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An Audit of the Use of Simulation in Australian and New Zealand Physiotherapy Curricula

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Abstract

Purpose: The aim of this exploratory research was to investigate the use of simulation in physiotherapy curricula across Australia and New Zealand. The key areas of focus were whether simulation was being used, the forms of simulation used for training and assessment, evidence for educational simulation practices, and the enablers and barriers to implementing simulation into the curricula. Method: All Australian and New Zealand Universities offering a physiotherapy degree were invited to participate in an electronic survey. As no pre-existing tool was available to answer the aims of the study, a custom designed survey was developed. The survey was pilot tested on three physiotherapy academics to limit ambiguity and ensure the questions directly related to the purpose of the study. An introductory invitation was circulated via the Council of Physiotherapy Deans Australia and New Zealand. Open and closed ended questions were analyzed following a sequential explanatory strategy. Results: Fourteen (14) of the possible 22 universities (64%) responded, with all indicating that they use simulation for training or assessment and many using it for both. All core areas of clinical practice were represented, as were low to high-fidelity forms of simulation. Role play (77%), low/medium fidelity manikins (77%), and standardized patients (62%) were the most frequently used for training. Role play (73%), standardized patients (45%), objective structured clinical examinations (45%), and low/medium fidelity manikins (37%) were the most frequently used modalities for assessment. The key enablers appear to be availability of equipment, academic support, growing evidence for its use, safety, and positive student experiences. The key barriers appear to be time, cost, and access to trained staff and equipment. Conclusions: Academics across Australia and New Zealand described simulation practices for both training and assessing physiotherapy students. Academics were able to identify a limited but expanding evidence-base for simulation, more strongly focused on training than simulation-based assessments. Recommendations: Further research may justify increased investment of time, money, resources, and training in different simulation modalities.

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ABSTRACT

Purpose: The aim of this exploratory research was to investigate the use of simulation in physiotherapy curricula across Australia and New Zealand. The key areas of focus were whether simulation was being used, the forms of simulation used for training and assessment, evidence for educational simulation practices, and the enablers and barriers to implementing simulation into the curricula. **Method:** All Australian and New Zealand Universities offering a physiotherapy degree were invited to participate in an electronic survey. As no pre-existing tool was available to answer the aims of the study, a custom designed survey was developed. The survey was pilot tested on three physiotherapy academics to limit ambiguity and ensure the questions directly related to the purpose of the study. An introductory invitation was circulated via the Council of Physiotherapy Deans Australia and New Zealand. Open and closed ended questions were analyzed following a sequential explanatory strategy. **Results**: Fourteen (14) of the possible 22 universities (64%) responded, with all indicating that they use simulation for training or assessment and many using it for both. All core areas of clinical practice were represented, as were low to high-fidelity forms of simulation. Role play (77%), low/medium fidelity manikins (77%), and standardized patients (62%) were the most frequently used for training. Role play (73%), standardized patients (45%), objective structured clinical examinations (45%), and low/medium fidelity manikins (37%) were the most frequently used modalities for assessment. The key enablers appear to be availability of equipment, academic support, growing evidence for its use, safety, and positive student experiences. The key barriers appear to be time, cost, and access to trained staff and equipment. **Conclusions:** Academics across Australia and New Zealand described simulation practices for both training and assessing physiotherapy students. Academics were able to identify a limited but expanding evidence-base for simulation, more strongly focused on training than simulation-based assessments. **Recommendations:** Further research may justify increased investment of time, money, resources, and training in different simulation modalities.

Keywords: simulation, physiotherapy, education, students, training, assessment

INTRODUCTION

The use of simulation across healthcare education has grown rapidly over the last several decades since the development of the first Resusci Annie in 1960 and the first published paper on the Objective Structured Clinical Examination (OSCE) in 1975.[1-2] Some of the key drivers for implementation of simulation have been ethical concerns, in particular for skills or scenarios that are low frequency and high risk to patient safety. Physiotherapy practice encompasses numerous such skills (e.g., invasive suction, complex mobilization). Yet it is not clear if physiotherapy academics are routinely implementing simulation in their university curricula, despite its success in medicine and nursing education.

In medicine and nursing education, simulation is effective for training and assessment of both students and clinicans.[3-5] In medical education there is evidence that both students and clinicians benefit from simulation education especially when targeting technical skills, clinical decision making, and non-technical skills such as communication and team work.[5-6] The strongest evidence for simulation in achieving competency in medical education are in the areas of technical skills, communication, and team-work and therefore protecting patients from risk.[3] In nursing education, technical skills were improved more than knowledge and attitude when the effectiveness of simulation was analysed.[4] Nursing students also report higher satisfaction with high-fidelity simulation and standardized patients than low fidelity simulation, for example a part-task trainer.[4] Simulation is being used across a wide range of clinical specialties, including obstetrics and gynecology, emergency medicine, midwifery, and surgery.[6-14] Across these specialties, simulation is often used to allow practice of high-risk skills such as airway management or obstetric emergencies. [6-8] Across medicine and nursing university settings, valid and reliable simulation-based assessments are used to assess both technical skills, such as acute care skills, and non-technical skills, such as communication and teamwork.[14-16] As multiple simulation encounters are required to accurately predict students' performance in the clinical setting, these simulation activities are often woven throughout curricula for maximum impact.[15-16]

There are many forms of simulation commonly used across healthcare education, these include high-fidelity patient simulators, medium fidelity manikins, task trainers, standardized patients, MASK-ED™ (KRS simulation), role play, objective structured clinical examinations (OSCEs), Peer Patient simulation and virtual reality. High-fidelity patient simulators are manikins designed to allow non-invasive and invasive procedures to be performed on them while providing realistic outputs such as heart rate and oxygen saturation. [15] High-fidelity patient simulators can be programmed to respond in set ways.[15] Medium fidelity manikins are either a full or half-body manikin and have minimal computer components or outputs, such as Resusci Annie and the cardiology patient simulator, Harvey.[1] Task trainers include models that look like a section of the human anatomy and allow discrete procedures to be practiced, for example, a lower torso for pelvic examinations or an arm for taking non-invasive blood pressures.[15] Standardized patients are individuals trained to consistently portray a predetermined patient subjective and objective case history.[15] They are commonly trained actors or real patients trained to provide consistent responses. MASK-ED™ (KRS simulation) is a novel form of simulation that involves an academic donning a silicone mask and taking on the persona of a patient.[17-18] Role play involves students practicing clinical skills on one another, but they are not trained or encouraged to mimic the signs and symptoms of a real patient. An OSCE involves breaking down the area of competence being assessed into components. Multiple stations with specific time intervals are used to assess competence and individuals rotate through each one.[1] OSCEs often involve active stations using simulation-based assessments to assess practical skills, but can also involve passive stations to assess theoretical knowledge.[15] Peer Patient simulation requires the student to undertake specific training to allow them to act out the part of a patient, including the physical characteristics, for their peers to then practice clinical skills.[19] Virtual reality includes immersive computer-based simulations where the students may be asked to participate in various activities that involve interaction with virtual patients.[20]

In physiotherapy, simulated learning environments with standardized patients have been shown to be a valid and effective strategy for the partial replacement of the work integrated learning environment, within cardiorespiratory and musculoskeletal areas of practice.[21-22] However, it is not clear whether academics are using simulation in their curricula prior to students commencing work integrated learning. A recent audit of Canadian physiotherapy schools demonstrated that there was variability in academics' use of classroom-based simulation.[23] The ability to authentically link theory to clinical practice and build student confidence prior to work integrated learning were identified as key reasons for the use of classroom-based simulation. Canadian academics identified their main barriers as the logistics and time required to organize simulation activities. It is unclear if academics across Australia and New Zealand are capitalizing on the known benefits of simulation, especially with high-risk skills such as oropharyngeal and nasopharyngeal suctioning. No such audit has been undertaken to explore this across Australia or New Zealand to date. The purpose of this study was to explore the use of classroom-based training and assessment across Australian and New Zealand universities offering physiotherapy degrees (i.e., before students commence work integrated learning).

This study aimed to provide a broader understanding of current simulation practice across Australia and New Zealand physiotherapy schools; to establish whether academics are basing their use of simulation on evidence; and to identify any enablers and barriers

that academics face in implementing simulation into their curriculum. This has not been previously examined in Australia and New Zealand. An electronic survey was chosen as the best tool to achieve these aims as it allowed for individual responses from a large cohort across a wide geographical area, faster data gathering and analysis, with responses going directly into the database and analysis tool.[24]

This study aims to answer the following research questions:

1. Is simulation being used in physiotherapy university curricula?
2. What forms of simulation are being used in the classroom teaching of physiotherapy students?
3. What forms of simulation-based assessments are being used to assess physiotherapy students?
4. Are academics' simulation choices informed by evidence?
5. What are the barriers and enablers for implementing simulation in physiotherapy university curricula?
6. What are the plans for future use of simulation in physiotherapy university curricula?

The reporting of this study has followed the recommendations outlined in *Good practice in the conduct and reporting of survey research* and *A guide for design and conduct of self-administered surveys of clinicians*.[25-26]

METHOD

Design and Development

A descriptive study involving a purpose-specific electronic survey was undertaken between December 2017 and September 2018. Both closed and open-ended free text questions were included. Approval was granted for this study by The University of Canberra Ethics Committee in September 2017. A custom designed survey was required as no pre-existing tool captured the information relevant to the purpose of this study. The survey was designed by one researcher and then pilot tested on three academics, questions were adjusted to minimize ambiguity and final agreement reached by all four authors. The questions were designed specifically to answer the research questions. The survey was designed to allow for more than one participant from each institution to take part to ensure the use of simulation across the whole physiotherapy curriculum could be captured.

Sample Selection and Recruitment

The eligible participants were university academics from all 22 universities across Australia and New Zealand who offered a physiotherapy undergraduate and/or post-graduate course (2017-2018). Potential participants were identified through the Council of Physiotherapy Deans Australia and New Zealand.

The survey was distributed via the email networks of the Council of Physiotherapy Deans Australia and New Zealand. Two emails were sent via this network to invite academics to participate. A follow-up email was then sent to individual universities who had not participated following the first two emails. All participants provided written informed consent before commencing the survey.

The response rate was 64% with responses received from 14 of the 22 universities, which included at least one from New Zealand and each state and territory in Australia.

Data Collection

Data were collected via Qualtrics, an electronic survey platform.[27] The survey included 11 open- and closed-ended questions (Table 1). Questions focused on identifying which units of study used simulation and the evidence for its use. The last two questions (10-11) allowed discussion of enablers, barriers and future plans for simulation in the physiotherapy course(s).

Data Analysis

A concurrent triangulation design was used, whereby the quantitative and qualitative data was collected and analyzed at the same time.[28] Data analysis took place using the "Data and Analysis" feature in Qualtrics.[27] For the closed-ended questions percentages and frequencies were reported using descriptive statistics. Open-ended responses were coded using a Grounded Theory approach by one researcher and then cross checked by two other researchers.

Table 1. Survey questions.

Name of university:	_____
Consent to participate:	• Yes • No
Q1. Do you currently use any of these forms of simulation? Mark all that apply.	• No • Standardised patient • Role play • Task trainer • Low/medium fidelity manikin • High fidelity patient simulator • MASK-ED™ (KRS Simulation) • Other (please specify): _____
Q2. Do you use simulation as a training tool within the classroom (i.e. not as a no replacement for clinical placement)?	• Yes • No (Continue to Q6)
Q3. Which forms of simulation do you use in your classroom? Mark all that apply.	• Standardised patient • Role play • Task trainer • Low/medium fidelity manikin • High fidelity patient simulator • MASK-ED™ (KRS Simulation) • Other (please specify)_____
Q4. Which courses/subjects/units do you currently use simulation in your classroom for training? Mark all that apply.	• Cardiorespiratory • Musculoskeletal • Neurological • Orthopaedics • Paediatrics • Women's/Men's Health • Other (please specify): _____
Q5. Is there any evidence for the use of your simulation tool in the physiotherapy classroom?	• Yes (please provide details): _____ • No
Q6. Do you use simulation-based assessments for the purpose of summative assessment within the classroom?	• Yes • No (continue to Q10)
Q7. Which forms of simulation do you use for simulation-based assessments? Mark all that apply.	• Standardised patient • Role play • Task trainer • Low/medium fidelity manikin • High fidelity patient simulator • MASK-ED™ (KRS Simulation) • Other (please specify): _____
Q8. Which courses/subjects/units do you currently use simulation-based assessments? Mark all that apply.	• Cardiorespiratory • Musculoskeletal • Neurological • Orthopaedics • Paediatrics • Women's/Men's Health • Other (please specify)_____
Q9. Is there any evidence for the use of your simulation-based assessment tool?	• Yes (please provide details)_____ • No
Q10. Have you found any barriers or enablers to implementing simulation into your classroom training or assessment?	• Please provide details: _____
Q11. Do you have plans to implement simulation into your curriculum in the future?	• Please provide details: _____

RESULTS

Participant Demographics

Out of the possible 22 sites, responses from 14 (64%) were received, with two universities having two responses each. Therefore, a total of 16 completed surveys were collected and analyzed. This resulted in all Australian states and territories, offering physiotherapy degrees, and New Zealand being represented (Table 2).

Table 2. University break down by country and state/territory

State or Territory/Country	Number of universities who responded/potential number
New Zealand	1 of 2
Australian Capital Territory, Australia	1 of 1
New South Wales, Australia	6 of 8
Queensland, Australia	3 of 5
South Australia, Australia	1 of 2
Victoria, Australia	1 of 4
Western Australia, Australia	1 of 2

Purpose and Types of Simulation Used

All 14 universities (100%) indicated that they were currently using at least one form of simulation. Thirteen universities indicated that they used simulation for classroom-based training and therefore answered the questions in relation to training, while 11 answered the questions in relation to simulation-based assessment. One university (7%) was not using it for classroom-based training of physiotherapy students, and two universities (14%) indicated that they did not use it for assessment purposes. There was a spread across the universities regarding the types of simulation being used, with many using multiple types (see Table 3). For training of students, role play (i.e., practicing skills on fellow students) (77%), low to medium fidelity manikins (77%), and standardized patients (62%) were the most common forms of simulation. For assessment activities, role play (73%) was again the most common form of simulation, with standardized patients (45%) and the use of an OSCE (45%) the next most frequently used. Standardized patients appeared to be used both as part of an OSCE and separately.

Table 3. Number of universities using the different types of simulation for classroom-based training and simulation-based assessments.

Type of simulation	Training (n = 13)	Assessment (n = 11)
Role play	10 (77%)	8 (73%)
Low/medium fidelity manikin	10 (77%)	4 (36%)
Standardized patient	8 (62%)	5 (45%)
Task trainer	7 (54%)	3 (27%)
High-fidelity patient simulator	4 (31%)	2 (18%)
Other	2 (15%) – (Peer patient; Virtual Reality)	1 (9%) – Peer patient
MASK-ED ™ (KRS Simulation)	1 (8%)	0 (0%)
OSCE	N/A	5 (45%)

OSCE – Objective structured clinical examination

Areas of Clinical Practice Where Simulation is Being Used

Units across all core areas of physiotherapy clinical practice incorporated simulation for training. Introductory, generic units of study also incorporated simulation, with a focus on professional practice, motivational interviewing, and patient assessment skills (see Table 4). These other units of study tended to have a focus on non-technical skills such as communication. All core physiotherapy units also had simulation-based assessments, as well as units of study that focused on professionalism, preparation for work integrated learning and manual handling (see Table 4).

Table 4. Areas of clinical practice that simulation is used in physiotherapy curricula

Subject/Unit/Course	Training (n = 13)	Assessment (n = 11)
Cardiorespiratory	12 (92%)	9 (82%)
Musculoskeletal	9 (69%)	7 (64%)
Neurological	6 (46%)	6 (55%)
Orthopedics	4 (31%)	3 (27%)
Pediatrics	5 (38%)	3 (27%)
Women's/Men's Health	0 (0%)	0 (0%)
Other	4 (31%)	4 (36%)

N.B. Women's/Men's Health are specialty areas of clinical practice and may not be taught as standalone units of study.

Evidence for the Use of Simulation for Training

Ten of the 13 universities (93%) indicated their use of simulation for training purposes was informed by evidence. Two of 10 respondents (20%) reported that there was qualitative evidence, either internal audits or external research, that simulation led to a positive student experience. Another respondent (10%) noted evidence showing that simulation led to an increase in students' confidence prior to commencement of work integrated learning. One academic (10%) quoted two chapters in books, and another soon to be published article, and numerous national and international conference presentations, supporting their use of simulation for training, in particular in preparing students for work-integrated learning. Two academics (20%) reported that they had manuscripts under review for publication, supporting their use of simulation. Regarding clinical skills, one (10%) reported there was no evidence, while two (20%) quoted research done into replacing clinical time with simulation in physiotherapy, however, this was not the primary aim of this survey question.

Evidence for the Use of Simulation-Based Assessment

Seven of the 12 universities (58%) using simulation-based assessments reported that evidence was informing the use of simulation. Of these seven respondents, three (43%) indicated that it was based on audits, reviews and/or research that they were currently undertaking. One respondent (14%) indicated that there was evidence for the use of manikins for assessing Intensive Care Unit skills. One other academic (14%) indicated there are systematic reviews that have demonstrated that simulation works for both training and assessment but did not provide further details. The remaining two respondents (29%) indicated there is evidence for the use of simulation but chose not to provide details. None of the respondents made a clear statement or link between evidence and student experiences, or simulation-based assessment and performance while on work-integrated learning.

Enablers to Using Simulation

Four of the academics reported enablers to using simulation in their curricula. These identified enablers related to availability of equipment, academic support, growing evidence for its use, positive student experiences, and safety: 1) investment in equipment and physical space, "recently opened a simulation ward and secured equipment which has been a significant enabler"; 2) evidence to support simulation use in healthcare education, "Growing evidence that [simulation is] useful and here to stay"; 3) key stakeholder support, such as classroom academics and having "the Dean's support"; 4) student engagement in simulation activities, "student 'buy in' (i.e. their appreciation of the enhanced 'reality'…and repeatability)"; and 5) enhanced patient safety, "excellent consistency and a safe place for students to make mistakes without dire consequences."

Barriers to Using Simulation

Of the 15 academics who commented on the barriers to simulation, time was identified by 7 (47%) as a significant barrier to the use of simulation. This included a resistance by educators and academics to use simulation-based assessment because of the "perceived extra time" requirement for the set-up and creating required resources. Cost was also identified by 7 of the 15 academics, including paying actors to play the role of the standardized patient. Other barriers included:

- A lack of staff resources;
- A lack of trained staff to maximize the benefits of simulation;
- Reliance on the same academics to implement the simulation training;
- A lack of trained standardized patients/actors/peer patients and the resources required to train them;
- A lack of space for equipment and large groups of students and standardized patients;
- A lack of suitable equipment;
- Timetabling of simulation activities to ensure adequate availability of resources;
- Ensuring that simulation is more effective and efficient than alternate forms of education; and
- Access and equity to ensure all students have adequate access to standardized patients.

Plans for the Future use of Simulation in the Physiotherapy Curricula

All academics currently using simulation identified that they would continue to use it, while others who were not currently using simulation identified that if time and staff resources allowed, implementing simulation in their curriculum "would be ideal." Plans for future practice included accessing resources shared with other disciplines such as nursing and medicine. Other strategies for expanding the use of simulation included implementing it throughout the degree, refining current processes and expanding into other units of practice where it is not currently being used. Some academics were also waiting for the evaluation of their current model before expanding its use.

DISCUSSION

Simulation is being used in most physiotherapy curricula across Australian and New Zealand universities, but most commonly for training as opposed to assessment. The majority of respondents reported that there is evidence to support their use of simulation in training physiotherapy students, while a little more than half are using evidence to support their use of simulation-based assessments. Simulation is most frequently used in cardiorespiratory physiotherapy units. The key enablers appear to be availability of equipment, academic support, growing evidence for its use, safety, and positive student experiences. The key barriers appear to be time, cost, and access to trained staff and equipment.

The results from this survey are consistent with those described in a recent audit of Canadian physiotherapy schools.[23] The Canadian authors similarly found that there was variability across universities regarding how and when simulation was used, but some patterns were consistent across both the Canadian and current study. In both studies, cardiorespiratory physiotherapy appears to lend itself to high fidelity simulation because of the required development of technical skills that can be low frequency, high risk, and invasive, for example oropharyngeal and nasopharyngeal suctioning. Unsurprisingly then, cardiorespiratory physiotherapy was the most common unit of study using high fidelity patient simulators and medium fidelity manikins.

For orthopedics and the neurological curricula, standardized patients were most commonly used. Across both studies, increased authenticity of linking theory to clinical practice was cited as a reason for using simulation, with all the Canadian schools reporting this as a reason for using simulation in their curricula. Also, enhanced student confidence and improved clinical reasoning were highlighted by participants as a benefit of simulation-based education in both studies. Logistics ("organizing students, staff, and volunteers; creating time in a busy physiotherapy curriculum; and coordinating with other faculties to use shared facilities," [p266]) and "time" were the most frequently identified barriers by the Canadian participants, consistent with the academics in our study.[23] It is interesting to note that in the Canadian study that few participants mentioned cost as a barrier, unlike the Australian and New Zealand academics.

In the United States of America, a survey of nursing education institutions found that the majority have simulation embedded across the curriculum, with high-fidelity simulation most frequently used for invasive procedures, and part-task trainers in their foundation skill units.[29] These findings are consistent with those found in our survey. While a survey of Australian and New Zealand nursing educators found that simulation was frequently embedded into nursing curricula (both as an adjunct or a substitute for work integrated learning), this study similarly identified barriers that include adequate staff time, training and resource development.[30] These authors called for more robust evaluation of the use of simulation in nursing education in Australian and New Zealand. Nonetheless, they reported respondents were positive about the ability of simulation to prepare students for work-integrated learning. Similarly, preparation of students for work-integrated learning is an area of research that needs exploration in physiotherapy.

The enablers and barriers that were identified by the academics in the current study were consistent with those found in the nursing and midwifery literature, such as having access to resources and buy-in from the university and staff.[31-32] Consistent barriers include insufficient staff or more training needed for facilitating simulation; cost; lack of equipment and space; time-tabling difficulties; facility workloads or resistance.[30-32] An international survey of simulation centers found that both the top strengths and barriers were financial support, dedicated simulation technicians, and staff training.[33] In an international survey in the field of anesthetics a lack of financial and human resources were the most common barriers with a lack of time being the next most common.[34] It is clear that if universities have the support of key academics, such as the Dean of the Faculty, trained staff and access to resources, then they are able to implement simulation in all key units of physiotherapy education for both training and assessment. These same key areas appear to be barriers to either implementing or expanding simulation programs.

The results from this survey indicate that most physiotherapy schools are implementing the cheapest and most readily available form of simulation, i.e., role play with peers. However, in physiotherapy education it appears important to implement the appropriate form of simulation for the skills being taught and assessed. For example, cardiorespiratory physiotherapy has had the

biggest uptake of simulation, in particular, the use of high-fidelity simulation. This is possibly due to high-fidelity patient simulators or task trainers being well-suited for the high risk, low frequency events that require high levels of technical proficiency in potentially stressful situations, such as suctioning of a deteriorating patient. These technical skills are also often invasive and therefore it is inappropriate they should be realistically practiced on peers or standardized patients.

On the other hand, standardized patients appear well-suited to development of non-technical skills such as communication and professionalism. High-fidelity simulation, medium-fidelity simulation, and standardized patients have been shown to be the most effective forms of simulation in nursing education.[4] There is currently only one physiotherapy school in Australia and New Zealand using MASK-ED™ (KRS Simulation). MASK-ED™ (KRS Simulation) simulation involves an expert clinician donning a silicone mask and role-playing a patient character that they have developed to meet teaching objectives for specific units of study.[17-18] This is an area of simulation that is worth exploring further following its successful implementation into nursing education.[17-18] Another new area of simulation being explored in Australia is Peer-Patient simulation, which involves undergraduate healthcare students being explicitly taught to act the role of a patient for their fellow students in a simulated learning environment.[19] There is promising early data to support the use of Peer-Patient peer simulation in preparing physiotherapy students for work integrated learning.[35] Finally, while the majority of physiotherapy schools are using simulation-based assessments they acknowledge that the evidence base is limited and requires more robust research. Likely barriers to simulation-based assessments include those identified such as access to actors, time, and cost. One strategy that two Australian universities have developed to overcome some of the "perceived barriers of using [simulated patients] SPs" that was mentioned by one academic is the development of "Peer-Patient simulation". By training students to act as patients, this form of simulation aims to overcome barriers such as a lack of staff resources and trained standardized patients, as well as the high costs associated with standardized patient use for training purposes. The use of Peer Patient simulation requires ongoing investigation.

Educational and Clinical Implications

While there is promising evidence for the current practice of simulation-based training, there is a need for more research into the value of simulation-based assessment in physiotherapy education. Most of the academics did not cite any evidence for their use of simulation. Many universities appear to be completing audits and research into their current use of simulation; therefore, the body of evidence will continue to grow and strengthen in coming years. Physiotherapy educational research could explore the benefits and effects that simulation can have on physiotherapy student competence, including which form of simulation is best for improving specific technical and non-technical clinical skills. It will also be important to identify whether simulation-based assessment can identify physiotherapy students' readiness for work-integrated learning.

Strengths and Limitations

Strengths of electronic surveys include the quicker response time, and data analysis, yet typically result in lower response rates.[24] To decrease the risk of non-response rate bias, various response rates have been cited as adequate, commonly 60-80%.[36-38] It is also noted that that the correlation between response rates and non-response bias is imperfect.[38] Our response rate of 64% was likely to be adequate and due to the cross-sectional nature of the responses to this survey it has been possible to describe the common areas and types of simulation used across Australian and New Zealand physiotherapy curricula. Despite this, possible limitations include under-reporting, especially if one academic completing the survey at each university was not familiar with simulation use across the whole curriculum. On the contrary, it is also possible that the universities which did not respond may have had lower levels of engagement and uptake with simulation, therefore our findings may have over-estimated the use of simulation in physiotherapy curricula in Australia and New Zealand. Other limitations include the use of a custom-made survey which was only pilot tested on three academics from the one institution, and therefore the validity and reliability are unknown. To increase participation in the electronic survey the number of open-ended questions was limited and therefore the question relating to enablers and barriers was included as a single question. This may have inadvertently led individuals to focus on one or the other and limited the responses received for this question.

CONCLUSION

Overall, academics across Australia and New Zealand described contemporary teaching practices that use several types of simulation that were perceived as valuable for both training and assessing physiotherapy students. Further research may justify increased investment of time, money, resources, and training in different simulation modalities. Academics were able to identify a limited but expanding evidence-base for simulation, more strongly focused on training than simulation-based assessments.

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