

Manikin Simulation in Mental Health Nursing Education: An Integrative Review

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TITLE: Manikin simulation in mental health nursing education: An integrative review

SHORT TITLE: Integrative review of mental health simulation

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ABSTRACT

Mental health is a significant issue worldwide, and the contemporary nursing graduate needs to be skilled in all aspects of patient care, including proficiency in physical and psychosocial health care, and competency in assessing and managing mental health challenges. Developing clinical ability in mental health care can be difficult without adequate exposure to mental health care situations. While simulation has gained increasing popularity in nurse education in recent years, there has been limited investigation of the effect of manikin simulation in the development of knowledge and confidence in mental health care in undergraduate nurse education. To investigate this further, a review of the published literature from 2000 to 2016 was undertaken, which found nine articles that met criteria for inclusion in this review. Simulation was found to increase learner confidence, satisfaction with learning, and self-efficacy in knowledge and communication in mental health care scenarios through the opportunity to rehearse complex care situations. While there are limitations in the available research, simulation holds potential to enhance undergraduate nurse education in mental health care.

KEYWORDS: Simulation; Manikin; Mental Health; Nurses; Psychiatric Nursing; Students, Nursing.

INTRODUCTION

Mental health disorders contribute significantly to the global burden of disease and are one of the largest single causes of disability (World Health Organisation (WHO), 2013). Patients with mental health issues are seen in every health care setting and the demand for specialist mental health services continues to increase (Australian Institute of Health and Welfare (AIHW), 2014). Globally, nurses are the largest health care group contributing to mental health care, but few receive ongoing specialist training in mental health care (WHO 2015). This is problematic, as while mental health nursing is a distinct speciality area of clinical practice, all nurses' need comprehensive initial training, continuing professional development and mentoring in mental health care in clinical practice (Innes, Morphet, O'Brien, & Munro, 2014).

Importantly, a strong educational foundation in mental health care needs to be a priority in all undergraduate nurse education programs with strong leadership and quality educational resources (Mental Health Nurse Education Task Force (MHNET), 2008; Moxham, McCann, Usher, Farrell, & Crookes, 2011). Few students begin their nursing education with the intention of working in mental health speciality areas (Moxham et al., 2011; Stevens, Browne, & Graham, 2013). However, as mentioned above, all clinicians need mental health knowledge and skill, along with the confidence to

use these attributes in their clinical setting (NSW Health 2015). Concerns about the capability of the current model of undergraduate nursing education in Australia to develop the skills and knowledge of the future nursing workforce to provide consistent, high quality, integrated mental health care have been raised by education specialists (Happell & McAllister, 2014; McAllister, Happell, & Flynn, 2014). Supervised clinical practice is one way of building capacity, however it is challenging to secure sufficient quality clinical placements with a primary mental health care focus that give students an opportunity to consolidate knowledge of mental health care and build confidence in their abilities to provide effective and integrated mental health patient care (Barrett & Jackson, 2013).

Learning via simulation activities is widely used across nurse education, both in undergraduate programs and clinical education for ongoing professional development (Cant & Cooper, 2010; Foronda, Liu, & Bauman, 2013; Stroup, 2014). Despite this broad usage, there has been limited evaluation of the transference of knowledge developed in simulated clinical scenarios through into clinical practice (Fisher & King, 2013; Richardson & Claman, 2014; Weaver, 2011). Simulation is valued by students and educators as a teaching methodology to develop skills, knowledge, confidence and critical thinking (Cant & Cooper, 2010; Foronda et al., 2013; Norman, Dore, & Grierson, 2012). Furthermore, it allows integration and synthesis of curricula content, and provides a low-risk environment with standardised learning experiences that has authenticity and relevance to practice (Hopwood, Rooney, Boud, & Kelly, 2016). Education with simulation gives the learner access to a wide variety of clinical scenarios, the opportunity to practise and allows timely feedback on clinical capability (Laschinger et al., 2008). This perceived value of learning by simulation has led to its acceptance as valid learning strategy gaining acceptance by accrediting bodies and professional organizations (Breymer et al., 2015).

In an Australian context, manikin simulation is used extensively, in particular in undergraduate education (McGarry, Cashin, & Fowler, 2014 b). Standardised patients, virtual patients and simulation of patient experience (for example, voice-hearing experience simulation) have also been reported (Brown, 2015). Limitations of simulation as a learning method include cost of set up, challenges in building the confidence and engagement of learners with the scenario, challenges with technology and lack of flexibility and responsiveness of the scenario to meet individual learning needs (Becker, Rose, Berg, Park, & Shatzer, 2006; Cant & Cooper, 2014; Kaplan & Lehr, 2013). Manikin simulation, while initially expensive, has the advantage of minimal further expenditure and greater flexibility for transport and spontaneity of use. It also facilitates learner-centred learning as the educator can readily respond to learning needs.

It has been suggested that simulation facilitates knowledge development and synthesis, an ability to practice clinical skills, and to apply knowledge and skills in a safe replication of a clinical experience (Cant & Cooper, 2010). Understanding how the use of manikin simulation enhances nursing students' learning of mental health care is crucial as this teaching method becomes widespread (Brewer, 2011; McGarry, Cashin, & Fowler, 2011). We suggest that as simulation activities are further integrated into nursing curricula, there needs to be rigorous examination of its potential to affect pre-registration preparation for psychiatric nursing practice (McGarry, Cashin, & Fowler, 2014 a; McGarry et al., 2014 b). This review will help fill this gap in the existing level 1 evidence.

AIM

This integrative review aimed to answer the following research question:

How does manikin simulation affect undergraduate registered nurses' knowledge and confidence in managing mental health care? The outcome measures of interest include the effect of simulation on participants' knowledge including critical thinking, and the effect on participant satisfaction or confidence in providing mental health care. Secondary aims of the review include cost relative to benefit, student engagement and time expenditure.

METHOD

This study is an integrative review of the literature. The strength of an inclusive review is that it allows concomitant understanding of a phenomenon through qualitative methods along with measurement of impact and effects through quantitative methods, valuing both equally (Pluye & Hong, 2014). A systematic search of publications was undertaken from 2000 to 2016. A broad range of databases were used to ensure comprehensive retrieval of potential studies. These databases included CINAHL plus, Medline, Scopus, ProQuest Health and medical complete and Dissertation and Theses database, along with Google Scholar. The search strategy, databases and MeSH terms are listed in Figure 1. The search was undertaken by the first author with support from a specialist librarian.

The inclusion and exclusion criteria are listed in Figure 1. The early limit to the year 2000 was in recognition that both the capability of simulation technology and educational practice has evolved and it was therefore important to focus on current scholarly material in this area.

Study identification and selection process

In the database search phase, study title and abstract were reviewed for relevance. If the title and abstract had insufficient detail to determine eligibility, the full article was retrieved and screened for relevance. The first author completed the screening for inclusion. Citation chaining (Ellis, 1989) was used to ensure that the search was comprehensive. Study selection process is demonstrated in Figure 1.

Synthesis design and quality assessment

Studies that met the inclusion criteria were assessed for quality using the Mixed Methods Appraisal Tool (MMAT), widely used to appraise the methodological quality of studies of multiple methodologies (Johnston et al., 2016; Pluye, Robert, Cargo, Bartlett, O’Cathain, Griffiths, Boardman, Gagnon & Rousseau, 2011; Souto et al., 2015). Relevant information for analysis from each paper was extracted and the methodological quality was appraised (see Table 1). Two authors (EK, AJ) independently assessed each study using the MMAT and where there were differences in the evaluation, discussion ensued. When consensus was not reached, the third author (MM) made the final decision, as occurred with one paper (Kameg, Howard, Clochesy, Mitchell, & Suresky, 2010). Quality assessment is particularly important in an IR where studies may lack methodological rigor.

Data analysis

Analysis and synthesis of the results of the review were undertaken using a convergent qualitative design (Belanger, Rodríguez, & Groleau, 2011; Clark & Creswell, 2011). The qualitative results of the included papers were first analysed for themes, exploring the studies using pre-existing codes looking for the key responses related to the study aims across studies, and these were synthesised to create a broad overview and understanding. The outcome measures of the quantitative papers were reviewed, looking specifically at the measurable outcomes, including confidence and knowledge, and this analysis was used to support the relative importance of the themes introduced by the qualitative analysis (Clark & Creswell, 2011).

RESULTS

Nine studies met the inclusion criteria and were included irrespective of the MMAT quality assessment score to ensure a comprehensive review of the topic. A range of methods were used by the authors, however quantitative methods predominated with seven studies (Table 1). While the context of the individual simulation scenarios differed, all used manikins to depict a mental health care episode in an acute care setting. The effect of simulation on knowledge and critical thinking was more commonly reported than the effect on learner’s confidence. All studies originated from the United States.

Quality

The methodological quality of the included studies varied, with a range of MMAT scores from 0% to 75%, shown in Table 1. One study incorporated a comparison group and all studies used a convenience sample. Sample size where reported was small ($n < 54$). Some of the studies reported their methods of ensuring the validity and reliability of results (Kameg et al., 2010; Lehr & Kaplan, 2013; Szpak & Kameg, 2013), but in a number (Beckford, 2013; Oliver, Ambrose, & Wynn, 2011; Spinner-Gelfars, 2013) this was not addressed. Four studies used some form of validated assessment tool to provide objectivity and increased reliability of outcome measures (Kameg et al., 2010; Kameg, Englert, Howard, & Perozzi, 2013; Lehr & Kaplan, 2013; Szpak & Kameg, 2013).

Knowledge

In regards to knowledge and critical thinking, Five of the studies specifically addressed knowledge as an outcome measure (Kameg et al., 2013; Lehr & Kaplan, 2013; Murray, 2014; Oliver et al., 2011; Szpak & Kameg, 2013) while two of the included studies, Murray (2014) and Szpak and Kameg (2013) reported statistically significant changes in knowledge and critical thinking after simulation. Others (Lehr & Kaplan, 2013; Szpak & Kameg, 2013) found that participants reported better understanding of nursing concepts in mental health scenarios. Conversely, Kameg et al. (2013) measured knowledge as an outcome but found no difference post-intervention.

Confidence

There was limited examination of learner confidence across the studies. However those studies that did report confidence showed that participation in simulation led to reduced anxiety (Szpak & Kameg, 2013), and increased confidence in mental health scenarios in communication, assessment and provision of care (Lehr & Kaplan, 2013; Murray 2014). Learners perceived that these attributes would be useful and transferable into nursing practice (Beckford, 2013; Szpak & Kameg 2013) and that they had developed increased self-efficacy in communication skills (Kameg, Clochesy, Mitchell & Suresky, 2010). While not specifically measuring confidence, Maruca and Diaz (2013) found that learners valued the opportunity to practice mental health skills by way of the simulation activity when they did not have an opportunity to do so in their scheduled clinical placement.

Many studies lacked a control or comparison group. However, we acknowledge the challenges in undertaking research with a control group in a student population. While the simulation evaluation survey (SES) was used to evaluate participants' perception of simulation in three studies (Kameg et al 2013; Kameg et al 2010; Szpak & Kameg, 2013), the outcome measures were assessed using study-specific, and in some cases non-validated assessment tools, reducing the reliability and validity

of their results (Cant & Cooper 2010). In addition, all studies were undertaken in the US limiting generalizability of the findings to a global context. There was relatively little reporting of cost effectiveness of simulation, and no reporting of time effectiveness of simulation as a teaching method.

DISCUSSION

The aim of this review was to provide level 1 evidence around the effectiveness of manikin simulation as a tool for improving undergraduate registered nurses' knowledge and confidence in managing mental health care. Integration of the results of the included studies suggest that manikin simulation has value in mental health care education for undergraduate nurses, with reported increased understanding of mental health concepts and improvement in clinical ability, including assessment and intervention, clinical reasoning and decision making. Simulation has been shown to increase learner's knowledge, confidence and self-efficacy in provision of care (Cant & Cooper, 2010; Foronda et al., 2013; Kaddoura, Vandyke, Smallwood, & Gonzalez, 2016).

In this integrative review we identified significant methodological limitations in the studies reviewed, including, small sample sizes, lack of validated tools, single site studies, and reliance on observational studies. However we also identified that manikin simulation provides an exciting and innovative learning and teaching strategy which challenges learners' knowledge and beliefs of mental health care. Indeed, the process of simulation and practice of mental health care situations can create a rich learning environment where participants have the capability to rehearse clinical performance in a low-risk clinical setting. The focus of the studies included in this review varied, and their contribution to the review questions varied, however, with the inclusion of both quantitative and qualitative studies ensured that data was rich and detailed.

Increased confidence and learner satisfaction

Mental health simulation activities reportedly increased students' satisfaction with their learning and the development of greater recognition of personal attributes. This includes learners' level of confidence and perceived limitations in professional practice. Satisfaction with learning and self-confidence promote student engagement in learning, particularly in the understanding of difficult or challenging concepts (Scott, 2008) such as those found in mental health care (Brown, 2008). The safe environment that simulation provided may have contributed to the learners' ability to construct their clinical practice (Cant & Cooper, 2010) by challenging assumptions; the heart of education is challenging the status quo and this is done by questioning assumptions and stereotypes. This was supported by a perceived increase in participants' confidence in managing mental health care, with

measured and self-reported reduction in anxiety related to mental health nursing care after participation in a simulated scenario. Lack of confidence may be a barrier to the provision of effective mental health care (Sivakumar, Weiland, Gerdtz, Knott, & Jelinek, 2011).

Opportunity to rehearse clinical practice

Additionally, the simulated interactions were aligned with the clinical environment which supported learners' understanding of mental health care and increased mastery of clinical skill. Simulation provided the opportunity to repeat clinical experiences after supported debriefing, which may have contributed to the learners' satisfaction (Kelly et al., 2016). Simulation also allowed students time to discuss and reflect on their experience in mental health nursing care. This indicates that the structure of the education sessions need to incorporate sufficient time for this important facet of learning (Kelly, Hager, & Gallagher, 2014) as students valued the direction from an experienced clinician in the development of their clinical judgement. While improved decision making and clinical reasoning in mental health care were also reported, with a perceived ability to transfer these attributes to clinical practice, there has been limited investigation of what impacts the transfer of these attributes from a simulated environment to the clinical setting.

Increased self-efficacy in knowledge and communication

Student perceptions of the value of mental health simulation training revealed increased self-efficacy in both knowledge and communication skills, along with an increased ability to prioritise patient care in mental health conditions. Elements of self-efficacy included reports of elevated development of critical thinking skills, perception of increased knowledge of mental health conditions and management, as well as perceived increases in understanding of the key concepts in mental health care. Knowledge of self is important in the development of self-efficacy, leading to enhanced professional capability and clinical competence (Pike & O'Donnell, 2010) and this holds particular value within mental health nursing. Hall (2015) reported that simulation allowed participants to become more skilled and increasingly competent in clinical practice, promoting persistence and increasing self-efficacy. Individuals with high self-efficacy, those who believe that they can perform well, are more likely to view difficult tasks as something to become skilled at rather than something to be avoided. While self-efficacy was not a specific focus of this review nor of the studies cited in this report, it was a theme that emerged in a number of areas of the results including in the ability to prioritise care and communication.

Student perception of knowledge enhancement may not always relate objectively to actual knowledge building (Johnston et al., 2015). The only study which assessed knowledge before and

after the simulation activity reported no change in participants' level of knowledge, however it did identify students that were at risk of poor academic performance in the learning environment. Simulation may help educators to ensure that all learners have the opportunity to develop the necessary skills and knowledge for successful transition to clinical practice.

Interestingly, there has also been investigation of the effectiveness of simulation as an educational tool for mental health nursing students in the development of recognition and assessment of physical deterioration in a patient with a primary mental health issue. While it was excluded from the review as it specifically looked at the integration of assessment of physical deterioration into a mental health scenario, Unsworth, McKeever, and Kelleher (2012) highlighted the potential benefits of integrated simulation that included both physical and psychological parameters, demonstrating a holistic approach to nursing assessment and care.

There was limited reporting of the cost- and time-effectiveness of simulation in mental health care. This is a critical deficit, as wide scale adoption of such educational intervention by increasingly stretched tertiary and training staff requires a clear estimation of cost and time requirements. A criticism of simulation education is that a theory of learning has not been used to support the learning experience (Berragan, 2013; Bland, Topping, & Wood, 2011). However, in this review, five of the interventions used a pedagogical framework; these were Bandura's theory of self-efficacy (Kameg et al., 2010), Kolb's theory of experiential learning (Kameg et al., 2013; Murray, 2014) and Jeffries' National League of Nursing simulation framework (Maruca & Diaz, 2013; Szpak & Kameg, 2013).

A reported limitation of manikin use in simulation is the lack of realistic facial expression (Kameg, 2010). While it is beyond the scope of this review, the impact of this on participants' engagement with the scenario and on their learning warrants further evaluation, particularly in the context of mental health education. Developing hybrid forms of simulation such as MaskEd™, where the educator uses props and realistic masks to take on the role of the expert patient, may have potential to enhance the clinical preparedness of undergraduate nurses (Frost & Reid-Searl, 2015; Kable, Arthur, Levett-Jones, & Reid-Searl, 2013; M. McAllister, Searl, & Davis, 2013). These simulation techniques can benefit from systematic and methodological evaluation processes informed by earlier research.

LIMITATIONS

There are limitations in the reliability of the results due to the methodology of the studies, with no true experimental studies. However, the ethical difficulties associated with limiting educational

experience for some, but not all students, must be acknowledged. Knowledge and confidence are difficult to measure using an objective assessment tool, so there was a reliance on self-reported measures. One of the issues encountered in simulation research is that concepts like critical thinking are not easily measurable (Maneval et al., 2012). Few studies reported results from pre- and post-intervention, and only one study used a control group. None of the included studies used randomisation in recruitment of their participants, and where reported, all participants were recruited using convenience sampling. There was limited reporting of rich qualitative data from the studies for synthesis in the review. Sample sizes were small, however there was a high response rate among the recruited participants. Much of the data was gathered after the intervention which gives limited insight into the effect of the intervention and reduces the transferability of these results.

Selective publication may have led to a positive bias on results, and limited reporting of knowledge from this burgeoning field of education. There is also risk of article selection bias leading to an incomplete understanding in this field, but this has been somewhat mitigated by the search strategy using multiple databases and citation chaining to provide a higher level of consistency.

CONCLUSION AND RECOMMENDATIONS

There is evidence to suggest that knowledge and understanding of mental health care by undergraduate nursing students can be enhanced by the use of manikin simulation in education/training. This includes not only a better understanding of concepts, with improvements in clinical abilities, with increased skills, reasoning and decision making, but also the potential ability of nursing students to transfer this to their clinical practice in nursing care. In addition, participants in mental health care simulation are more likely to be more confident in their capability to provide mental health care. Self-efficacy emerged as a theme in the review, which can be linked to increased engagement with challenging clinical situations.

While the strength of the recommendations are constrained by the limited available published research and the methodological limitations, there is beginning evidence to indicate that the use of manikin simulation in mental health care education can be effective in building both the knowledge and confidence of undergraduate nurses. This is linked to reduced anxiety with increased self-efficacy in students engaging in mental health care situations, increased understanding of mental health care concerns, and increased self-awareness of capability to provide mental health care.

Further investigation using more robust methods and comparative groups or learners in mental health simulation using high fidelity manikin is needed. Future research could add to this new body of knowledge, including comparison of methods of simulation, and a greater understanding of how

to ensure these demonstrated benefits are transferred into clinical practice, leading to improved client/ patient outcomes. This may provide necessary support and impetus for greater inclusion of simulation as an educational tool across national and international nursing curricula.

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Figure 1. Search strategy and the article selection process

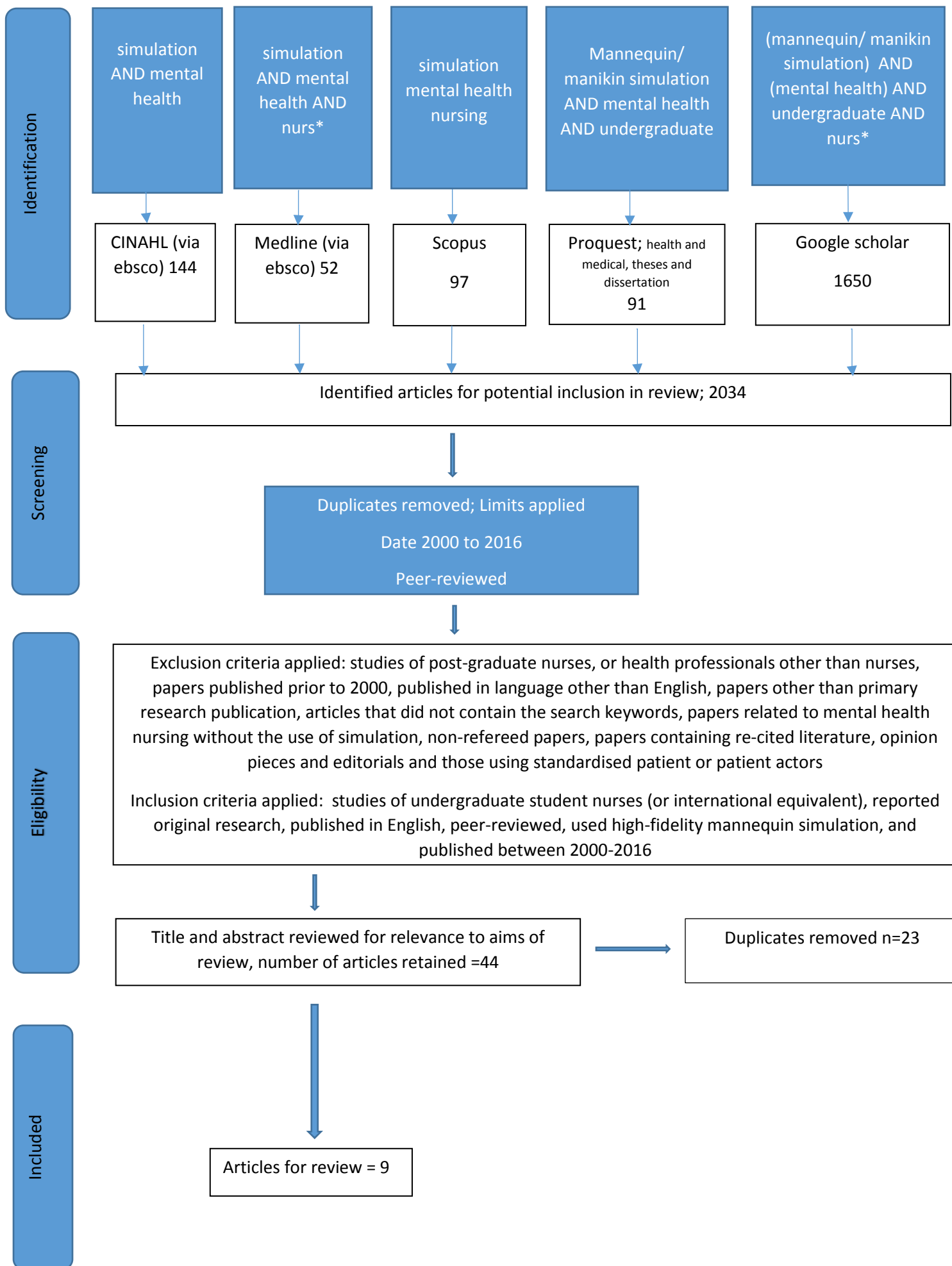


Table 1: Data extraction and quality indicators

Authors, year, journal, origin	Stated aim of the study	Research design	Sample size/ Selection/ allocation to group	Measures used	Validity/ reliability	intervention (if present)	Effect on participants' Critical thinking & knowledge	Effect on participant satisfaction or confidence and engagement with MH care	Limitations	MMAT score (consensus rating)
Beckford, 2013. Open Journal of Nursing, USA	To develop a curriculum that incorporates HFS in mental health assessment and interventions across acute psych, medical-surgical, maternity and paediatric	Quantitative non-randomised, single group repeated measures	Not reported	Pre- and post-test, self-rated ability to provide mental health care, 10 item survey	Not reported	5 Sim education scenarios using 3g mannequin: alcohol withdrawal in the young adult, elder abuse in the community, post-traumatic stress disorder in adolescent outpatient care, depression in the military veteran, end of life and organ donation in the paediatric intensive care	Not reported	Anecdotally students identified an ability to transfer knowledge between simulations in the lab to patient care in the clinical setting	Self-reported outcomes	0% (A)
Kameg, Clochesy, Mitchell & Suresky, 2010. Issues in Mental Health Nursing, USA	To compare the effectiveness of two educational delivery methods; traditional lecture versus HFS, on senior level nursing student's self-efficacy with respect to communicating with patients experiencing mental illness.	Quantitative non-randomised, single group repeated measure, duplicated in 2 groups at different times	Convenience non-randomised sample groups N=38 students	Three outcome measures used: -Single item VAS for self-rating of self-efficacy in communication skills. -A ten item, four point likert scale for general self-efficacy. - SES using a four point likert scale to evaluate perceptions of simulation.	-VAS has test – retest reliability, and construct validity. -General self-efficacy Cronbach's alpha range 0.76-0.90. -SES Cronbach's alpha 0.87. -SES expert review for content validity.	Participants attended a 2 hour lecture on communication skills, including the pre-test surveys. Participants completed one of two HFS scenarios (increasing anxiety and panic or worsening depression) , in the role of the nurse	Not reported	Significant increase in self-efficacy of communication skills	Small sample n=38 Researcher bias- sim instructor & lecturer	75% (C)
Kameg , Cozzo Englert, Howard, Perozzi, 2013. Issues in Mental Health Nursing, USA	To determine the effect of HFS in mental health care on nursing student knowledge, retention of knowledge and perception	Quantitative, non-random, quasi experimental design, repeated measures	Convenience , non-randomised n=37	Knowledge measured using a 30- question exam. Pre- and post-simulation intervention, repeated 12 weeks later to assess retention of knowledge. -Simulation effectiveness survey (SES) using a four point Likert scale was used to evaluate perceptions of simulation post-intervention only	Validity of knowledge measure assumed due to the similarity of the knowledge outcome measure to other validated measures. -SES Cronbach's alpha 0.87. -SES expert review for content validity for content validity. 95% response rate	Three scenarios: Care of the Patient Experiencing Acute Alcohol Withdrawal, Care of the Patient Experiencing Trauma related to IPV, and Care of the Patient Experiencing PPD	There was no improvement in participant's knowledge	Not reported	Participation was incentivised	75% (A)
Lehr & Kaplan, 2013. Clinical	To determine the effect of mental health HFS on critical thinking, confidence in	Quantitative, non-randomised, non-	Convenience sample n=54	Pre- and post-simulation 5-point Likert scale surveys measured students' self-rated	Simulation effectiveness tool has established reliability and	Scenario 1: Patient experienced fall while intoxicated. Key points were injury assessment (fractured	100% of participants agreed (78% strongly agreed) that the Instructor's questions	95% agreed that they felt more confident in decision making skills; 96% felt more	Delayed data collection for a portion of respondents.	75% (A)

Simulation in Nursing, USA	communication, and pre- & post-anxiety level of students	experimental.		anxiety in mental health care. Simulation effectiveness tool measured effect on learning post-intervention	validity	arm and pain), intoxication, aggressive behaviour, family disruptiveness, inappropriate behaviour and response from patient, and lack of patient and family understanding of medical terminology Scenario 2: Post-operative assessment for prostate cancer. Key points were addressing sexuality concerns, sexual innuendo, depression and suicide risk	helped them to think critically; 88% agreed (44% strongly agreed) that they developed a better understanding of the pathophysiology of the conditions; 97% (80% strongly agreed) that they were challenged in their thinking and decision making skills	confident in determining what to tell the health care provider; 91% agreed that they felt more confident to be able to recognise changes in patient condition	Groups of students had different content prior to intervention; the validity of the anxiety measure tool was not addressed	
Maruca & Diaz, 2013. Advances in Dual Diagnosis, USA	To determine if HFS enhanced psychiatric nursing education	Qualitative, descriptive	Convenience sample n=38	5 item open-ended survey questions related to learning experience in simulation	Both authors analysed and developed themes	Simulation activity involved participant recognising the need and implementing the CIWA-Ar assessment, and recognised and managed care of a simulated patient requiring alcohol withdrawal management	Not measured	Students responded positively to the simulation as a teaching tool	Post intervention assessment only	25% (B)
Murray, 2014, International Journal of Health Sciences Education, USA	Describing the implementation of HFS in psychiatric nursing	Mixed methods descriptive post-test only design	Convenience sample n=19	20 item 5-point Likert scale not stated (but survey questions specifically address confidence in mental health practice and self-efficacy)	Expert evaluation of survey for content validity	4 scenarios with acute care focus with concurrent MH issues	Participants reported that simulation activities stimulated critical thinking and decision-making skills mean score = 4.74 (SD 0.57) and that simulation experience enhanced learning of psychiatric and mental health nursing mean score=4.68 (SD 0.59). Participants also reported that they were able to assess the mental status of a client with a psychiatric or mental health disorder (mean= 4.47 SD 0.62)	Participants reported feeling confident in recognising the signs and symptoms of alcohol withdrawal (mean= 4.21 SD=0.71), confident in recognising signs of acute inhalant intoxication /delirium (mean=4.26 SD=0.65), confident in parent education: discharge planning for teens' drug abuse problems (mean=4.32 SD= 0.67), confident in recognising acute delirium psychosis induced by hallucinogens (mean= 4.37 SD= 0.77), confident that I can facilitate the initiation of an emergency	Small sample size, no pre-test for comparison. No validity or reliability testing of survey tool	50% (B)

								psychiatric detention (mean=4.42 SD=0.61)		
Oliver, Ambrose, & Wynn. 2011, Journal of Nursing Education , USA	Describes the implementation of HFS for undergraduate nurses integrating mental health and medical-surgical nursing care	Non randomised quantitative descriptive, self-rated	Not stated	Survey- no further information	Not addressed	3 scenarios: hypertension & suicide ideation, atrial fibrillation & suicidal depression, and deep vein thrombosis or chest pain & depression	92% of respondents felt that they developed a better understanding of pathophysiology, 91% felt they understood classroom measures better	Not measured	No consideration given to bias, validity or reliability of the results	25% (A)
Spinner-Gelfars, 2013, Teaching and Learning in Nursing USA	Assess the effectiveness of HFS in promoting effective communication by undergraduate nurses in psychiatric-mental health nursing	Qualitative, descriptive	Not stated	Participants reflected on their experience in simulation activity and responses were collated by the author	Not addressed	Variable scenarios for each individual student- no clear objectives for scenario	Not reported	Not reported	Technology issues in implementation of scenarios	50% (A)
Szpak & Kameg, 2013, Clinical Simulation in Nursing, USA	Investigate the impact of HFS on nursing student anxiety prior to attending clinical placement and interaction with mentally ill patients	Quantitative non-randomised	Convenience sample n=48, response rate n=44	Three outcome measures: -Pre- & post-intervention single item VAS to measure anxiety; - STAI pre & post-intervention (40 item Likert survey that); -SES- 9 questions 4-point Likert survey	-VAS is sensitive and has construct validity. -STAI has been validated and is a reliable measure. -SES expert review for content validity, Cronbach's alpha 0.87	2 scenarios: depression and suicide ideation & anxiety and substance abuse	Participants agreed that simulation helped understanding of nursing concepts (mean = 3.4, SD = 0.490), simulation stimulated critical thinking abilities (mean = 3.6 SD = 0.504), that knowledge can transfer to the clinical setting (mean = 3.6, SD = 0.545) [4 point scale 1= strongly disagree 4=strongly agree]	Participants agreed that they were nervous during simulation experience (mean =2.9, SD= 1.001), and more importantly that they will be less nervous in clinical because of simulation (mean = 3.2, SD = 0.769)- [4 point scale 1= strongly disagree 4=strongly agree] Significant changes in student level of anxiety - t test 4.9 (p<0.01) STAI 1 (state) at time 1 (pre) mean=1.8 (SD=0.4) and at time 2 (post) mean =1.5 (SD=0.49), with no change in inherent anxiety STAI Y-2 (trait anxiety)	Small sample size, lack of standardisation of simulation due to variable student responses	75% (A)

Key to table:

CIWA Ar- Clinical Institute Withdrawal Assessment for Alcohol

HFS- High Fidelity Simulation

IPV- Intimate Partner Violence

MH- Mental health

PPD- Postpartum Depression

SD – standard deviation

SES- Simulation Experience Survey

STAI- State-trait anxiety inventory (differentiates state anxiety - subjective feeling of responding to a stressor- from trait anxiety- proneness to anxiety)

VAS- Visual Analogue Scale

Consensus rating

A- Both authors rated same score independently

B- Both authors rated same score after discussion

C- Agreement not reached, third author rated

