language is not English)?

All groups generally found it difficult to identify particular groups that benefitted from simulation training.

#### 6.2.3.1 Students

The overall perception of students was that simulation was an enormously valuable. This was the case for all students groups however there were broad distinctions between undergraduate and graduate entry students. As might be expected graduate entry students have had differing life experiences to undergraduate students and they had a different emphasis on how they wanted to utilise simulation. From previous work experience, graduate entry students have had the opportunity to develop a professional identity. This is not to say their physiotherapy identity is in place, however they generally reported that they are confident in engaging patients, with less than half the focus group participants nominating ‘communication development’ as a major outcome of simulation. They recognise that their placement time is short (compared to undergraduates) and to that end they are interested in accessing as many practice opportunities as possible, and developing their technical skills. Whilst simulation is seen as extremely valuable by the majority of graduate entry students, their preference is to utilise simulation as a targeted transition. One student referred to simulation as an ‘apprenticeship’, with the emphasis on opportunities to practice. Graduate entry
students are keen to not just gain knowledge, but also to identify and address gaps in their knowledge. They are also more aware of the broader clinical environment and the need to build on their professional skills such as developing routines, time management and establishing structure. It was apparent that some final year students who were reaching the end of their course felt they gained limited benefit from simulation. Most of the content in this report, with regard to student experiences and opportunities to improve as they identified them, came from students in these years. Many reported that they were ready for ‘real’ patients and were anxious to experience as much treatment with ‘real’ patients as they could. This would suggest that simulation has reduced value for students who are nearing the completion of their course.

Many of the students participating in the programme were international students or students for whom English was an additional language. Many of these students reported having gained particular benefits from the non-threatening simulation learning environment and opportunity to gain feedback on their communication skills and communication styles from actors, supervisors and their peers,

“I didn’t think that simulation would be a waste of time, but I found that I was able to practice my speaking and get feedback from the actor. I feel a lot more confident now” (S17).

6.2.3.2 Simulation Supervisors
Several supervisors commented that simulation identifies the students that do not have a solid theoretical grounding, or those that are rote learners. To that extent the simulation supervisors felt it was important that students immediately experience ‘practice within context’, and to utilise that opportunity in simulation. They noted that even at this early stage, this process encourages the development of rudimentary clinical reasoning, as well as a patient awareness, and the need to make use of the scenario information.

Supervisors felt that simulation seems well suited for the mature learner e.g. students for example need to be able to make effective use of their ‘down time’ (SCE12). Several supervisors reported that whilst masters students could be a bit more resistant to simulation, as they had already experienced work and developed skills, they were also very motivated high achievers and more attuned to patient status and circumstance. In that sense their base level of skills was higher.

6.2.3.3 Clinical Administrators
Some universities indicated that they had trialed simulation placements as a ‘remediation activity’ for students who had failed placements. They had experienced success with that process and so were likely to continue with that option.

6.2.4 What are the perceived problems with simulation training?

There was generally very high satisfaction with simulation training but most groups could identify some areas for improvement. Based on the feedback from focus groups it was difficult to differentiate between improvements for general aspects of simulation and improvements in actor and supervisor activities so responses for both of these topics have been combined.
6.2.4.1 Students

Placement Model
A number of students commented on the Monash Model. A pivotal aspect of the Monash model was the continuity between the simulation and placement ‘area of practice’. If the two were in the same area of practice, there was a potential for increased exposure, and ongoing learning, and students identified how valuable this was. Ideally the feedback from the simulation supervisor could be contrasted to that of the clinical fieldwork educator. The main disadvantage of the Monash model cited by students was the disruption in patient continuity on placement, so that they missed out on placement experiences such as ‘hand-over’. This disruption was compounded when simulation days were not consecutive. Some students felt that the reduced time on placement disadvantaged them in having less time to demonstrate skills to the clinical fieldwork educator. Other students felt the model worked well for them, complimenting their placement that was in the same area of practice.

With both the UQ and the Sydney models, students were in the main very positive. The ability to see the same patient over an extended period of time was identified as an advantage of the UQ model. Sydney model students felt that a week in simulation was a good period of time, especially as the week was quite intense. Some students felt that the UQ model was very tiring, which impacted on their ability to prepare for the next day as they were exhausted each evening.

Preparation for placement
Students expressed a desire for more information prior to the simulation placement. This was primarily information about the operational aspects of the placement. Some of the questions expressed included:

- Will I be assessed?
- What do I do when others are treating?
- What are the expectations of performance?
- Do we ask questions?
- What do we do in non-treating times?

Students also felt they would benefit from having more information about how to handle stress in the simulation placement.

Demonstration and Feedback
Students expressed the desire to have more feedback from simulation supervisors, particularly opportunities for individual feedback. They sought opportunities for individual feedback related to learning goals. A common suggestion was to have a mid-week one on one feedback, “To get specific feedback on exactly what we need to work on, and be able to get ongoing feedback over the subsequent days/weeks” (S).

Students also felt there was a need to strive for consistency across simulation supervisors in their approach to feedback and there were a number of requests to ensure that actors give feedback out of character. There was also a suggestion to hold off on supervisor ‘time out’ unless a student is ‘really crashing’. They prefer to sometimes finish the treatment and get feedback after.

Students also wanted more opportunities to observe the simulation supervisor treating patients. They were interested in seeing and discussing aspects such as treatment options, optimal treatment, or evidence based treatment. Students could see value in having more demonstration from the
supervisor to benefit from their experience, with this demonstration from supervisors potentially positioned during a ‘time out’.

**Timing of simulation**
There were a number of suggestions that it would be useful to access simulation earlier in the course. One suggestion was to record final year simulation sessions and use them for earlier year education instead of lectures. There was also a request to ensure simulation is not straight after exams, or back to back with exams and placement. One group suggested that even with Monash model it would be useful to have one full week of simulation prior to placement. In essence merging the Sydney and Monash models.

**Time pressures**
Students in all models made reference to time pressures whilst on simulation. They would have benefitted from more time to prepare for the next day. Students enjoyed the opportunities in simulation to reflect, research etc. but felt these periods need to have some direction and structure to get maximum value. Students felt they would like to have non-treating time more structured. In particular, some 2nd year students commented that they found self-directed learning difficult to maintain over time.

Conversely, a number of students (particularly final year and masters students) wanted a ‘busier’ more realistic simulation. They wanted to create an environment with more interruptions, less time with patients, greater complexity. They felt it was important to accelerate the complexity of simulation as the placement progresses and shorten time frames with patients to replicate demands of private practice. A number of students also commented that within a given session it would be useful to have an actor demonstrate different ‘stages’ of the condition e.g. 3 weeks later. Students also felt it would be valuable to create more multi-disciplinary experiences and more ‘team’ experiences e.g. hand-over.

**Simulated Patients**
All students made positive reference to the simulated patients but they had a number of suggestions for improvements,

- Ensure actors are all fully briefed on their condition.
- Ensure actors don’t improvise too much and depart from the ‘script’.
- Ensure actor’s feedback is clinically targeted and specific.

Some groups suggested additional training for simulated patients e.g. specific training in ‘feedback’ techniques.

**Documentation**
More than half the students interviewed made reference to documentation. They requested more pre-simulation instruction about documentation. They wanted more time to practice and demonstration from the supervisor on ‘best practice documentation’. They also requested less ‘non-clinic’ documentation that is time consuming and repetitive e.g. reflective journals, case studies, reflective essay, assessment tasks.

**6.2.4.2 Simulation Supervisors**
Simulation supervisors were able to identify opportunities to improve the provision of effective and efficient physiotherapy simulation training and they were also able to identify barriers and potential solutions to those issues.
Preparation for placement
Supervisors also identified the need for simulation pre-briefing with a particular emphasis on encouraging students to ‘buy into’ the experience and fully explaining the placement expectations. Supervisors felt that it was important to acknowledge that simulation is not real but it can result in excellent and specific learning outcomes.

Placement organisation
The majority of supervisors identified ways in which placement organisation could be improved. They emphasised the importance of ensuring enough time for ‘set-up’, “when it works, it works well’ (SCE). Supervisors also emphasised that the facility needs to be organised so that set-up is not operationally onerous or time consuming. It is also important to ensure access to enough (well trained) different SPs i.e 4 or 5 a day and to have a stable base of available SPs. A few supervisors indicated that a separate debrief room is really important in the set-up so that students can be taken to a different location for debrief. A few supervisors recommended the use of ‘gentler days’ to vary the pace and allow more time for reflection and debrief.

Demonstration and Feedback
In the absence of ‘right-then’ feedback, some supervisors suggested that debriefing could be used to provide mini-tutorials that contain content...a type of masterclass...or in real time an issue can be ‘ear-marked’ and dealt with in the debrief. A number of supervisors suggested it would be helpful to have some structure relating to consistent debrief content. It would be helpful for supervisors to have a similar structure in how they debrief with students...attempt at some standardisation that lends itself to the learning outcomes.

Training
A number of supervisors suggested that there was a need to provide more training for both supervisors and for simulated patients. They identified the need to train simulation supervisors in simulation specifically for the allied health area. Some supervisors commented that NHT-Sim is quite medical and nursing based and less specifically applicable for allied health professions. They also identified the need for more training for actors, particularly in terms of providing feedback.

Communication
Several simulation supervisors highlighted opportunities to improve communication to ensure more effective use of simulation time. There are opportunities to improve communication with supervisors in the clinical setting who are seeing students subsequently or concurrently to update them on student performance and get their feedback on ways to improve simulation. They also thought it would be useful to develop guidelines around supervisor/simulated patient ‘liaison’ in order to ensure that they worked together to support student learning, particularly in terms of planning the requirements for each day.

6.2.4.3 Clinical Fieldwork Educators
26 clinical fieldwork educators participated in focus group discussions. Of these, the majority had supervised students who were engaged in the ‘Monash model’ of simulation. The majority of clinical fieldwork educators expressed difficulty in identifying definitive and consistent differences in the personal and professional competencies of students who had completed simulation, compared to students who had not. It was difficult for educators to draw any direct causality, as the timing of student’s simulation participation varied, with some students progressing on to a field placement straight after simulation, and some doing so quite a while after the completion of simulation.
Additionally, some students had done fieldwork placements prior to attending simulation and then continued to other field placements. Whilst not being able to draw consistent conclusions on the contribution of simulation to fieldwork placement performance, clinical fieldwork educators were able to identify the behaviours of those students who did demonstrate carry-over skills from simulation. They could also identify the areas in which they felt some student’s lacked competencies. The majority of educators had opinions on the value of simulation as a learning tool, and how it could be maximally used to prepare students for fieldwork placements.

**Communication**

14 of the 26 clinical fieldwork educators had experienced the Monash model, and so the majority of comments referred to that model. The majority of the clinical fieldwork educator comments on the Monash model referred to the inherent problems of the model that impact on a field placement. Specifically, that patients are often there for a short time and so students miss out on patient continuity and the opportunity to experience key procedures (e.g. Discharge). In some cases students unable to get through their caseload on placement. Travel was an issue with the time required to travel between the hospital and the simulation facility. Problems occurred if the area of practice differed between the simulation sessions and the placement. At times there was only limited communication between simulation supervisors and clinical fieldwork educators and feedback was not always received constructively. It would be helpful if clinical fieldwork educators had opportunities to visit the simulation setting and observe, discuss etc. It would also be helpful to have greater contact with simulation supervisors so that clinical fieldwork educators know what has been covered, what has been achieved and what the main focus was in the simulation training. A number of clinical fieldwork educators expressed the view that it was important that the ‘Intensity’ of simulation matched that of the clinical placement.

**6.2.4.4 Simulated Patients**

The simulated patients offered a number of comments in terms of the operations they feel could be improved in simulation. It was apparent from the focus groups that there is enormous variation across programmes nationally. Actors were in agreement that the internal organisation of simulation would be improved through increased liaison between simulation supervisors and themselves. The actors reported that some educators were very open to close liaison, and the engagement with students was very much a team effort but this was not universally the case. They noted that a close liaison facilitated a flexibility that could be utilised in planning training activities, and indeed during activities (e.g. actor changes an aspect of their presentation).

**Placement organisation**

Actors highlighted that it was important to have good liaison with simulation supervisors and simulated patients in order to plan the day optimally: for example, it is important to discuss when and how feedback will be given by both. Actors indicated that some supervisors are focused on their ‘teaching’ role and are less mindful of the simulated patients input and opportunities to liaise together. They also indicated that some supervisors interrupt a lot, which tends to alter the ‘flow’ of the session. Many actors felt it was important to give feedback both in and out of character depending on the nature of the feedback.

**Training**

A number of actors indicated that it would be beneficial for simulated patients to have more training in giving feedback,
“...you don’t want to crush them, or falsely flatter them. You have to be aware of a student’s sensibilities” (SP2)

They also felt that better materials could be provided to assist with their training and preparation. Sometimes scripts were too dense and repetitive with too much jargon. They need to be written from a ‘first person’ patient perspective. In some cases videos were missing and these are helpful in terms of visualising the patient situation. A number of actors emphasised the need for simulated patient consistency e.g. not have different people playing the same patient on different days.

6.2.5 What are the real costs of students attending traditional clinical placements? Do the benefits of simulation training justify the potential cost?

Most of the groups that participated in the focus groups discussions were not able to provide much information about the costs of simulation training or the perceived value of simulation training relative to cost. Only the administrator groups focused on this topic. Whilst the vast majority of programmes planned to continue to utilise simulation, the majority of administrators saw it as a relatively expensive option. Whilst the benefits could justify the costs simulation needed to be used judiciously to get the maximum benefit.

6.2.1 Clinical Administrators

Cost of Simulation
Administrators acknowledged that amidst the significant differences in university clinical education programmes that utilize simulation, all universities are now better equipped to include simulation in their clinical education programme based on now having simulation equipment in place and having gained experience in running placements. All administrators agreed that to date, simulation has been a useful and relevant part of their clinical education programme. All universities are, to a greater or lesser extent, considering the ongoing specific use of simulation in their programme.

The ongoing challenge that administrators identified is in continuing to utilise simulation in an effective, efficient and sustainable way. The drivers for future development differ between universities. Each university has a different ‘placement context’ (e.g. fieldwork placement availability), differing educational objectives in the use of simulation and differing operational imperatives (e.g. student numbers).

Administrators were able to identify several areas where they felt simulation had contributed to increased clinical capacity in their programme. No administrator could definitively identify a quantative aspect of that capacity, as the majority felt their clinical education programmes had evolved over time, and they simply had no data to inform capacity changes. In other words it was difficult to put specific numbers around the additional placement capacity that simulation generated.

Administrators commented on capacity issues they have experienced. If well organized, simulation can be used to supplement clinical fieldwork experiences so that the placement can become shorter and more focused:

- Where there are no placements in a given area of practice, simulation can provide some training and exposure. In that sense simulation contributes to capacity.
Simulation can enable an increase in through-put of students, which was an imperative for some of the larger universities. This enables providing training to students without having to source multiple placements.

Simulation could be conducted for entire student cohorts when no appropriate fieldwork placements were available.

Simulation can be utilized to instate specific competencies necessary for a placement, and in that sense create capacity with shorter fieldwork placements.

Administrators were able to identify the major costs involved in conducting a simulation programme, and the costs involved in providing traditional placements. The consensus from the 15 administrators was at face value simulation is more expensive to run than the provision of placements. This could differ however with universities that are required to pay for placements. As one administrator pointed out, the initial funding was for a pilot programme, so at the time there was not a lot of thought around cost effectiveness (A1). All administrators agreed that they have to carefully consider costs. Universities have made decisions about their ongoing clinical education programme, including simulation, based on what they have learnt thus far, including cost implications.

Several factors were identified as adding to cost of simulation:

- Simulation is more labour intensive, and therefore more costly.
- The use of simulated patients is the single biggest ongoing cost in simulation.
- There are ongoing costs within the simulation unit e.g. phones, computers etc
- Placement sites frequently charge different rates to take students. At present, for most universities, there is no dollar limit on placement costs. (A4)

With regard to what might be called ‘hidden costs’, administrators identified:

- The development and implementation of simulation required a massive increase in coordination and management tasks that are expected of academic staff. This aspect may not have been costed in simulation set-up and recurring costs.
- The use of fieldwork clinical educators in the simulation unit provides a nice continuity for students, however the cost of back-filling that position, or the impost on other staff if it is not back-filled, is another simulation cost.

**Future options**

A number of administrators indicated that they viewed simulation as part of an ongoing development in terms of attempting to replace fieldwork learning with other methods e.g. videos, online activities etc. As such, they were looking to use other learning modalities in tandem with simulation e.g. virtual reality, videos etc.

Some universities were expanding simulation and starting to explore inter-professional learning opportunities. Some universities had trialed simulation as a ‘remediation’ activity with some success, so they were likely to continue with that. Some were thinking about using simulation as a mid and end unit assessment vehicle, as placements are getting more difficult to find. Some universities were utilizing simulation to develop core skills such as communication, teamwork etc. Many indicated the need for greater buy-in by clinical educators and students and the importance of ensuring that the learning objectives are very clear. Some are looking at simulated patient costs and starting to utilise the advantages of competition amongst suppliers.
It is still seen to be early days in terms of the development of simulation and there is a need to gain more experience in the area in order to understand the most cost effective ways to utilise simulation training in different programmes.
Chapter 7: Discussion

7.1 Project success

The National Simulation Project represents a major collaborative effort on behalf of the Physiotherapy profession which has changed the face of physiotherapy education in Australia. Nationally benchmarked scenarios, agreed assessment tools, training resources and teaching materials for actors and staff have been created. As a consequence of the programme, 1,790 students from 16 of the 19 Australian Physiotherapy Schools completed 143 five-day simulation placements. This amounted to more than 99,000 hours of simulation training with more than 400 staff nation-wide being trained and gaining experience in implementing simulation. Most importantly, the programme has triggered a major cultural change in physiotherapy clinical education with simulation training now widely accepted as a valuable component of clinical fieldwork and physiotherapy education. The initiative was grounded in the concept of experiential learning and utilised a rigorous evaluation process. Simulated learning programmes can be tailored to meet individual student needs and to provide a safe environment to make mistakes, reflect and repeat activities, thereby rapidly increasing student confidence and competence. The capacity of the profession to collaborate effectively and to bring about a significant step change in educational methods in a short period of time reflects very positively on all of the participants.

There has been an almost universally positive response from students and staff throughout the country to the introduction of simulation units, with the simulation experience being highly valued by both students and staff. Simulation is now seen as adding significant value to clinical training through enhancing the confidence and competence of all physiotherapy students by preparing them to be more effective whilst on clinical fieldwork and, ultimately on entry to the workforce. The project resulted in a quantum leap in terms of the resources, training and knowledge available to the profession to implement simulation training thanks to major funding assistance from Health Workforce Australia and the Commonwealth Government. The collaborative nature of the project and the impact of the simulated learning programme on student learning have been recognised through a number of award processes.

The national simulation project focused on full-time clinical simulation units that ran for five days, predominantly targeted at penultimate or final year students, and based in one of the three core areas of physiotherapy practice: cardio-respiratory, neurological and musculoskeletal. Each student experienced highly realistic clinical ward or outpatient environments, assessing and treating simulated patients and supervised by clinical experts in much the same way as they would in the equivalent ‘real’ clinical setting. Simulated patients were professional actors trained by expert clinicians to present as closely as possible specific clinical problems and provided highly realistic interactions for students. In order to facilitate reflection and clinical reasoning, all students saw the same simulated patient cases and were able to share their experiences in group debriefing sessions where differences in treatment approaches or patient responses were analysed. This provided high quality learning opportunities for students.

The emphasis was on the application of experiential problem-solving in physiotherapy education, based on Kolb’s Experiential Learning Cycle [1]. Students were provided with a low-risk yet authentic
learning environment where they could actively experiment with solutions to problems, reflect and discuss their solutions. It is an approach that encourages learning through mistakes and repetition, without cost to the student or patient. An experiential approach makes learning more concrete, particularly in the context of translational science professions, since it combines physical / kinesthetic with mental and behavioural domains. Simulation-based learning, if targeted to a specific group of learners, can be a highly effective strategy that enables abstract knowledge to be translated into tangible learning without the inherent risks and limitations found in a real clinical environment. This philosophy and a systematic, evidence-based approach underpinned the development of the national simulation project.

7.2 Building on previous work

The project took an evidence-based approach to implementation; building on findings from the literature and from an Australian Research Council (ARC) funded randomized controlled trial [3,4]. The project also built upon evidence collected in a major survey of Physiotherapy Schools to evaluate the use of simulation training. There were a range of perceived barriers to greater use of simulation: lack of access to facilities, equipment, technical support and trained actors; lack of funding / time to develop scenarios; and a lack of trained clinical educators. Despite this, the report indicated general support for the replacement of up to 20% of clinical time with simulation training. This provided a clear starting point for the national simulation project and meant that Physiotherapy was well placed to undertake a major project of this type.

7.3 Developing a collaborative ethos

Throughout the project there was a clear understanding that the project emphasis was on implementation of simulation and building capacity to achieve long-term change in both attitudes and educational practice. To achieve this, the Project Team developed a systematic approach to building ownership and collaboration amongst the participating universities. Key to this was a clear communication strategy to engage all stakeholders in achieving the programme outcomes. During the planning phase of the programme the Project Team engaged in six months of consultation with stakeholders to develop a detailed and fully costed project proposal and a comprehensive quantitative and qualitative evaluation protocol for the project.

A transparent approach to the division of funding between the Universities was taken in order to ensure that all universities felt that they were equal partners from a financial perspective. This was based on a standardised funding algorithm. Funding was provided for specific equipment and access to high-fidelity simulation settings required by each university. Also included were costs of simulation supervisors and professional actors, plus sufficient funding for the appointment of a research officer at each university. Contractual arrangements were established between Curtin University and all of the participating Universities to provide a framework for undertaking the collaborative project.

In order to facilitate collaborative decision-making and communication between the many participants, the Project Team held monthly teleconference meetings. Each participating university designated a Project Liaison Officer to participate in meetings and contribute to the work of the project team. Teleconference meetings were used to involve all participants in as much decision-making as possible and to communicate progress. In addition, regular email and phone communications were used to support each university at each stage of their programme
implementation and evaluation. A monthly teleconference meeting was also conducted for Research Officers from each university to collaborate about the day-to-day set-up, running and evaluation of the simulation units. This meeting was essential to ensure ongoing clarity of purpose within this group and to facilitate collaborative problem-solving. Two whole group face-to-face meetings were organised with the explicit aim of engendering cohesion and a clear sense of collaboration. More than 100 teleconference meetings occurred over the course of the project with hundreds of individual phone conversations and thousands of emails being exchanged. In addition, the project team distributed regular communiqués, communicating the progress of the project to all academic, health care provider and professional stake-holders. The project was also characterized by a great deal of peer to peer sharing and support and colleagues within Universities and across different Universities assisted each other as they learned to implement simulation. As a result, the project implementation has been characterized by a willingness amongst all participants to collaborate, to share resources and expertise, to take risks and to engage in collective learning in a way that is unprecedented in health sciences education in Australia.

7.4 Providing high-quality simulation

7.4.1 A cohesive, high-quality simulation learning programme

A systematic approach was adopted to develop a cohesive, high quality simulated learning programme. Amongst the standardized elements of the programme, it was agreed that each simulation unit would comprise five full days in order to replicate a week of clinical practice. Timetables were developed that ensured the most effective use of time, including sufficient debriefing time and actor-student sessions scaled to ensure that all students experienced both group and individual sessions with simulated patients. The majority of staff involved in delivering the simulation units completed NHET-Sim workshops and online modules so that they understood the opportunities that simulation provided to facilitate student learning. All simulated learning environments were set up to be as realistic as possible, whether replicating intensive care units, a hospital ward or an outpatients physiotherapy clinic, with all the appropriate resources and equipment needed. Also, as part of the contractual arrangements, each university agreed to provide access to or to purchase high-fidelity mannequins for acute intensive care cases. Funding was also allocated to ensure that professional actors were used uniformly and that there was sufficient time and expertise to train them to role-play the simulated patients as realistically as possible. All students were supervised by an academic or expert clinician who had received training in simulation based education, in a standardized ratio of 1 supervisor to 4 students. These features helped to ensure that quality of the simulation units.

7.4.2 Benchmarked, physiotherapy competency-specific case scenarios

Most importantly, the simulated patient scenarios were developed and written specifically for the national project and all universities selected from this bank of 45 cases. Scenario development occurred in a very structured manner utilizing teams of experts from around the country. Ultimately the scenarios reflected nationally-agreed best-practice across 45 patient presentations that are considered to be the core conditions / problems that every graduating physiotherapist should experience prior to entering the workforce. This aspect of the project has been warmly welcomed by clinical educators. It is a unique way of ensuring that students are more work-ready, having received a more consistent exposure to key patient presentations than has ever been possible before.
7.4.3 Ensuring incorporation of diversity
Many of the programme’s simulated patient scenarios intentionally addressed issues of equity and diversity. All of the scenarios had the capacity to be extended beyond the basic clinical scenario to address communications, equity or safety issues. Examples included: Indigenous Australian health issues, domestic violence, youth suicide, cultural diversity, communication disabilities post stroke and communication with non-English-speaking patients. This allowed universities in different locations to use scenarios appropriate for them: e.g. the University of Western Sydney chose a scenario with a Vietnamese patient undergoing thoracic surgery; Curtin University was able to use a scenario with a young Indigenous Australian man from regional WA suffering from bronchiectasis. Following a review of the scenarios in 2015, additional complexities have been added to several scenarios, including an example of grief / bereavement and a same-sex couple.

7.5 Meeting the needs of individual courses
In order to encourage sustainability, a number of elements of the simulated learning programme needed to be flexible so that each university could develop simulation unit(s) which would best fit within their existing curriculum and suit the needs of their health partners. Each participating university was allowed some flexibility around student numbers, core practice areas and timing models. This flexibility was very important in enabling all Universities to develop simulated learning programmes that meshed most effectively with the other elements in their course.

7.6 Outcomes

7.6.1 Achieving targets
This has been a major project by almost any measure and the participating Universities should be acknowledged for the fact that all Universities met their project targets within the required time frames and contributed fully to the successful outcome of the project. Collectively, the Universities achieved 97% of their target number of simulation training days. In total, 1790 Physiotherapy students across Australia participated in the project, completing 13,219 days of simulation training across three main practice areas. This amounted to more than 99,000 hours of simulation training. The project team analysed data from more than 15,000 questionnaires and interviewed 220 individuals during the project evaluation. To assist in implementing the project 20 contracts were negotiated involving the Universities and Healthcare facilities within a 6 month period and 37 ethics applications were submitted to facilitate data collection in all relevant facilities. It is important to acknowledge the level of collaboration and support from all participating Universities which underpinned the project.

7.6.2 Adding value to student learning
Both quantitative and qualitative data from students, supervisors, and administrators from different parts of the country show that the national simulation project has clearly added value to the physiotherapy student learning experience Australia wide. The project had a universally positive impact on clinical confidence and competence for students and facilitated a major cultural shift for both students and staff.

A key aspect that was identified as extremely important to all involved in feedback was the focus of the simulation placements on student learning; in contrast to traditional fieldwork placements where the primary emphasis has to be on patient care and minimizing risk to patients. This is extremely important because it made the learning experience less threatening for students and it meant that
educators could focus their entire attention on student learning rather than also having to focus on patient care. This created a constructive, growth mindset oriented learning environment where mistakes were not just tolerated, but were actively encouraged, alongside reflective debriefing in order to consolidate learning.

The project intentionally focused on an educational approach that actively encouraged experiential learning and collaborative reflection. Pre-clinical physiotherapy education has traditionally focused on knowledge-based rather than problem-solving or experiential learning. Yet it has been widely noted that once students start fieldwork placements, there is often a disparity between this academic learning and the requirements of a clinical setting [2]. The simulated learning programme encouraged the use of time-outs, rewind and replay during assessment / treatment sessions to facilitate experiential problem-solving. Peer discussion during time-outs helped to improve student learning without reliance on an expert clinician. Both individual and group debriefing was seen by students and staff as invaluable. Staff acknowledged that group debriefing for a simulated patient that all students had seen encouraged higher level clinical reasoning and understanding of the value of different approaches to the same problem. Focus group responses from students clearly showed that they valued this new approach to learning.

There was almost universally positive feedback about the simulation units from both students and staff. In focus groups, students specifically reported valuing the opportunity to work with professional role-play actors. Initially many students were unsure or skeptical about the capacity of actors to portray simulated patients authentically. Many of them reported being astounded by the realism of the clinical situation and they universally acknowledged the professionalism of the actors. The actors also acknowledged that they were able to develop an important role in providing students feedback on their communication skills. The importance of this aspect of student learning was underestimated prior to undertaking the project.

7.6.3 Improving student confidence and competence
Quantitative evaluation data showed that students’ self-reported confidence levels increased significantly in each of the main clinical competence areas by the end of the five day simulation units. Communication skills improved by an average of 21%, and assessment, treatment and clinical reasoning by 27%. Although no single core practice area stood out as superior overall in increasing student confidence, cardio-respiratory simulation units showed the highest confidence increases and mixed practice units the lowest in communication skills (Figure 20). There was however a clear difference between timing models, with the UQ unit resulting in the greatest increases in students’ confidence across all skill areas (Figure 21). During focus group sessions students also expressed that simulation training clearly improved their confidence in their capacity to undertake clinical practice.

Students’ clinical competence was evaluated using data from the standard physiotherapy assessment tool (APP) completed by supervising clinicians. The APP grades of simulation students for the 5 week clinical fieldwork placement incorporating their simulation unit were compared with those of equivalent students who had not completed simulation. Analysis showed that simulation-trained students demonstrated improved overall grades and importantly, specific improvements in the Professional Skill items of the APP. This is a good indication of the educational benefit from utilizing simulation training.

Data regarding simulation-trained students’ competence was also collected at the end of the 5-day simulation unit and comparisons made between core practice areas and timing models. APP data
collected on day 5 of the simulation unit showed a clear difference in mean grade between practice areas, with cardio-respiratory units having the highest grades and mixed model units the lowest (Figure 25). This difference was particularly notable for Clinical Skills mean grades. This may be a reflection of the ability to focus on core practice-area specific skills in the cardio-only units and the contrasting range of clinical skills required in a unit encompassing cardio, neuro and musculo cases in 5 days.

There was also a significant difference between timing models in APP score at the end of simulation (Figure 26). As anticipated, APP grades for the Monash model were highest. In this model students interspersed simulation days with fieldwork placement days and so their simulation competence assessment came towards the end of the fieldwork placement, up to 5 weeks after starting simulation. In contrast the Sydney model simulation APP was completed at the end of the initial 5-day block, before any fieldwork placement experience. It is equally unsurprising that the UQ model resulted in lower APP grades, particularly in clinical skill areas, since the students undergoing UQ model units were predominantly in their penultimate year rather than their final year and so would be expected to be at a lower skill level, even after 5 days of simulation training.

7.6.4 Efficiency of preparation for clinical training

It proved to be more challenging to determine conclusively whether simulation in the context of the current project improved the efficiency and/or effectiveness of preparation for clinical training. Although the opinion of clinical fieldwork supervisors was sought via a questionnaire and focus group involvement, only a small amount of data directly relevant to this question emerged, much of it anecdotal. In practice, it proved extremely challenging to access clinical fieldwork supervisors to ask then to participate and for those that did, a number of unanticipated circumstances mean that meaningful comment was difficult. Actually gaining access to fieldwork supervisors proved to be more challenging than anticipated, due largely to the concerns of state and local health employer bodies about ensuring that participation in the study by clinicians was absolutely voluntary and not completed during work time. Direct contact between any of the local or central study organisers was not permitted in a number of states and so recruitment was limited to a letter sent via University clinical coordinators. Those fieldwork supervisors who were accessed and who agreed to participate were, in practice, unable to make a comparison between simulation-trained and non simulation-trained students because they were generally not able to identify these groups. This limitation was again largely the result of the study organisers not being able to directly contact supervisors and provide this information. Since Universities place multiple students with each individual fieldwork supervisor (not just either simulation-trained or non simulation-trained) and there are multiple placement blocks throughout the year, clearly isolating the specific students that the study was interested in it proved to be even more difficult. Thus supervisors generally found it almost impossible to comment meaningfully on the relative “readiness for practice” of simulation-trained students.

This was particularly unfortunate as there was some very positive anecdotal evidence from supervisors who had supervised students during the simulation unit in the UQ introductory unit and then coincidentally went on to supervise them or observe them on their hospital placement. Several of these supervisors commented that simulation-trained students were indeed more able to “hit the ground running” at the start of their ‘real-life’ fieldwork placement, being more confident and capable of managing the basic communication and professional skills required. This meant that clinical supervisors could more quickly allow students to assess and treat patients independently, requiring less clinician intervention and so freeing the clinician to manage their own workload more
effectively. This would be a useful area for future research, since there are clear implications for improvements in clinical service provision if clinical supervisors are able to maintain a more normal patient load during the first week of a placement block.

7.7 Project Impact

The project has been distinctive in its capacity to take the majority of physiotherapy clinical education programmes across Australia and transform them in a very short space of time by introducing an educational programme that is innovative for the profession. Changes in educational processes are normally incremental with a steady spreading effect over time. The project has been distinctive in creating a step-change by globally introducing an educational approach that was unfamiliar for the majority of collaborating Universities. With the benefit of significant funding from the Commonwealth Government through Health Workforce Australia it provided the resources, training and support mechanisms to enable very significant change to occur within a two-year period.

7.7.1 Impact on staff and students

The national impact of the project on the physiotherapy profession cannot be underestimated. It has moved entry-level physiotherapy education forward 5 to 10 years profession-wide. Physiotherapy-relevant simulated learning environments have now been established at 16 Universities that teach physiotherapy, supported by 45 physiotherapy-specific benchmarked patient scenarios. More than 400 educators and at least 300 actors across the country have been trained in experiential and reflective simulation techniques and have gained exposure to the potential benefits of simulation training. The project has the potential to impact on the learning experience of the 8,488 physiotherapy students (Information provided by AHPRA) currently enrolled in physiotherapy courses and all future students of the profession. This represents an enormous amount of learning for both the students and the academic and clinical staff who implemented the project.

In addition, the project has established a model for collaborative University partnership and new educational and research collaborations have been established as a direct result of this project and there has been a clear shift towards sharing resources in many parts of the country.

7.7.2 Building the reputation of Australian physiotherapy

The success of this collaboration across an entire profession with so many distantly-located participating universities has been remarked upon and applauded by many professional groups at both national and international levels. There is a genuine interest in collaborations to benefit from the expertise that has been developed here in Australia and to create similar programmes in physiotherapy education elsewhere in the world.

The capacity to successfully implement a programme of this magnitude has also been widely recognised and acknowledged by other professions. The project has received widespread recognition from many other disciplines and has established a model for university collaboration. Other allied health disciplines are now undertaking similar projects to develop evidence for implementing simulation within their curricula. For example, The Australian Catholic University is leading a group of six Occupational Therapy Schools in a project to develop evidence for the use of simulation based learning as a partial substitute for traditional clinical placements. Speech Pathology Australia is coordinating a project involving six Speech Pathology programmes to determine if students achieve a
comparable level of competency in placements where 20% of placement time is replaced with simulated learning activities. These projects will further add to the evidence base for simulation training.

7.8 Building Capacity
Data collected during the project indicates that, for the majority of Universities, the introduction of simulated learning programmes added to the capacity to support clinical education (Table 11).

All but three Universities identified that the simulated learning programme developed for the project did increase clinical capacity. This was either through replacing an entire clinical unit, as in the case of the UQ timing model for several Universities, or through the replacement of either the first week or a day per week of a placement (Table 11). The three Universities who did not feel that simulation had increased clinical capacity were those who were constrained to introducing the unit outside of their clinical programme, either by adding clinical simulation days to enhance academic coursework or by introducing the simulation unit into weeks of the clinical programme when fieldwork placements were not run.

Six of the participating Universities have been able to identify ways in which the introduction of simulation will continue to build capacity within their clinical education programmes (Table 12). For some, the introduction of simulation has opened up the viability of additional clinical fieldwork placements, which otherwise were insufficient in condition range or length. For example, one University has used a Monash model approach to add one day per week of intensive care simulation to a placement that otherwise can only offer low complexity medical or rehabilitation cases. Adding simulation means that the placement is now viable as a core area placement. Other Universities have used the UQ model of an introductory simulation unit to release an entire clinical fieldwork placement in the penultimate year of study, thereby freeing up placement opportunities for final year students. This has been particularly successful at the University of Queensland and is steadily being introduced to all penultimate year students at Curtin and the University of South Australia. Several other Universities have found that the Sydney model is acceptable to their clinical partners who find it useful to free up clinicians for the week at the start of certain placements.

However, a slightly larger number of Universities (n=7) have found that, even though simulation did increase clinical capacity in theory, in practice sustaining their chosen model of simulation has been more challenging. The reasons for this vary between Universities but include factors such as clinical partner resistance to a particular model or challenges in sustaining clinical simulation in general, as is the case for several rural and remote Universities. Clinical partner resistance varies between sites, but is generally a matter of collaborating more closely over the exact model that will fit the needs of both academic and clinical partners.

The majority of Universities have indicated that they will continue to utilise simulation training as a key component of their courses moving forward. However, in the short term, for some Universities this means adding elements of clinical simulation into academic coursework units rather than into their clinical programme. While this process will vary between Universities it is likely that with further learning and development the role of simulation training will gradually expand.
Table 11: Has simulation increased clinical capacity?

<table>
<thead>
<tr>
<th>Has simulation increased clinical capacity?</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes:</td>
<td>Curtin, Queensland, S. Australia</td>
</tr>
<tr>
<td>• UQ model of an introductory unit has released an entire fieldwork placement;</td>
<td>Notre Dame</td>
</tr>
<tr>
<td>• Monash model has enabled uptake of new core practice area fieldwork placements;</td>
<td>Sydney, Flinders</td>
</tr>
<tr>
<td>• Sydney model has released first week of fieldwork placement.</td>
<td></td>
</tr>
<tr>
<td>Yes, but:</td>
<td>W Sydney, La Trobe, Melbourne, Griffith</td>
</tr>
<tr>
<td>• Monash model increased clinical capacity by 1 day/week of fieldwork placement during the project. However this model cannot be sustained into the future in the same form – a different model is being considered;</td>
<td>Monash</td>
</tr>
<tr>
<td>• Monash model theoretically increased clinical capacity, but cannot be sustained into the future.</td>
<td>Central Queensland, Charles Sturt</td>
</tr>
<tr>
<td>• Sydney model theoretically released first week of fieldwork placement during the project. However this cannot be sustained into the future;</td>
<td></td>
</tr>
<tr>
<td>No, but:</td>
<td>Australian Catholic University</td>
</tr>
<tr>
<td>• UQ model used in the project did not replace any clinical time. However, a different model is being considered.</td>
<td></td>
</tr>
<tr>
<td>No:</td>
<td>Bond</td>
</tr>
<tr>
<td>• Modified Monash model did not replace any clinical time. However, it was successful and will be continued;</td>
<td>James Cook</td>
</tr>
<tr>
<td>• UQ model used in the project did not replace any clinical time. It cannot be sustained into the future.</td>
<td></td>
</tr>
</tbody>
</table>

7.9 Challenges to Successful Implementation

7.9.1 Current project

There were a number of challenges to implementation of the current project. The very short 3-month time-frame between acceptance of the project proposal and the start of implementation meant that a number of elements of planning and training could not be done comprehensively. Scenario development teams had to be appointed and then 45 scenarios written in a very short space of time. Although the resulting scenarios are remarkably well developed, there was not time for them to be fully piloted and not all scenarios were as complete as would have been liked. For Universities who had no prior experience with simulation, having limited time frames in which to plan and implement simulation caused high levels of stress. A longer time-frame for planning and the opportunity to do some pilot work would have meant that implementation could have been at a
deeper level, with greater involvement of partner organisations and clinicians, which in turn may have improved sustainability beyond the life of the project. The inflexible nature of the academic course structure for a number of Universities meant that the project simulation units had to be inserted at a point that could not then be sustained into the future. For example, some Universities chose a UQ model stand-alone unit so that they could place it in the weeks beyond the end of the semester rather than in normal semester time. However, in practice these Universities found that such timing meant it was challenging to find staff available or willing to participate as supervisors and that students were less amenable to a new learning approach beyond the end of their usual academic year.

7.9.2 Future implementation

The project also identified a number of potential challenges to the successful implementation of clinical simulation across entry-level physiotherapy programmes into the future. Although the HWA surveys had identified that providing simulation training for simulation supervisors and academic staff was an essential component of sustainability, it became clear that additional educational sessions for clinical staff in partner organisations would also have been useful. Where Universities have found it difficult to continue with clinical simulation embedded in clinical fieldwork, it is often due to the resistance of clinical staff, most of whom have no experience with role-play simulation. Some staff may see simulation as a second-best option that detracts from their traditional training role in ‘real-life’ settings. In retrospect, and perhaps in planning ahead, it is clear that buy-in from all stakeholders, in particular from clinical fieldwork educators, is an essential component for successful implementation of simulation.

The apparent inflexibility of academic course structure mentioned above is also noted as a limiting factor for some Universities. As Universities become more centralized in their organization, individual schools have less autonomy and so less ability to add or remove elements from their courses. Rigid contractual arrangements between schools and partner health organisations also restrict the ability to insert simulation training into existing clinical units. It may require time for some Universities to address these limitations.

An ongoing issue for many physiotherapy schools is access to simulation facilities that are sufficiently high-fidelity. These facilities are often managed by Nursing or Medical schools, who prioritise usage to their own staff and students. Although several Physiotherapy Schools/Departments have managed to find space or leverage usage of new space for simulation, many are still reliant on facilities that are managed by other groups. Particularly if simulation units are scheduled for within-semester time, access can be very limited.

Although this project provided many Universities with the equipment and training of supervisors needed for future sustainability, the ongoing costs of running future simulation units is a factor that will inevitably limit some. For example, as mentioned in section 5.2.10 above, the cost of actor time in particular varied enormously from one state to another. Future simulation units need to be financially viable to be sustained and so a range of different models have been discussed and developed by different Universities, in particular models that are less intensive of actor and supervisor time. Additional strategies for recruiting actors at reduced costs will also need to be considered. Different Universities are exploring the establishment of their own pool of actors rather than using a performance company, or of using acting students or semi-professional actors. However, in addition to devising less expensive ways of running simulation, an important factor will be to steadily build the case for simulation as a value-adding educational modality through research and dissemination, and to present this model to staff at higher levels within Universities who can
influence the level of funding available. A learning modality that is seen to be essential to successful graduates is more likely to attract the funding that it needs.

Although the project made great strides in expanding the number of physiotherapy educators with experience and training in simulation, there is an ongoing need for such training. The NHET-Sim project has been very effective in providing this education, although addition of some more physiotherapy-specific skills to courses would now be timely. The experience, skill and confidence of the profession in organising and running simulation has increased during the last two years. The next step is to expand the number of educators with skill in the writing and development of simulation scenarios, in particular so that simulation learning programmes can be developed that are specific to academic and clinical context. The project has made clear that, although ongoing collaboration between Universities is vital for the development of skills and knowledge, for simulation to be sustainably successful, each University will need to have the confidence to modify the suggested simulation models and develop simulation scenarios that are suitable for application within their own context.

References

Chapter 8: Future Plans

This project has had a remarkable impact on the attitudes and confidence of physiotherapy academic and clinical educators across the country towards clinical simulation. In the course of just two years, simulation as a clinical training modality has progressed from an idea viewed positively by a small minority in 2012 to a practical learning approach embraced by all entry-level programmes in 2015. However, there is considerable variation between Universities in the way in which they can best implement simulation into their clinical ad academic programmes.

8.1 Timing model

There is a universal intention amongst all Universities to include simulation in some form within their clinical or academic programmes. Section 7.9.2 has discussed some of the key limitations to implementation of pure clinical simulation for some Universities.

As illustrated in Table 12, six of the 16 participating Universities have established a sustainable model of simulation that is already embedded in their clinical programmes. Of these, three Universities have found that the UQ model of an introductory clinical simulation unit that replaces a transitional fieldwork placement is the most practical to implement, has the greatest impact on increasing clinical capacity and provides a wholesale introduction to final year fieldwork for students. Two other Universities have found that the Sydney model with the first week of fieldwork replaced by simulation is the most manageable to organize for clinical partners and provides the opportunity for an introduction to a core area to be provided immediately before the associated fieldwork placement. Two other Universities are also considering this model, although are still collaborating with clinical partners about the best format. One University has found that the Monash model is the most useful for increasing clinical capacity by adding more complex simulated clinical case days to make a fieldwork placement with a limited case-load viable. Although this approach is seen by many other Universities as having potential value, the practicalities of establishing the necessary close collaboration with clinical facilities limits its wider application.

Five of the participating Universities have decided that the most practical way of including clinical simulation is to embed shorter periods into their academic programme. In many cases this is due to the constraints of established arrangements that limit flexibility in their clinical programme. For some Universities though, adding immersive simulation days or ½ days into their academic programme is seen as a more effective way of helping students to bridge the potential gap between academic learning and practical within-context application.

There are a number of Universities who are still discussing with their academic and clinical partners the best way to progress with simulation as a learning strategy to enhance clinical training. In some cases, in particular for rural and remote Universities, the key limitation is the lack of funding to develop simulation. These Universities suffer from limited access to facilities and equipment costs are often higher due to distance. There is also limited access to staff and actors so that simulation is often driven by one or two staff members only, making it unsustainable. In the case of another metropolitan-located University, the constraints of their University academic organization is proving to be the greatest challenge to adding in anything more than occasional role-play activities within the academic curriculum.
### Table 12: Future simulation plans

<table>
<thead>
<tr>
<th>University</th>
<th>Planning to use simulation:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within the clinical programme</td>
</tr>
<tr>
<td>ACU</td>
<td>✓</td>
</tr>
<tr>
<td>Bond</td>
<td>✓</td>
</tr>
<tr>
<td>Charles Sturt</td>
<td></td>
</tr>
<tr>
<td>Central Queensland</td>
<td></td>
</tr>
<tr>
<td>Curtin</td>
<td></td>
</tr>
<tr>
<td>Flinders</td>
<td></td>
</tr>
<tr>
<td>Griffith</td>
<td></td>
</tr>
<tr>
<td>James Cook</td>
<td>✓</td>
</tr>
<tr>
<td>La Trobe</td>
<td></td>
</tr>
<tr>
<td>Melbourne</td>
<td>✓</td>
</tr>
<tr>
<td>Monash</td>
<td></td>
</tr>
<tr>
<td>Notre Dame</td>
<td>✓</td>
</tr>
<tr>
<td>Queensland</td>
<td>✓</td>
</tr>
<tr>
<td>South Australia</td>
<td>✓</td>
</tr>
<tr>
<td>Sydney</td>
<td></td>
</tr>
<tr>
<td>Western Sydney</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL (%)</strong></td>
<td><strong>6 (38%)</strong></td>
</tr>
</tbody>
</table>

#### 8.2 Simulation scenarios

The simulation scenarios developed within the current HWA project have proven to be an excellent starting point for all Universities. These scenarios have been and will continue to be updated and made accessible to all Universities via the inter-University AARNET Cloud storage system. However, already many Universities have started to develop their own scenarios, which offer more learning objectives more specific to their context. For example, one University has developed a series of scenarios that focus on simulation supervisor interactions with students in order to prepare them more effectively for different clinical supervisor expectations. Another University has developed scenarios that are more focused on later stage students and aim to develop their ability to manage complex patients with multiple problems, rather than just problems within one core practice area. In another University, a bank of cases have been developed that provide later stage students with the opportunity to work with a mixed case-load of patients, as might be required during a real-life weekend on-call roster, learning to prioritise patients from across the core practice areas. Additional scenarios are also being developed that focus more specifically on specific patient groups rather than core practice pathologies: for example, developing more appropriate Indigenous patient cases.

#### 8.3 Ongoing collaboration

Successful cross-profession collaboration has been a hall-mark of this project and there is a strong desire amongst all participants for this to continue and expand to include more clinical educators rather than predominantly academic staff. The precise structure for collaboration is yet to be determined, but it is envisaged that it will exist both locally and nationally at a number of levels: collaboration for sharing scenarios and additional resources; collaboration in terms of shared problem-solving and discussion of simulation development and ideas; collaboration in research, since the current project has demonstrated the power in greater numbers. It is likely that this level of
collaboration will need some form of central organization to ensure sustainability but this is yet to be determined.
Chapter 9: Conclusion

This has been a highly positive project leading to substantial changes in the perception and understanding of simulation training. Despite some initial skepticism simulation training has been universally accepted by students and staff. It has been a very positive example of professional collaboration, gaining widespread admiration for the Physiotherapy profession. Almost universally people have embraced the unique learning opportunity that the project provided. As a result of the learning achieved and the resources provided by the project, Physiotherapy is uniquely well placed to continue to utilize simulation training as a component of clinical education, for the benefit of future student cohorts.