

## Mask-Ed™: A scoping review

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**Introduction:** Simulation is commonly used in health professional education. Mask-Ed™ is a novel form of teacher-in-role methodology involving the educator wearing a purpose-made silicone mask to become the simulated patient. The simulation unfolds spontaneously and in response to the students' or cohorts' knowledge, skills or learning objectives. The evidence to support adoption appears limited. This is significant given the resources required to establish a Mask-Ed™ character and the changes to courses educators will likely make to embed this simulation. This scoping review aims to explore the current literature and evidence base relating to Mask-Ed™.

**Methods:** A scoping review was completed in September 2020 following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist. Five databases and Google Scholar were searched for English, peer-reviewed publications containing variants of "Mask-Ed". Screening and data charting were completed independently by both authors and then reviewed collaboratively. A descriptive analysis was conducted reporting findings based on study design. A thematic synthesis was completed for studies containing qualitative data.

**Results:** Eighteen studies published between 2011 and 2020 by Australian universities and health institutions were included. Twelve studies reported on 10 unique datasets drawing on survey, focus group and mixed method designs. Two studies reported case studies without data, one study was on training and a final three provided research summaries or pedagogical discussion of Mask-Ed™.

**Conclusion:** There is emerging evidence, self-reported by preclinical nursing students, that Mask-Ed™ supports improved engagement and confidence in formative learning activities. There is limited evidence, however, to support use in other health or medical disciplines or in individual or summative assessment.

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## Introduction

The use of simulation pedagogy in health education has increased significantly over the past decade (Ryall et al., 2016; Seaton et al., 2019). Realistic and meaningful simulations are accepted pedagogies to facilitate student learning (Nestel, Krogh & Kolbe, 2018; Ryall et al., 2016). A review conducted by Bogossian and colleagues (2018) identified reasons for simulation use, including addressing the increasing need for clinical practicums, teaching preclinical communication and technical skills in a safe environment, assessing student performance or fitness-to-practice and providing an opportunity for interprofessional learning. The review also identified recent barriers to embedding simulation within health education curriculum, which consisted of resources relating to the time and cost associated with creating the simulation, including staff education, support and educator–student ratio, and access to suitable equipment and simulation environments (Bogossian et al., 2018).

Simulation modalities range in fidelity. They can include simulated and standardised patients, part-task training with mannequins or simple roleplay. The use of multimedia, virtual reality avatars and software-based simulation is also increasing (Dieckmann et al., 2007; Rosen, 2008; Ryall et al., 2016). For preclinical or novice students, simulation is mostly used to allow multiple and repeated learning opportunities without compromising real-patient care or health organisations' finite education resources (Ryall et al., 2016). As a result, curriculum-based simulation is primarily designed by academic educators to address the specific learning objectives of their classes (Bogossian et al., 2018). Standardised patients are most commonly used for hurdle or competency assessments (Ryall et al., 2016).

One such example of an academic educator designed simulation is Mask-Ed™ KRS. Developed in 2008 as High Fidelity Patient Silicone Simulation, it reportedly combines the realism and humanistic aspects of simulated and standardised patient methodologies with teacher-in-role and process drama pedagogy (Reid-Searl, Happell et al., 2012; Reid-Searl, McAllister & Sinclair, 2014; Rhodes & Reid-Searl, 2015). Mask-Ed™ KRS involves the health educator becoming the simulated character using a silicone mask and developed life history. The educator can then guide the simulation or allow it to unfold spontaneously and in response to the student or cohort's knowledge, skill or learning objectives within a single learning activity or episodically across a unit of study (Frost & Reid-Searl, 2017; Reid-Searl, Bowman et al., 2014). The hallmarks of the educator role are further denoted by the KRS acronym, standing for *knowledge, realistic* and *spontaneous* (Reid-Searl, 2020). This contrasts with the low-fidelity realism in peer roleplay and predefined or scripted "cases" required when actors are employed as simulated patients

(Reid-Searl, Happell, et al., 2012). See Reid-Searl (2020) and Frost and Reid-Searl (2017) for further details about Mask-Ed™ educator training, character development and simulation design.

Despite the innovation and reported foundation in education and simulation theory, the body of evidence to support the adoption of Mask-Ed™ has not been gathered in one study. This is significant given the resources required to establish a Mask-Ed™ character, the likely changes academic educators will make to courses to embed this simulation modality and the capital investment required to complete training in Mask-Ed™. Thus, determining whether there is an evidence base for this simulation modality could assist academics and providers of health education who are contemplating the use of Mask-Ed™. This scoping review aims to explore the current literature and evidence base relating to Mask-Ed™.

## **Methods**

Scoping reviews are designed to synthesise a broad or emerging area of research. They may inform systematic reviews, feasibility trials or pilot projects. Studies included are of varying quality, with the themes and data presented and summarised rather than critically appraised (Arksey & O'Malley, 2005; Grant & Booth, 2009; Levac et al., 2010; Lockwood et al., 2019).

### ***Protocol***

This scoping review methodology followed the 22-item Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist (Tricco et al., 2018). Item 12 and 16 are optional items that relate to critical appraisal. These were not undertaken due to the size and nature of the papers included in the scoping review, as commonly reported by Grant and Booth (2009).

### ***Search strategy and eligibility criteria***

The search was designed and completed by both authors with the assistance of an academic health science librarian. Five databases—CINAHL, Proquest Central, ERIC, Web of Science and Scopus—and Google Scholar were identified as being relevant to the area of enquiry. Search terms included “Mask-Ed”, “masked education” and “KRS simulation”. A manual search of the “Related publications—Journal articles” list on the Mask-ED™ website (<https://www.cqu.edu.au/about-us/structure/schools/nm/simulation/mask-ed/related-publications>) and academic publications list for the top two authors (Reid-Searl and Frost) was also completed by the first author.

To be included in this review, studies needed to (1) feature Mask-Ed™ as the focus of the paper, (2) be published in a peer-reviewed journal and (3) be written in English. Publication dates in database searches were from 2008, given this was the year Mask-Ed™ was developed. The review excluded grey literature, including book references,

websites, conference presentations and professional newsletters. All searching was conducted between the 2nd and 9th of September 2020.

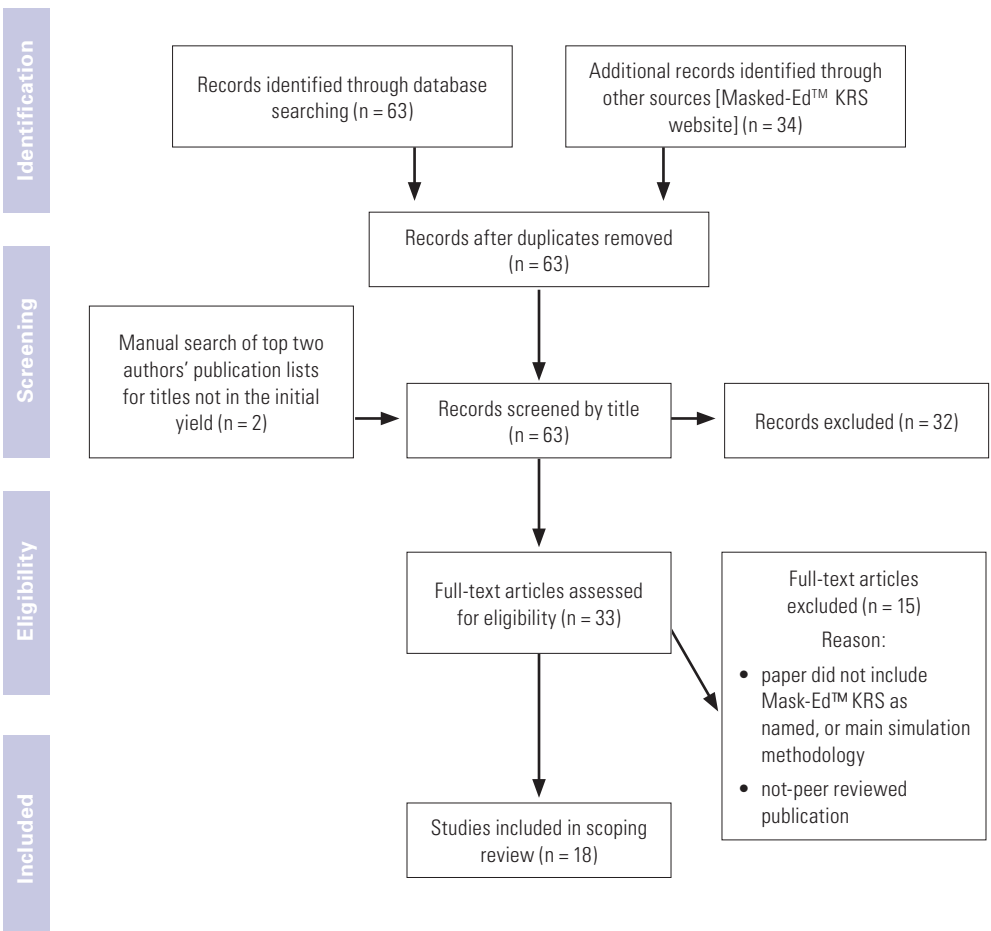
**Selection of sources of evidence and data charting**

Through the initial search, 97 studies were identified, of which 18 met the inclusion criteria and are included in this scoping review. Articles were imported into Endnote reference management software. Both authors reviewed the articles independently for duplication and then eligibility by title using the a priori inclusion and exclusion criteria. Both authors compared their respective title list and had 100% consensus without disagreement. Full-text review was then undertaken on each study by both authors independently. Both authors then compared their final list of included papers and agreed on the final 18 studies that met the inclusion criteria. The selection process is presented in Figure 1.

**Figure 1**



PRISMA 2009 Flow Diagram of Mask-Ed™ KRS Search



### ***Data charting process and items***

Data charting was determined by both authors a priori in the form of a template. This template was adapted from the PRISMA-ScR data charting example (Tricco et al., 2018). Data items included reference, country of study, data collection date, survey or recruitment, sample size and analysis type, health disciplines, study aim or purpose, data collection method and study findings or outcomes (as detailed in the appendix). Both authors tested this process with an agreed study and confirmed that the items were suitable and the process was replicable. Data charting was then completed by the first author and reviewed by the second author, with a final meeting held to resolve any minor discrepancies.

### ***Synthesis of results***

The results are presented in the appendix. A descriptive analysis is then presented, with studies grouped by design, including: (1) studies reporting datasets, (2) descriptive case studies without data and (3) discussion and narrative articles. Analysis and grouping were completed by both authors collaboratively. Thematic synthesis of the qualitative studies was completed using Thomas and Harden's (2008) three-step methodology. Step one involved line-by-line inductive coding of verbatim transcripts for content and meaning. Next, in step two, initial codes were grouped by shared meaning, forming descriptive themes. Finally, step three involved further revision and synthesis of the descriptive themes to generate the final analytical themes.

## **Results**

This scoping review aimed to explore the current literature and evidence base relating to Mask-Ed™. A total of 18 studies met the inclusion criteria. All studies were published between 2011 and 2020 and undertaken in Australia, with the exception of a single report undertaken in New Zealand. Twelve (67%) of the studies included the Mask-Ed™ KRS developer within the authorship group. All authors were affiliated with health services or universities. A summary of the studies is presented in the appendix.

Twelve of the 18 studies reported on participant data, with a total of 10 unique cohorts reported. Mainey et al. (2018) and Reid-Searl, Mainey, et al. (2019) drew two datasets from the one cohort, a pre-post cohort survey and post-activity focus groups, respectively. Reid-Searl, Eaton, et al. (2011) and Reid-Searl, Happell, et al. (2012) reported on thematic analysis undertaken with the same focus groups. Their 2011 study reported on student opinions and perceptions, and the 2012 study reported on responses to Mask-Ed™. Four studies reported quantitative survey data, and six studies utilised qualitative methodologies, with five drawing on focus groups and one reporting on educator journaling. Two further studies reported mixed-methods methodologies, combining an initial quantitative pre-post survey with subsequent focus groups. One quantitative and one mixed-methods study included different standardised rating tools for student-reported learning outcomes in interprofessional collaborative teams. Two studies reported

case studies on Mask-Ed™ use in an education setting without outcome data. One study reported on the training process for educators based in New Zealand, and the final three papers were discussions of Mask-Ed™ pedagogy and research summaries. A narrative synthesis of the studies as grouped by design is outlined below.

### ***Studies reporting datasets***

Three pre-post survey studies reported completing descriptive statistics and non-parametric analysis of quantitative questionnaire data to determine the impact of Mask-Ed™ with their respective cohorts (Frost & Delaney, 2019; Mainey et al., 2018; Reid-Searl & O'Neill, 2017). Collectively, the three studies reported data from 150 nursing students. Reid-Searl and O'Neill (2017) reported use of Mask-Ed™ in a tag-team simulation experience with 32 participants, resulting in reported increased student confidence and insight based on a single descriptive statistic. Mainey et al. (2018) completed a content analysis of short-answer survey questions for 99 participants (responses rate 93%) and concluded students' pre-workshop focus on touch moved to post-workshop focus on person-centred care, and that Mask-Ed™ simulation was a catalyst to increasing confidence due to realism, character vulnerability and classroom safety. Frost and Delaney (2019) reported on questionnaire data from 19 participants (76%), concluding students reported increased confidence following Mask-Ed™ simulation.

Two studies involved cross-sectional surveys. In the study by Frost, Isbel, et al. (2017), nursing and Master of Nutrition and Dietetics, Occupation Therapy and Physiotherapy students completed a survey following a 3-minute case vignette involving a Mask-Ed™ character. They reported that out of 30 preclinical students (a response rate of 22%), 25% had an "advanced understanding" of their role and 64% had "some understanding" of their own role. In contrast, in other disciplines, no students reported an "advanced understanding" of the role and 52% reported "some understanding". Frost, Sainsbury, & Waller (2017) used radar charting to report survey data obtained by nursing students who participated in two workshops with Mask-Ed™ compared to a non-Mask-Ed™ control group. Student-reported confidence was said to be greater for two of four clinical judgment domains (respond to a patient and noticing patient cues) and four of the six intended learning objectives.

Two studies utilised different validated Likert-scale tools to evaluate post Mask-Ed™ student-reported change in interprofessional learning. Frost, Isbel, et al. (2017) modified the 5-point Readiness for Interprofessional Learning Scale (RILS) and reported good internal consistency (0.71) for teamwork and collaboration, professional identity, and roles and responsibilities for 26 participants (response rate 18%). In contrast, Lawlis et al. (2018) used the 8-point Interprofessional Collaborative Competencies Attainment Survey (ICCAS). They reported no significant difference in students' understanding of their respective roles following the interprofessional learning Mask-Ed™ simulation with 10 dietetics, nursing and occupational therapy students. A significant difference in pre- and post-activity data

was reported at a cohort level for communication, collaboration, roles and responsibilities, family-centred approach, conflict management and team functioning.

Thematic synthesis of the studies reporting thematic analysis of qualitative data from focus groups and journaling revealed four overarching themes relating to the use of Mask-Ed™. The total number of focus group participants was between 93 and 118 (an exact number is unknown as Dwyer et al. (2015) reported a range of dietetic, nursing and occupational therapy participants, i.e., five focus groups of 5–10 participants). Reid-Searl, Levett-Jones, et al.'s (2014) study involving seven nurse educators' journaling regarding their Mask-Ed™ implementation is included here. The four overarching themes are: (1) the realism of the Mask-Ed™ character creates an authentic learning experience (Dwyer et al., 2015; Frost & Delaney, 2019; Lawlis et al., 2018; Reid-Searl, Eaton, et al., 2011; Reid-Searl, Happell, et al., 2012), (2) Mask-Ed™ requires a skilled educator for preparation and implementation that is reflexive and responsive (Reid-Searl, Eaton, et al., 2011; Reid-Searl, Levett-Jones, et al., 2014), (3) Mask-Ed™ develops student confidence, empathy, communication, reflection and problem-solving and introduces patient-centred care (Frost & Delaney, 2019; Reid-Searl, Bowman, et al., 2014; Reid-Searl, Happell, et al., 2012; Reid-Searl, Mainey, et al., 2019) and (4) Mask-Ed™ creates a safe, fun, engaging and social learning environment where mistakes are okay and students are taken out of their comfort zone (Dwyer et al., 2015; Lawlis et al., 2018; Reid-Searl, Bowman et al., 2014; Reid-Searl, Happell, et al., 2012; Reid-Searl, Levett-Jones, et al., 2014; Reid-Searl, Mainey, et al., 2019).

### ***Descriptive case studies without data***

Both case studies provide a narrative description of a Mask-Ed™ character being embedded into a 12-week unit of study with nursing students. Reid-Searl, McAllister and Sinclair (2014) detailed the influence of teacher-in-role and process drama on Mask-Ed™ pedagogy. Frost, Foster and Ranse (2017) reported on Mask-Ed™ as part of unfolding case pedagogy within chronic illness education. Both studies report advantages of embedding Mask-Ed™ across a unit of study, including student exposure to the humanistic aspect of nursing, learning of the broader social impact of a health condition, developing a relationship and rapport over repeated patient contact, repeated and ongoing learning and feedback from the educator, and facilitation of communication skills in a “safe”, formative environment (Frost, Foster, & Ranse, 2017; Reid-Searl, McAllister, & Sinclair, 2014). However, there was no outcome data or evaluation to substantiate this. Frost, Foster and Ranse (2017) identified time taken to design the learning experiences as a limitation.

### ***Discussion and narrative articles***

The three discussion and narrative papers span the initial (McAllister et al., 2013), intermediate (Frost & Reid-Searl, 2017) and, more recent, advanced (Reid-Searl, 2020) time points in the 12-year history of Mask-Ed™. McAllister et al. (2013) provide an



initial “deconstruction” of the pedagogical design elements and conceptual theories that underpin Mask-Ed™, namely Vygotskian sociocultural learning theory, applied theatre and embodiment. Frost and Reid-Searl (2017) summarised emerging research, positioning Mask-Ed™ as a preclinical educational tool that could possibly assist skill development and clinical readiness in professionalism, critical thinking and analysis, provision and coordination of care, collaborative and therapeutic practice, and caring. Most recently, Reid-Searl (2020) provided a personal account of the development of Mask-Ed™ over time, and more specifically, the intention for it to be a realistic simulation approach to create a human connection for novice nursing students learning personal care skills. The references cited in these narrative reviews are all included as outcome studies in this review. An additional article provided a narrative summary of the Mask-Ed™ training process for a group of eight nurse educators in New Zealand. It concluded that four of the nurse educators anticipated implementing Mask-Ed™ (Rhodes & Reid-Searl, 2015).

### ***Methodological observations***

While critical appraisal of individual studies is beyond the scope of this review, two main methodological observations can be made overall regarding the included papers, drawing on the McMaster University Evidence-Based Practice Research Group guidelines (Law, Stewart, Letts, et al., 1998; Law, Stewart, Pollock, et al., 1998). First, due to the infancy of Mask-Ed™, it is to be expected that studies are largely exploratory and pragmatic in design. This is also consistent with trends in study design in the broader simulation literature (Bogossian et al., 2018; Ryall et al., 2016). Second, the 18 studies in this review include case study, cross-sectional, prospective cohort study without control group (except for Frost, Sainsbury & Waller (2017), which included a control comparison) and pre-post design.

### ***Participating disciplines***

More than 80% of students and 100% of educators were from the discipline of nursing, with 13 students from the discipline of dietetics, seven from occupational therapy, six from physiotherapy and 11 from medical sonography and imaging. A further “small number” of medical students and doctors participated in the Dwyer et al. (2015) study, but the exact participant number was not reported.

### ***Risk of bias***

Given the observational, pragmatic nature of the study designs, the results reported should be interpreted with consideration of the following risks of bias. First, as mentioned, non-nursing health disciplines are underrepresented in these studies, with results being broadly representative of preclinical nursing students. Second, sample selection was purposive and on a volunteer basis. While this limited the power imbalance and ethical issues related to academic educators essentially seeking an evaluation of learning activities from their students, it also introduces the possibility of intervention bias. This could



present as volunteer student participants in these studies being more motivated learners or perceiving it as beneficial to partake in their educator's (and assessor's) research project. Third, attention bias should also be considered. It is highly probable that the participants of all studies were aware that Mask-Ed™ was the focus of the study and, consequently, they may have provided more favourable survey responses and comments in focus groups about this simulation pedagogy. Further, sampling for focus groups until saturation was only reported in one study (Dwyer et al., 2015).

Measurement bias could also be considered in this scoping review. Studies ranged from reporting quantitative data from a single outcome measure (Reid-Searl & O'Neill, 2017) to using non-standardised or validated surveys (Frost & Delaney, 2019; Frost, Isbel, et al., 2017; Mainey et al., 2018; Reid-Searl & O'Neill, 2017). Thematic analyses drew on differing methodologies (Dwyer et al., 2015; Frost, Sainsbury, & Waller, 2017; Lawlis et al., 2018; Reid-Searl, Eaton, et al., 2011; Reid-Searl, Levett-Jones, et al., 2014) or did not mention the specific type of content analysis (Mainey et al., 2018) or thematic analysis methodology (Frost & Delaney, 2019; Reid-Searl, Bowman, et al., 2014).

Intervention biases could also be considered for several studies. Co-intervention may have occurred in studies that utilised Mask-Ed™ as part of a hybrid simulation experience (Dwyer et al., 2015; Frost, Foster, & Ranse, 2017; Frost, Isbel, et al., 2017; Lawlis et al., 2018; Reid-Searl, McAllister, & Sinclair, 2014). Triangulation relating to the intervention was evident in several studies, with focus groups used to further explore survey results (Frost & Delaney, 2019; Lawlis et al., 2018) or validated scales used within researcher-designed surveys (Frost, Isbel, et al., 2017). Finally, the involvement of the Mask-Ed™ developer (Reid-Searl) in close to 70% of the Mask-Ed™ publications included in this scoping review should be considered. While this may bring inherent bias, the remaining 30% of independent studies did not differ in their reporting of data and themes relating to Mask-Ed™ (Frost & Delaney, 2019; Frost, Isbel, et al., 2017; Frost, Sainsbury, & Waller., 2017; Lawlis et al., 2017). This could be addressed in future studies by looking at independent replication at universities or with authors who have not been involved in Mask-Ed™ development or research to date.

## Discussion

Simulation is a much-utilised preclinical teaching and learning pedagogy in medical and health education. Mask-Ed™ draws on teacher-in-role methodology, using a full head silicone mask, clothing and rich character history developed to intentionally meet student learning objectives in peer group or cohort-level formative learning activities. This scoping review was completed to explore the literature and evidence base for this reasonably new pedagogy. Eighteen English language peer-reviewed studies focusing on Mask-Ed™ were found. Studies were largely descriptive, using pre-post survey or post-activity focus group methodology to explore the impact, experience and potential development of 295–320 nursing, medical sonography, medical imaging, dietetics, occupational therapy

and physiotherapy students, nurses, nurse educators and medical students and doctors. Overall, studies to date have been undertaken to primarily determine the impact of this simulation methodology in a formative learning environment.

### ***Teaching and learning environments and experiences***

The studies share a similar narrative about Mask-Ed™ enabling the educator to draw on their knowledge to guide, coach and scaffold students, allowing for spontaneous and iterative teaching and learning moments and immediate debrief (Dwyer et al., 2015; Frost & Reid-Searl, 2017; Frost, Sainsbury, & Waller, 2017; Reid-Searl, Bowman, et al., 2014; Reid-Searl, Levett-Jones, et al., 2014). Mask-Ed™ was consistently reported to engage students in *realistic* and *humanistic* learning experiences (Frost & Reid-Searl, 2017; Frost, Sainsbury, & Waller, 2017; McAllister et al., 2013; Reid-Searl, Levett-Jones, et al., 2014). This is considerable, given all studies included student learning in peer groups, with observers or as part of a broader class—all scenarios that tend not to replicate “real-world” patient–practitioner interaction or ratios.

Further, Mask-Ed™ studies that occurred in the decontextualised setting of a classroom and those undertaken in the highly contextualised environment of a high fidelity simulation ward yielded similar outcome data. This supports the notion that while the Mask-Ed™ character and spontaneity of the simulation are consistently described as realistic, they are also meaningful. In simulation, meaningfulness is considered independent of realism. It can be defined as “the degree to which individuals experience a task as one which is valuable and worthwhile for learning or professional practice” (Nestel, Krogh, & Kolbe, 2018, p. 25).

In relation to student learning, the main themes that emerged from the studies related to increased confidence and reduced fear, greater clinical readiness, and development of metacognition, communication and reflection (Dwyer et al., 2015; Frost & Delaney, 2019; Frost & Reid-Searl, 2017; Frost, Sainsbury, et al., 2017; Reid-Searl, Bowman, et al., 2014). While a promising finding, there are two initial caveats to consider. First, all studies detailed Mask-Ed™ being used as a formative learning tool and not for summative assessment. Consequently, the formative aspect of the learning experience could be an unreported contributing factor to the suggestion that Mask-Ed™ learning increases confidence and facilitates growth in clinical and professional skills in-situ. Second, self-report measures can reflect altered perceptions of the students and educators but not necessarily skill or competency improvement. This impacts the generalisability of the emerging themes from the use of Mask-Ed™ and could be considered in further Mask-Ed™ research or evaluation.

Survey and focus group data support student development of interpersonal, teamwork and communication skills (Dwyer et al., 2015; Frost, Foster, & Ransie, 2017; Frost & Reid-Searl, 2017; Mainey et al., 2018; Reid-Searl, Bowman, et al., 2014). Yet, studies exploring whether the use of Mask-Ed™ interprofessional learning activities could lead to

an increasing student awareness of other disciplines found a null hypothesis, suggesting that in preclinical interprofessional learning (IPL) teams, the use of Mask-Ed™ itself does not facilitate increased awareness of disciplines outside of the student's own. This could be influenced by students being in their initial years of study and not having been exposed to other disciplines yet in clinical practicums.

Rhodes and Reid-Searl (2015) reported on nurse educator reflections of implementing Mask-Ed™. Although the sample size was relatively small ( $n = 7$ ), it is interesting that their observations of student learning were consistent with studies that reported students' accounts of learning, albeit via survey or focus group. While further studies would be required to confirm this similarity, it could be inferred that educator observations and perception of student learning may be an accurate reflection of student-reported learning.

### ***A comparison of two simulated patient pedagogies***

Mask-Ed™ can be described as a type of simulated patient methodology. The educator (or a non-educator who undertakes a patient role) can be described as “a well person who is trained to portray a patient” (Nestel, Sanko, McNaughton., 2018, p. 52). Further, both methodologies (Mask-Ed™ and simulated patient) are designed to create realistic simulation experiences for the learner. Consequently, a number of comparisons can be made between Mask-Ed™ and the traditional simulated patient methodology. First, both draw on a number of simulation learning theories. These include psychomotor and communication skills drawn from behaviourism and cognitive and social constructivism in relation to students drawing their own meaning to meet learning outcomes (Bearman et al., 2018). Mask-Ed™ and simulated patient methodologies also rely heavily on situated theory, whereby students learn through emersion in a real-time simulated context (Bearman et al., 2018). Next, both simulation methods lend themselves to the benefits of observer learning within small groups or cohorts (O'Regan et al., 2016). Mask-Ed™ and simulated patient methodology can involve the role of a confederate who primarily assists the educator or researcher in guiding the simulation and retaining the safety for all involved (Nestel, Sanko, & McNaughton, 2018). Finally, a limitation of both methodologies is the risk of presenting stereotyped or stylised patients to student cohorts.

In contrast, there are a number of differences between the methodologies. Simulated patient methodology and supporting evidence have mainly involved summative, standardised assessments (Nestel, Sanko, & McNaughton., 2018). As reported in this review, Mask-Ed™ has only been used in formative learning activities. This highlights a potential limitation, as the effectiveness of using Mask-Ed™ in summative assessment is unknown. No studies to date report on standardised use of Mask-Ed™, which could be seen to negate the principle of spontaneity underpinning Mask-Ed™ pedagogy. Nor do any studies report on the use of learning outcomes of Mask-Ed™ being used with students in individual (one-on-one) simulation. Thus, the presence of peers and social learning is an undeniable contributing factor to the Mask-Ed™ literature to date. Finally,

the reliance on a single educator raises questions about the sustainability of Mask-Ed™ pedagogy. Unlike Mask-Ed™, cases involving actor-based simulations can remain embedded within a workshop or unit of study regardless of personnel changes. However, if the Mask-Ed™ educator is unavailable, either due to illness, sabbatical, conflicting timetabling or leaving the institution, it is unclear what the contingency options are as there are no reports of multiple educators presenting as the same character.

### **Recommendations**

Drawing on the findings of this review, inferred recommendations would include trialling Mask-Ed™ with preclinical, single allied health discipline workshops or units of study that require humanistic learning experiences to facilitate confidence, communication, psychomotor and meta-cognition skills in preparation for clinical placements. Further research studies could assess the impact of Mask-Ed™ in early clinical scenarios, with blind assessors comparing the student capability of those who have and have not had a preclinical Mask-Ed™ experience (depending on research design and ethical approval). Studies employing control groups would add to the rigour of the current evidence base. Such studies could consider student competency data from clinical placements and determine if Mask-Ed™ learning experiences result in students demonstrating superior confidence or competency on summative practicum assessment compared to students without preclinical Mask-Ed™ learning experiences.

### **Conclusion**

Mask-Ed™ is an innovative, educator-lead form of humanistic patient simulation that has the capacity to provide preclinical students with meaningful learning experiences. The findings of the review indicate there is an emerging evidence base in support of Mask-Ed™ being used as a formative learning pedagogy for preclinical nursing students to increase confidence relating to clinical and communication skills. While a small number of non-nursing students have been included in studies to date, the impact of Mask-Ed™ cannot be generalised to a discipline level. Nor is there evidence that Mask-Ed™ assists with the development or understanding of other disciplines in preclinical interprofessional learning activities. More research is needed trialling Mask-Ed™ with these students.

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**Appendix**  
**Search Results Summary**

Reference	Country	Participants	Analysis	Analyzed (n)	Sample Disciplines	Purpose/Aim	Data Collection Method	Findings/Outcomes Regarding Mask-Ed™
1. Reid-Searl, Eaton, et al. (2011)*#	Australia	2nd & 3rd year of course & first-year graduates	Thematic analysis (Ritchie & Spenser, 1994)	21	Nursing students	Explore students' opinions & perceptions of Mask-Ed™	Post-activity focus group	Main themes <i>Realism of character</i> <i>Skills of teacher</i>
2. Reid-Searl, Happell, et al. (2012)*#	Australia	2nd & 3rd year of course	Thematic analysis	21	Nursing students	Explore students' response to Mask-Ed™	Post-activity focus group	Main themes <i>Preparation for clinical reality</i> <i>Reducing fear/increasing confidence</i> <i>Taking out of comfort zone</i>
3. McAllister, et al. (2013)	Australia					Mask-Ed™ simulation explained using conceptual theories: <i>Vygotskian sociocultural learning theory, applied theatre &amp; embodiment</i>	Discussion paper	
4. Reid-Searl, Bowman, et al. (2014)*	Australia	Foundation level of course	Thematic analysis	11	Undergraduate medical sonography & medical imaging students	Explore how/if Mask-Ed™ simulation facilitated clinical communication skill learning	Post-activity focus group	Positive contribution to student learning Themes <i>Benefits of interacting with non-peer</i> <i>Learning made fun</i> <i>Insight into empathy</i> <i>Therapeutic communication skills</i> <i>Engaged problem solving</i> <i>Purposeful reflection</i>

Reference	Country	Participants	Analysis	Analyzed (n)	Sample Disciplines	Purpose/Aim	Data Collection Method	Findings/Outcomes Regarding Mask-Ed™
5. Reid-Searl, Levett-Jones, et al. (2014)*	Australia	12 months journaling after initial 2-day training (November 2011–September 2012)	Thematic analysis (Miles & Huberman, 1994)	7/32	Nurse educators	Perspective and experiences of educators who implemented Mask-Ed™ at three universities	Training	Themes <i>Preparation, implementation &amp; impact</i> <i>Reflexivity &amp; responsiveness</i> <i>Student engagement &amp; ownership</i> <i>Teaching &amp; learning</i>
6. Reid-Searl, McAllister, & Sinclair (2014)*	Australia				Nursing students	Teacher in role (TIR), process drama & Mask-Ed™ pedagogy within 12-week unit	Case study report	
7. Dwyer et al. (2015)*	Australia	Not reported	Iterative thematic analysis (Creswell, 2009)	5 groups of 5–10 students	Registered nurses, medical students, medical doctors	High-fidelity hybrid Mask-Ed™-ALSi simulation pilot for nurse & doctor education relating to deteriorating patients	Focus groups	Main theme <i>Engagement</i> Subthemes <i>Realism of character</i> <i>Believability of the experience</i> <i>More connected</i>
8. Rhodes & Reid-Searl (2015)*	New Zealand	September 2014		8	Nurse educators	Professional learning summary of Mask-Ed™ workshop		Four nurse educators introduced Mask-Ed™ into three New Zealand education institutions
9. Frost, Foster, & Rånse (2017)	Australia				Nursing students	Combined unfolding case & Mask-Ed™ pedagogy within 12-week unit	Case study report	

Reference	Country	Participants	Analysis	Analyzed (n)	Sample Disciplines	Purpose/Aim	Data Collection Method	Findings/Outcomes Regarding Mask-Ed™
10. Frost, Isbel, et al. (2017)	Australia	Preclinical placements	Descriptive statistics & non-parametric analysis of quantitative questionnaire data & educator ratings. Student responses rated on 3-point criteria: 1 = <i>poor</i> , 2 = <i>some</i> , 3 = <i>advanced understanding</i>	Case study 30/138 RILS Scale 26/138	Nursing students (undergraduate & graduate); Masters of Nutrition & Dietetics, Occupational Therapy, Physiotherapy	Explore use of combined digital storytelling & Mask-Ed™ to assist preclinical health students to understand their role in interdisciplinary patient care & determine readiness for interdisciplinary learning	Cross-sectional survey (case study & validated tool Readiness for Interprofessional Learning Scale [RILS]).	<i>Understanding of own role</i> : 25% "advanced understanding", 64% "some understanding" <i>Understanding role of other health professional</i> : 0% "advanced understanding" RILS Scale Good internal consistency (0.71) for teamwork & collaboration, professional identity, roles & responsibilities
11. Frost & Reid-Searl (2017)*	Australia	Not applicable (N/A)			Nursing students	Summary of Mask-Ed™ as teaching tool	Discussion paper	May foster preclinical skills & readiness in professionalism, critical thinking & analysis, provision & coordination of care, collaborative & therapeutic practice caring
12. Frost, Sainsbury, & Waller (2017)	Australia	Preclinical placements	Radar charts for comparison of quantitative data with control group Thematic analysis (Braun & Clarke, 2006)	41/130	Nursing students	Explore preclinical student-reported clinical judgement following Mask-Ed™ workshop	Cross sectional survey	Student-reported greater confidence for 2/4 clinical judgment domains (respond to a patient & noticing patient cues) & 4/6 intended learning objectives. Positive impact on student communication & learning
13. Reid-Searl & O'Neill (2017)*	Australia	Not reported (1st year of course)	Single descriptive statistic	32	1st year nursing students	Mask-Ed™ & TAG team simulation on intimate care	Case study report with pre-/post-survey	Increase in student reported confidence & insight

Reference	Country	Participants	Analysis	Analyzed (n)	Sample Disciplines	Purpose/Aim	Data Collection Method	Findings/Outcomes Regarding Mask-Ed™
14. Lawlis et al. (2018)	Australia	August 2016	Descriptive statistics & non-parametric analysis of quantitative questionnaire data Inductive thematic analysis (Braun & Clarke, 2006)	10	Dietetics, nursing, occupational therapy students 3rd year or postgraduate	Explore preclinical interprofessional simulation experience using Mask-Ed™ within a simulation ward	Pre/post Interprofessional Collaborative Competencies Attainment Survey (ICCAS) Post-activity focus group	Statistically significant improvement in all domains (communication, collaboration, roles & responsibilities, family-centred approach, conflict management & team functioning. No significant difference in understanding respective roles. Focus group themes: <i>Authenticity</i> <i>Mistakes are okay</i> <i>Learning</i>
15. Mainey et al. (2018)*^	Australia	Not reported (1st year of course)	Inductive content analysis	99/107	Nursing students	Understand use & meaning of Mask-Ed™ to teach intimate care	Pre/post survey	Pre-workshop focus on touch moved to post workshop focus on person-centred care Catalyst to increasing confidence due to realism, character vulnerability & classroom safety
16. Frost & Delaney (2019)	Australia	Semester 1 (February–June); year not reported	Descriptive statistics & non-parametric analysis of quantitative questionnaire data Content analysis of transcripts	19/25	Nursing students	Investigate nursing student reported confidence levels of catheterisation & student experience with Mask-Ed™ character	Pre/post questionnaire and post-activity focus group	Students report increased confidence Main theme <i>"Human element"</i> Subthemes <i>Caring of a person</i> <i>Intimate care</i> <i>Communication</i>

Reference	Country	Participants	Analysis	Analyzed (n)	Sample Disciplines	Purpose/Aim	Data Collection Method	Findings/Outcomes Regarding Mask-Ed™
17. Reid-Searl, Mainey, et al. (2019) <sup>*,^</sup>	Australia	Not reported (1st year of course)	Inductive thematic analysis	29/99	Nursing students	Determine if Mask-Ed™ enhanced student learning of patient intimate care	Post-activity focus group	Central organising concepts <i>Safe journey of discovery</i> <i>Simulation modality</i> <i>Discovering the person</i> <i>Discovering confidence</i> <i>Discovering friends</i>
18. Reid-Searl (2020)*	Australia				Nursing students	Creator narrative of background to Mask-Ed™ & use in intimate care education	Discussion	Realistic simulation approach to create human connection for novice nursing students learning intimate care skills

Adapted from Tricco et al. (2018)

\* Mask-Ed™ original developer involved in study (n = 12/18; 67%)

# contains the same dataset/reporting on the same study

^ contains the same dataset/reporting on the same study