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Study Protocol: MASK-ED™ (KRS Simulation) - impact on physiotherapy student performance

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Abstract

Purpose: MASK-ED™ (KRS Simulation) involves an educator donning a silicone mask to portray a patient character that has been specifically developed in line with learning outcomes. The effectiveness of MASK-ED™ (KRS Simulation) to prepare physiotherapy students prior to commencing work integrated learning has not been investigated.

Methodology: This randomised cluster trial will investigate MASK-ED™ (KRS Simulation) in addition to usual teaching in neurological physiotherapy. Physiotherapy students in an intervention group will receive simulated learning via a MASK-ED™ (KRS Simulation) character as well as usual teaching. Students in a control group will receive usual teaching only, including role-play with peers. Consent will be concealed from the investigating team and blinded assessors will assess the primary outcome. Secondary outcomes will be practical and written examination results and a satisfaction survey.

Research implications: This will be the first randomised trial investigating MASK-ED™ (KRS Simulation)'s effect on students' readiness for work integrated learning.

Practical implications: The results from this study will inform physiotherapy education and curriculum development by increasing the evidence base for the use of simulation in training physiotherapy students prior to work integrated learning.

Originality: MASK-ED™ (KRS Simulation) was developed in nursing education at Central Queensland University, Australia. Although it has been investigated in medical imaging, this is its first practical application within physiotherapy curricula.

Limitations: It will be impractical and unfeasible to blind the participants and the investigators to tutorial group allocation and impractical for blind assessing of practical examinations.

Keywords: simulation training, students, physiotherapy, education

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BACKGROUND

Simulation allows students to practise realistic clinical skills prior to patient contact, thereby maximising learning opportunities and patient safety after students commence clinical placement (Alinier et al. 2004; Seropian et al. 2004; Watson, R et al. 2002). Preclinical simulation has the potential to better prepare students for work integrated learning by offering opportunities to practise clinical skills in a safe and supportive learning environment. Simulated learning allows students to make mistakes without potentially harming real patients and builds their confidence and professional identity.

Simulated learning environments in physiotherapy have been investigated as a substitute for work integrated learning (Watson, K et al. 2012). Replacing portions of clinical time with a simulated learning environment had no significant effect on student competence compared to standard work integrated learning in cardiorespiratory (Blackstock et al. 2013) and musculoskeletal practice (Watson, K et al. 2012). Physiotherapy students' stress responses during clinical placements, in a hospital setting and a simulated learning environment, have also been studied. The findings suggested that while both settings produced comparable physiological responses (heart rate and cortisol levels), students rated the simulation environment more stressful (Judd et al. 2016). Therefore, the simulated environment's stress demands should be built up gradually (Judd et al. 2016). This reinforces that simulation should be introduced into the classroom setting early in healthcare university degrees. Additionally, simulation may prove beneficial within the real clinical setting or in a simulated learning environment before clinical work integrated learning placements.

Simulated patients (usually trained actors or volunteers) have been used in physiotherapy education to provide students with more authentic clinical scenarios(Pritchard et al. 2016). The validity and reliability of simulated patients in assessing clinical competence has been investigated in physiotherapy with 'promising' yet inconclusive results (Panzarella & Manyon 2008). Although an Objective Structured Clinical Examination using simulated patients is feasible and correlates with physiotherapy students' final course grades (Gorman et al. 2010), simulated patients require developed scripts and characters, lengthy training and reimbursement. When faced with unique situations (e.g., questions not covered in training), standardised patients are not necessarily able to respond to these spontaneous teaching moments in an authentic and realistic manner.

MASK-ED™ (KRS Simulation) is a novel simulation technique in which expert clinicians don a high-fidelity silicone mask and role-play a character (McAllister et al. 2013). The character is developed with a distinct personality and history relevant to the teaching objectives (Reid-Searl et al. 2012). MASK-ED™ (KRS Simulation) allows the masked academic to steer the interaction with the student, to take advantage of and capitalise on spontaneous teaching moments and allows for immediate debriefing (McAllister et al. 2013). The academic has intimate knowledge of the curriculum's learning objectives, does not need a script and can mould the established character to these objectives. Standardised patients without appropriate knowledge of the curriculum, requirements of a physiotherapist, or potential patient reactions will be less able or unable to guide a teaching session to achieve necessary learning objectives.

MASK-ED™ (KRS Simulation) has been shown to decrease nursing students' anxiety of work integrated learning and build their confidence and feelings of preparedness (Reid-Searl et al. 2012). Nursing students perceived MASK-ED™ (KRS Simulation) to significantly contribute to preparedness for work integrated learning and be more

authentic and effective for learning in comparison to actors and high-fidelity patient simulators (Kable et al. 2013). Therefore, it is possible that a MASK-ED™ (KRS Simulation) character will provide a richer learning experience for students than alternative teaching methods.

No randomised trials investigating any aspect of MASK-ED™ (KRS Simulation) have occurred in any health discipline. Additionally, MASK-ED™ (KRS Simulation)'s effectiveness to increase clinical performance in physiotherapy students has not been examined. Classroom-based simulation's effect on clinical performance scores also requires further research. This randomised cluster trial will investigate MASK-ED™ (KRS Simulation)'s effectiveness on students' knowledge and clinical practice in neurological physiotherapy.

This paper follows the SPIRIT 2013 guideline (Chan et al. 2013) in outlining this randomised cluster trial's protocol. The questions this research intends to answer are:

1. Is MASK-ED™ (KRS Simulation) more effective than role-play with peers in improving physiotherapy student performance during work integrated learning?
2. Which components, if any, of physiotherapy student clinical performance does MASK-ED™ (KRS Simulation) affect?
3. To determine students' perceptions of MASK-ED™ (KRS Simulation).

RESEARCH HYPOTHESIS

Classroom-based MASK-ED™ (KRS Simulation) combined with usual teaching is superior to peer role-play combined with usual teaching.

PRIMARY OBJECTIVE

The primary objective is to determine if MASK-ED™ (KRS Simulation) is superior to usual teaching (including role-play with peers) in neurological physiotherapy.

KEY SECONDARY OBJECTIVE

The key secondary objective is to determine if MASK-ED™ (KRS Simulation) is superior to role-play with peers regarding improving any specific areas of knowledge or clinical skills (e.g., professionalism, communication, assessment or intervention).

OTHER SECONDARY OBJECTIVE

The other secondary objective is to determine students' perceptions of using MASK-ED™ (KRS Simulation) in the neurological curriculum.

TRIAL DESIGN

This study is a single-centre, single-blind, cluster randomised trial with concealed allocation between group post-measures and intention-to-treat analysis. Each tutorial group will be randomised to receive either the experimental or the control intervention. The aim is to compare the use of MASK-ED™ (KRS Simulation) to role-play with peers and determine the former's effect on physiotherapy students' clinical performance during their work integrated learning placements.

STUDY SETTING

This study will occur at an Australian university as part of the neurological units of study undertaken by physiotherapy students enrolled in either a bachelor or a master program (2018–21). The students will be in either their third year of a four-year bachelor's degree or their first year of a two-year graduate-entry master's degree. The students commence their work integrated learning after successfully completing their neurological curriculum.

ELIGIBILITY CRITERIA

All students enrolled in neurological units of study will be eligible to participate and there will be no exclusion criteria. Tutorial groups will be randomised; all students will be in either the experimental group and undertake the intervention or the control group and continue with usual teaching only. Only students who consent to and enrol in the study will have their data analysed. Consenting to data analysis will not affect students' tutorial group allocation as consent remains blinded until after all work integrated learning placements have occurred.

INTERVENTION

The experimental group will receive MASK-ED™ (KRS Simulation) and usual teaching. The unit of study's usual teaching encompasses a one-hour lecture in a large group (approximately 90 students) and two 2.5-hour tutorials in small groups (≤24 students) per week over 10 weeks. Tutorials incorporate explicit teaching, case-based learning, problem-based learning, video-taped practical skill demonstration and student practise. Specific feedback from the tutor regarding the class' learning outcomes supports all learning. Students have access to pictures and videos of clinical skills in the required text and the student manual.

The experimental group will receive MASK-ED™ (KRS Simulation) during five tutorials (12.5 hours). Students will directly interact with a uniquely created MASK-ED™ (KRS Simulation) character played by one of the researchers (see Figure 1). This character was designed and developed in accordance with MASK-ED™ (KRS Simulation) training principles to align with and enrich the course's learning objectives (e.g., assessment and treatment of a patient with neurological impairments) (Central Queensland University 2019). In small groups in the tutorials, students will be able to ask the MASK-ED™ (KRS Simulation) character questions and practise assessment and intervention skills that will have been covered in lecture content. Reflection is a critically important element of a successful simulation experience (Fanning & Gaba 2007); therefore, time will be devoted to debriefing the students following these interactions. Another investigator will be present during these tutorials to assist the masked researcher and students.

The control group will receive usual teaching, including role-play with peers. One tutor will teach all four control groups and another the four experimental groups.

Figure 1. MASK-ED™ (KRS Simulation) character with students during tutorial.

ADHERENCE

Class rolls will be kept to monitor the number of sessions that each participant attends and to ensure that there has been no contamination by swapping tutorial groups. If students must swap groups, they must swap into another corresponding group (i.e., from experimental to experimental).

OUTCOMES

The primary outcome will be criterion number 5 ('communication', verbal and non-verbal) of the 'Assessment of Physiotherapy Practice' scored out of four. Additionally, the following scores will be individually analysed: 'overall' (out of 80), 'professionalism' (out of 16), 'assessment' (out of 12) and 'intervention' (out of 20). A blinded assessor who will be unaware of student allocation and of the study will complete the assessment at the completion of the students' rehabilitation clinical placement. The 'Assessment of Physiotherapy Practice' is an assessment tool that has been tested and is reliable (Dalton et al. 2012), valid (Dalton et al. 2011) and the most common measure of physiotherapy student clinical performance in Australia.

The secondary outcomes will be the students' performance of clinical skills at the end of their units of study and before clinical placement, their written examination marks and a satisfaction survey. Performance will be measured during a practical examination in which students are provided with a clinical problem requiring them to demonstrate clinical skills: either an assessment or intervention technique. The student will act as the 'therapist' while another student simulates a 'patient'. A standardised 100-point marking schema based on the 'Assessment of Physiotherapy Practice', will be used to measure performance.

PARTICIPANT TIMELINE

The participants will be from two consecutive cohorts of students and will participate in the unit of study's tutorials from February to June of that year. During the subsequent 12 months, they will commence their work integrated learning and undergo a five-week rehabilitation practicum (see Figure 2). After Cohort 2 completes their study, consent will be unconcealed and data collected.

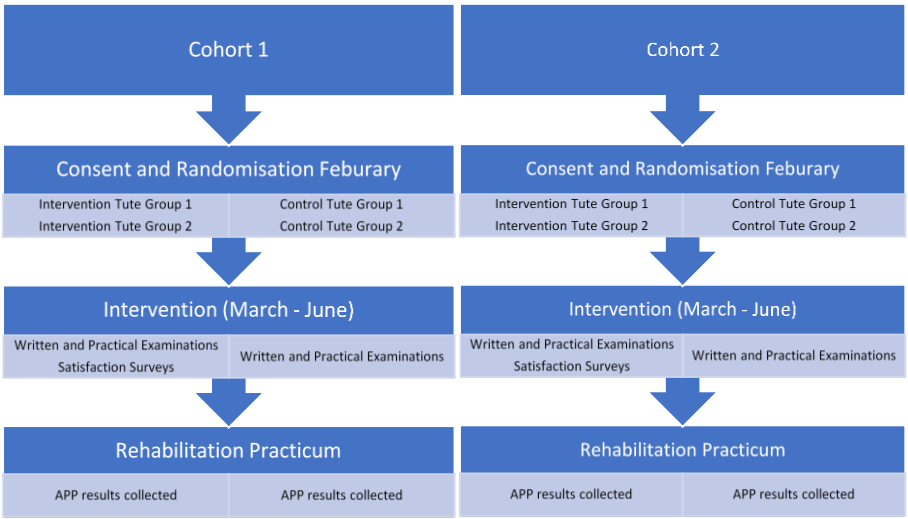

Figure 2. Project timeline for Cohort 1 and 2.

SAMPLE SIZE

Sample size calculations indicate that a sample size of 120 students will detect a 0.5/4 mark difference (12.5% change in criterion number 5 of the APP) with 80% power at a two-tailed significance level of 0.05.

RECRUITMENT

There are 160–180 potential participants across two cohorts of students. Therefore, a sample size of 120 is feasible. Students will neither receive any incentives to participate nor be disadvantaged if they do not.

ALLOCATION

Students are randomised into tutorial groups earlier in their academic careers. The tutorial groups will be randomised by drawing numbers from a hat.

BLINDING

Due to the nature of the teaching, all investigators and participants will know the allocation of intervention and control groups. The 'Assessment of Physiotherapy Practice' assessors will be blinded to the students' allocation and to the whole research project.

DATA COLLECTION AND MANAGEMENT

All 'Assessment of Physiotherapy Practice' results will be kept on a database managed by an independent staff member and will only be accessed in the data collection phase in 2021. One of three assessors will score practical examinations, with random moderation occurring across assessments. The exam results will be collected and stored on an internal university drive. Satisfaction surveys (see Table 1) will be distributed to all students in the intervention group after their fifth session with the MASK-ED™ (KRS Simulation) character. The secondary investigator will collect and store the surveys. After collection, all data will be deidentified, coded and stored securely on a password-protected computer during the project. According to university protocols, the data will then be stored at the university for the required five-year period, after which they will be destroyed.

Table 1. Satisfaction survey questions.

	Very unhelpful (0)	Somewhat unhelpful (1)	Neutral (2)	Somewhat helpful (3)	Very helpful (4)
Confidence engaging with an older person					
Developing rapport and empathy with patients					
Manual handling skills					
Communicating with an older patient					
Explaining treatments without using jargon					
Ability to step into the physiotherapist role					
Ability to apply theory to practice					
Interest / engagement with the material covered in the unit					
Remembering practical lessons from the classroom					
Self-reflection and learning from mistakes in a safe environment					
Potential to learn from other students' experiences (peer learning)					
Ability to give / receive feedback					
Readiness to undertake the practical exam					
Readiness to undertake clinical placement					

1. Do you think that MASK-ED™ (KRS Simulation) has been beneficial in any other way to enhance learning? Please describe.

2. In the classroom, is MASK-ED™ (KRS Simulation) more valuable for students than just practicing on each other? Please explain why / why not:

3. Are there any negative aspects to including MASK-ED™ (KRS Simulation) in the Physiotherapy classroom?

4. On balance, do you think we should continue MASK-ED™ (KRS Simulation) as a feature of the Physiotherapy curriculum? Please explain why / why not:

STATISTICAL METHODS

The groups' 'Assessment of Physiotherapy Practice' scores for 'overall', 'communication', 'professionalism', 'assessment' and 'intervention' and practical examination marks will be compared and presented as mean differences (95% CI). A Mann–Whitney U test will be used to determine whether differences are statistically significant. Intention-to-treat analysis will be used whereby all data from consenting participants will be included in the analysis regardless of whether participants attended the tutorials incorporating MASK-ED™ (KRS Simulation). If required, adjustments will be made for differences in grade point average across the tutorial groups. The surveys' Likert scores will be quantitatively analysed and the open-ended questions will be thematically analysed.

ETHICS AND DISSEMINATION

Initial ethics approval has been received from the university's Human Research Ethics Committee (6 November 2017: HREC 17–266).

CONSENT AND CONFIDENTIALITY

Participants will be recruited by an independent university staff member during one of the initial lectures in the study's neurological units. This independent staff member will introduce the study to the students and provide them with a participant information statement and consent form. The independent staff member will collect and store the consent forms to decrease any student-perceived bias. Deidentifying students' results and allowing only the investigators to access identifiable consent and data, as per the consent form, will maintain confidentiality.

DISSEMINATION OF RESULTS

After the research report is published, its summary can be forwarded to students who provide their contact details on their consent form. Trial results will be published in a peer-reviewed academic journal and presented at research conferences and meetings as appropriate. This paper will be authored by the investigating team.

DISCUSSION

This study's results will inform physiotherapy education and curriculum development by increasing the evidence base for using simulation to train physiotherapy students before work integrated learning. An improved understanding of classroom-based simulation's effect will help to optimise teaching strategies in the physiotherapy curricula. By improving pre-work integrated learning education, the following might be possible: improved student readiness to practise; reduced student failure rates; decreased student and clinical educator stress levels; and decreased burden on universities to find repeat placements. Simulation has shown promising results in healthcare education—particularly in medicine and nursing—and this study is endeavouring to expand this evidence base into physiotherapy education.

Contributions

EP and NM conceived the initial project. TR, EP, NM and BB not only initiated the study design but also comprise the investigating team and will be involved in implementation. All authors contributed to refining the study protocol and approved the final manuscript.

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Conflict of Interest

The research team declares no conflicting interests.

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