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ORIGINAL RESEARCH

Simulation-based education for nurse and midwife advanced practitioners: a scoping review

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ABSTRACT

Introduction
Simulation-based education (SBE) is widely adopted in undergraduate nurse and midwife education. The extent, format and evidence for its use in nurse and midwife advanced practitioner education is under explored. The aim of this scoping review was to establish the extent and types of available evidence on SBE for nurse and midwife advanced practitioner education.

Methods
The Joanna Briggs Institute guidance for conducting scoping reviews was followed. The inclusion criteria were advanced nurse/midwife practitioner student learners exposed to SBE in their programme of education. The databases Embase (Elsevier), Medline (EBSCO), CINAHL (EBSCO), PsycINFO (EBSCO), Web of Science, Applied Social Science Index and Abstracts (Proquest), ERIC (Proquest) and Cochrane CENTRAL were searched from date of inception to April 2024. Google Scholar and ProQuest Dissertation and Theses was search for unpublished literature. The findings are summarized narratively, supplemented by graphs and tables.

Results
One hundred and forty-six records, involving 5077 student participants were included in this scoping review. Records included 137 primary research studies that, respectively, were quantitative (76%), qualitative (10%) and mixed methods studies (7%). Eight records were reports of evidence syntheses (8%). These included four systematic, two integrative and two scoping reviews. The final record was a national SBE guideline for advanced practitioner education. Most records were from the United States of America (USA) and 48.6% were published in the 3 years spanning the outbreak of COVID-19. The description of the format of SBE, curriculum content and assessment and the reporting of simulation best practice standards reflect the presented findings.

Discussion
The extent and use of SBE in programmes at the advanced practitioner level in nursing and midwifery is under explored in countries outside of the USA. As no literature was found in relation to advanced midwifery practice, this scoping review findings relate to advanced nursing practice. Improved reporting on the standards of best practice is needed in nursing research on SBE. The research

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methodologies were largely limited to quantitative research designs. Future research, which focuses on advanced midwifery practice and use of other research methods, would strengthen the knowledge base and our understanding of SBE in advanced practitioner programmes.

What this scoping review adds

- The extent of evidence on simulation-based education (SBE) in advanced nurse practitioner education arises mainly from studies conducted in the USA and is largely quantitative in design.
- Research on midwifery, as a distinct profession of advanced practitioner, is lacking.
- There is a need to improve the reporting on the standards of best practice in SBE.
- There is a need to improve reporting of educational theory underpinning SBE.

Introduction

The growth in teaching and learning strategies, adopting adult-centred pedagogy, has increased in healthcare education. Simulation-based education (SBE) is an adult-centred instructional methodology, aimed at building on a foundational knowledge base to create new knowledge through immersive and interactive learning environments [1]. In graduate nursing and midwifery education, the integration of SBE in education programmes varies across and within geographical regions, higher education institutes and postgraduate programmes. Acknowledging that different terms are used to describe people seeking health treatment, in different healthcare practices and settings [2] (e.g. service user, client, consumers of health or women in the maternity setting), for purposes of this review the term 'patient' will be used throughout. SBE, in healthcare education, seeks to replicate the exposure practitioners have in clinical encounters where patient assessment, interaction and nursing and midwifery holistic care can be delivered and reflected on in a safe environment without compromise to patient safety [3]. Advanced practitioners (AP) are expert nurses and midwives, who have additional education which enables them to work as autonomous and accountable practitioners in a particular field [4]. The International Congress of Nurses (ICN) states that these practitioners have authority and responsibility to integrate 'clinical skills associated with nursing and medicine in order to assess, diagnose and mange patients' [4, p.6]. The curriculum development, programme design and review of education of APs is aligned with state and country nursing and midwifery governing bodies' standards of education and practice [5]. Furthermore, education oversight to discharge the responsibility of AP education accreditation may vary from central governing bodies, regional and national boards or agencies [5].

The establishment of the AP role is the professions recognition of the need to address the imbalance between healthcare demand and supply [6]. The healthcare achievements of nurses and midwives have been documented since the 19th century and the concept of autonomous care delivery by nurses and midwives was first reported in the 1960s [7,8]. Despite the international recognition and evidence of the impact of AP roles on patient experiences and patient-centred healthcare delivery, providing education for these roles is not without challenges [9,10]. For example, providing clinical education and clinical exposure in the practice environment can be challenging. Associated difficulties include staff shortages; service need priorities; the preceptors' own overburdened workload preventing them from providing the time, expertise and guidance to students, and the lack of specific or physical health system learning opportunities [11,12]. These constraints become problematic for programme's specific requirements, including the requirement to achieve the international minimum expectation of 500 hours of direct clinical exposure, within the programmes' timeframe, in addition to adding to the student burden to capitalize on opportunistic learning in the practice setting [4]. This education challenge may be further exacerbated with direct patient clinical hours increased from 500 to 750 hours, as required in the United States of America (USA), reported in the American National Task Force on Quality Nurse Practitioner Education [13]. Other countries may have to replicate this benchmark as health dynamic evolve.

Nurse and midwife educators in higher education institutes need to explore diverse teaching and learning methodologies to support student learning to develop the knowledge, skills, competency and confidence as APs. The pandemic event of 2020 threatened the delivery of healthcare education derailing normal education practice. Despite this, healthcare educators quickly adjusted by implementing alternative and complimentary educational strategies, in particular e-learning, to continue to meet the learning needs of participants in a time of unprecedented public health concern [14]. Alternative educational strategies, such as SBE can assist by bridging the theory practice gap and provide learning and assessment across the cognitive, effect and psychomotor domains at AP level [13]. The evidence of flexibility in programme delivery reflects some of the positive changes initiated during the pandemic restrictions, when traditional face-to-face teaching, learning and assessment were not permitted or hindered [15]. Waxman et al.'s call for a 'renewed focus on what occurs in the 21st century clinical setting, encouraging new reflection and evaluation of this heretofore "gold standard" of clinical

education' [16, p.301] was thus set in motion as willingness to engage in other forms of clinical education began. Nonetheless, governing bodies that oversee nursing and midwifery education standards must be satisfied with the quality and evidence to consider the change [17].

A survey by Nye et al. highlighted a variation in simulation hours, consensus on replacement of clinical hours with simulation, and the content taught in nurse and midwife practitioner programmes using SBE [18]. In addressing the variation in nurse practitioner (NP) programmes, the National Organisation of Nurse Practitioner Faculties (NONPF) emphasized the need for the standardisation of SBE in programmes to align with NP competencies and, thus, provide measurable educational opportunities to benchmark SBE against clinical practice experiences [12]. Further objectives of the national forum include the advancement of the science of SBE, as a teaching methodology, in AP programmes through quality research which included the reporting and implementation of simulation standards [12]. In addition, the NONPF SBE guideline provides key definitions that describe SBE. These definitions provide understanding and clarity of terms for SBE stakeholders. Lioce et al. updated published work, the healthcare simulation dictionary, provides evidence of the evolution of healthcare simulation terminology since its first edition in 2013 [19]. As terminology in the field of healthcare simulations evolves, it is important to capture key concepts or standardized terms that emerge in AP SBE research. For readers of research, it gives a reliable understanding of how SBE is conceptualized and defined internationally.

Clarity on the extent and use of SBE in Europe is reported with mixed results. Chabrera et al. compared the level of SBE implementation in the nursing curricula by consulting an expert panel gathered from higher level institutes across eight countries in Europe [20]. Findings from the exploratory study report that Eastern European countries (Poland, Croatia and Czech Republic) have embraced SBE as a teaching methodology in nursing programmes with consistent compulsory hours allocated to SBE in the curriculum at undergraduate level [20]. SBE studies at the graduate nurse/midwife programme level was not explored by the panel which suggest this discourse is lacking and needs to be discussed. One of the recommendations of the exploratory study, included a similar call for quality research to support greater implementation of SBE in the nursing curriculum.

Review objectives

To determine the appropriateness of conducting the review, we searched JBI Evidence Synthesis, PROSPERO and the Cochrane Database of Systematic Reviews to establish the existence, or not, of reviews on the topic, either completed or in progress. We found two completed reviews and no ongoing reviews. One of these was a systematic review on the effectiveness of SBE on satisfaction and learning outcomes in NPs' programmes [3], and the second was a scoping review of SBE in nursing practitioner programmes. This latter review was limited to studies conducted in America only, and the search strategy did not include a search of any educational databases [21]. As our planned scoping review was broader in scope, geographically and in populations which included midwives, we deemed the present review appropriate and needed. To foremost ascertain the extent of research on SBE in AP nursing and midwifery programmes, we undertook a scoping review with the following objectives:

1. Determine the extent of evidence on the use of SBE in nurse and midwife AP education programmes, including which countries are reporting research on SBE in AP education and the research approaches adopted.
2. Determine if SBE is defined in the identified AP studies, including existing similarities or variations in definitions for a reliable understanding of how SBE is conceptualized internationally.
3. Identify characteristics or standards of SBE in the identified studies, including what aspect(s) of AP is being taught using SBE, the learning theories/frameworks underpinning SBE and what are the learning outcomes associated with the SBE.

Methods

Protocol and registration

Joanna Briggs Institute (JBI) methodological guidance for scoping reviews underpinned the conduct of this review [22,23]. The review protocol has been published [24]. The findings are presented both narratively and graphically as outlined in the protocol [24]. The review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist [25] (Supplementary Appendix 1).

Eligibility criteria

The eligibility of studies was guided by the population, concept and context (PCC) framework, recommended by JBI [23].

Population

Studies involving nurses or midwives enrolled in programmes that lead to registration as an AP were eligible for inclusion. In enrolment into their programme, the student participants were exposed to SBE for teaching, learning or assessment. The definition of 'advanced practitioner' is as per the International Congress of Nursing [4].

Concept

The concept was any form of SBE, where the objective of the teaching methodology was to scaffold the teaching, learning and assessment of programme content at the AP level. These included for example simulated participant (SP), role play or high-fidelity simulators.

Context

The context was SBE delivered in any format and setting, for example, the delivery of SBE could have taken place in the university, college, clinical practice setting or virtual spaces within an AP education programme.

Information sources

This scoping review considered all primary research using quantitative, qualitative and mixed methods approaches. Evidence syntheses sources, including scoping reviews, integrative reviews and literature reviews on SBE in the population of interest were also eligible. In addition, grey literature was considered for inclusion from theses, dissertations and information produced by nursing and midwifery AP education bodies that referred to SBE at the AP student level. Editorial and opinion pieces or studies where the participants had already completed their education programme and were registered as APs were excluded.

Search strategy

To help develop and inform the search strategy, an initial limited search of Embase, Medline (EBSCO) and CINAHL (EBSCO) was undertaken by a subject librarian, using full and abbreviated terms related to AP, nurse or midwife practitioner, simulation and SBE. This search helped to identify relevant keywords and index terms for the formal search strategy. Once finalized, the search strategy, combining search terms related to the population and concept (see Supplementary Appendix 2), was implemented in eight databases, from date of inception, initially to January 2023, and then updated to April 2024. These were Embase (Elsevier), Medline (EBSCO), CINAHL (EBSCO), PsycINFO (EBSCO), Web of Science, Applied Social Science Index and Abstracts (Proquest), ERIC (Proquest) and Cochrane CENTRAL. Languages or other limits were not applied to the searches. Searches of other sources were also undertaken to supplement the database searches (Supplementary Appendix 2). To increase the sensitivity of the search a proximity operator was applied to the search terms advanced midwife/nurse practitioner (i.e. Near 2/wildcard*). This was designed to capture the variation of job roles and titles in this area. The selection of eligible records was limited to those published in English. No published records in other languages were identified. The findings of the searches were then added to Covidence for screening.

Study selection

Records from all searches were uploaded to Endnote 20, (Endnote [2022], Philadelphia, PA Clarivate) where an initial deduplication was performed. The remaining records were then exported to Covidence (a software programme for the conduct of systematic reviews) where further deduplication occurred. Two independent reviewers (KMcT and PM) screened the Covidence records on title and abstract in accordance with the eligibility criteria and objectives of the scoping review. Screening and selection of the first 25 articles was piloted and discussed to ensure consensus between the reviewers. After screening on title and abstract the same two reviewers independently assessed the full text of the records forwarded from the title and abstract screening against the review's eligibility criteria. Full text studied that did not meet the inclusion criteria were excluded.

Data charting process and data items

Data were extracted from the included records by two independent reviewers (KMcT and PM). The data extraction tool (as per protocol) [24] was tested for adequacy and comprehensiveness by two reviewers independently piloting the tool on three studies. Adjustments to the tool were made to include the aim of the studies and whether a definition of simulation was explicit in the included records as well as charting the modality of simulation. Data extraction included details about the population, concept, context, in addition to details relating to the country, year, journal title, type of evidence source, study methods, reported standards of simulation best practice (if any), associated educational theory, content taught and the learning outcomes of SBE, whether SBE was used for formative, summative or both forms as an assessment strategy in programmes delivered to APs. Table 1 presents the data charting tool. Any discrepancies between the reviewers were successfully resolved through discussion.

Synthesis of results

The data were summarized, and the review findings are presented narratively supported by figures, illustrative charts and tables as per prior protocol [24]. The findings are presented in three sections which address, directly, each of the reviews three objectives.

Results

Search and selection results

The database searches yielded 18,574 records of which 8196 were identified as duplicate and were removed. Following title and abstract screening of the remaining records, a further 9867 records excluded as these were clearly ineligible. Following full text review, 323 of the remaining 469 records were excluded, with reasons provided in Figure 1 (search and selection process). This resulted in the inclusion of 146 records in this scoping review [3,12,16,18,21,26–168]. The PRISMA diagram (Supplementary Appendix 1) provides an overview of the study selection process.

Characteristics of included studies

The characteristics of the included records are presented in Supplementary Appendices 3 and 4, and definitions of terms used in the records in Supplementary Appendix 5. In brief, the publication dates of the included records spanned from 1979 [28] to 2024 [29] with 72% (n = 107) published since 2016 (see Table 2). Notably, the number of published records during the years that WHO declared the COVID pandemic a global emergency (2020–2023) were respectively 16 records (22.5%) in 2020 [12,31,60,82,86,96,100,104,112,113,133,140,142,151,163,166], 24 records (33.8%) in 2021 [26,30,33,34,45,46,48,49,57,62,64,76,81,88,90,107,130,134,135,139,141,156,157,160], 24 records (33.8%) in 2022 [21,36,38,39,42,43,47,50,63,65,66,85,94,95,101,109,115,125,126,131,154,161,164,167,168] and 7 records (9.85%) in 2023 [58,80,103,108,137,146,158], totalling 71 records for the period, which is 48.6% of the total published work identified for this scoping review. The context for SBE was universities, virtual spaces,

Table 1: Data extraction tool

Scoping review details	
Person extracting the data	
Date data extracted	
Scoping review title	
Details and characteristics	
Citation details (e.g. author/s, date, title, journal, volume, issue, pages and doi)	
Country of origin	
Types of evidence source	
Aim/objective	
Population/description of the population	
Concept/simulation modality (standardized patient, high-fidelity simulator, virtual patient, telehealth standardized patient, role play and task trainer)	
Context (location of simulation activity)	
Definition of simulation (if provided)	
Standards of simulation reported INACSL	*Professional development* *Prebriefing* *Simulation design* *Facilitation* *Debriefing process* *Operations* *Outcomes & Objectives* *Professional integrity* *Simulation enhanced IPE* *Evaluation of learning and performance*
Curriculum content using SBE	
Learning outcomes (Summative/Formative)	
Theory reported	

Figure 1: Search results, study selection and inclusion process

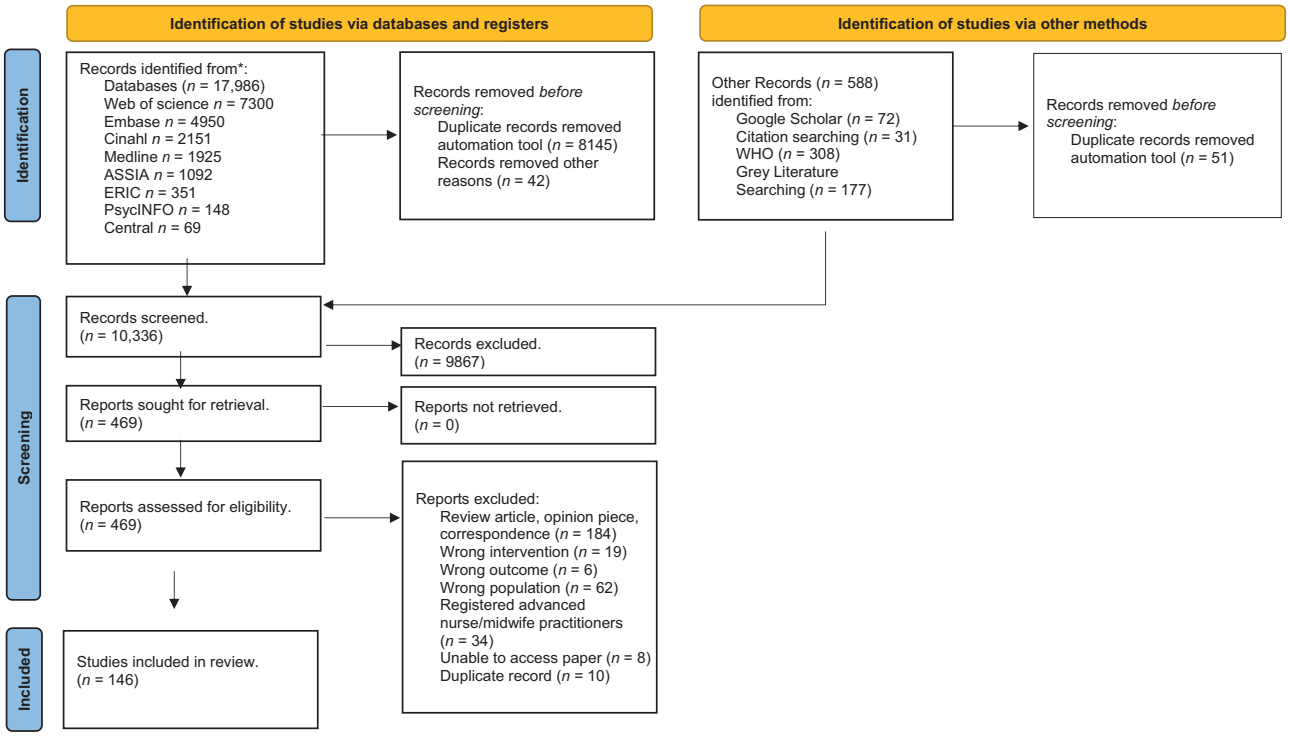

Table 2: Publication year, country, sample size, setting and study design of included records

Study characteristics		No. of studies (%)
Publication by year		
1979–1989		2 (1.5%)
1990–2000		2 (1.5%)
2001–2005		4 (3%)
2006–2010		10 (7%)
2011–2015		21 (14%)
2016–2020		46 (31%)
2021–2024		61(41%)
Country of publication		
United States of America		138
Canada		1
Brazil		1
France		1
Norway		1
South Korea		1
Singapore		1
Thailand		1
Taiwan		1
Sample size primary studies		
<25 participants		65 (47%)
25–50 participants		47 (35%)
50–100 participants		22 (16%)
100–200 participants		3 (2%)
Setting		
University (in person)		95 (69%)
University (Online Virtual)		26 (19%)
University (Hybrid in person & online university platform)		11 (8.5%)
University Blended (in person and clinical)		1 (0.75%)
Clinical		3 (2%)
Community		1 (0.75%)
Study design		
Quantitative		**113 (76%)**
Qualitative		**14 (10%)**
Mixed methods		**10 (7%)**
Evidence Syntheses	**Methods**	**8 (6.25%)**
	Systematic review	4
	Scoping reviews	2
	Integrative review	2
Educational guidelines		**1 (0.75%)**

clinical settings and the community. SBE, as described in the included records, involved role play, SP interactions, telehealth with SP, SBE with high-fidelity simulators (HFS), virtual interactions and computer-based interactions. Of the 71 records published during the pandemic years, SBE with SP was reported most frequently (n = 22 records), followed by telehealth with SP (n = 22 records), virtual and computer-based interactions (n = 14 records) HFS (n = 4 records) and one record reported on the use of a task trainer. During this period, published work included the NONPF guidelines on SBE in AP education [12] and five evidence syntheses [21,164,166,167,168].

Review findings

No records relating to the use of SBE in advanced midwifery practice education were identified in the search; thus, the findings of this scoping review relate to advance NP education.

Objective I: extent and types of evidence

In this scoping review 146 sources were identified where SBE was reported in any format and discussed in AP programmes. The records spanned nine countries and four continents, although most records were from the USA (n = 138), with the remaining eight records originating each from Canada [3], Taiwan [91], Singapore [149], Norway [153], South Korea [158], Thailand [164], Brazil [165] and France [168]. The types of evidence of the 146 records were 137 primary studies consisting of 113 quantitative [17,25,28–139], 14 qualitative [140–153] and ten mixed methods study designs [154–163]. Eight records were evidence syntheses, of which four were systematic reviews [3,27,164,168], two were integrative reviews [165,166] and two were scoping reviews [21,167]. The remaining record was an educational guideline on SBE in AP education programmes published by the NONPF [12]. The participant population were AP NPs' students in 136 of the 137 primary studies with the remaining one study referencing participants as nurse–midwife practitioners [150]. The included studies comprised of 5077, AP participant student learners in the records. The number does not include IPL participants, for example, undergraduate nurses, medicine or pharmacy. The population sample varied in size in the primary study records, ranging from six [45] to 171 [34] (Table 2).

Population

The population in the included records were from generic AP programmes (no population speciality provided) as well as population specific specialties, referred to as discipline specific AP track programmes. In the USA the term 'track' is used to describe the area of AP specialty. The term 'NP' is preferred to AP in the USA.

Twenty-nine studies also included the amalgamation of students from one or more speciality tracks [42,44,54,56,58,66,68,73,74,76,89,93,96,97,104,115,125,129,132,134,136,139,140,150,151,154,157,162]. In 12 studies the AP student population, as part of their programme, participated in simulation with interdisciplinary nursing grades [40,66,77,86,87,109,118,123,124,152,156,161] and, in 11 studies, with other healthcare professions. The interdisciplinary professions included medicine, pharmacy, dentistry, dietician, physical-therapy, social work and communication graduate students [55,57,59,67,72,102,110,133,144,155,163].

The speciality track reported most frequently as a standalone track was family nurse practitioners (FNP; n = 19) [28,30,34,38,39,47–49,52,78,80,94,100,111,121,122,127,135,147] followed by adult-gerontology acute care nurse practitioner (AGACNP; n = 8) [33,50,61,70,105,117,146,159], acute care nurse practitioners (ACNP; n = 7) [31,35,51,53,116,120,141], paediatric nurse practitioners (PNP; n = 5) [65,69,114,126,131], adult-gerontology primary care nurse practitioners (AGPCNP; n = 4) [26,45,90,103], acute care paediatric nurse practitioners (ACPNP; n = 2) [75,95], psychiatry mental health nurse practitioners (PMHNP; n = 2) [29,62] and anaesthetic nurse practitioners (n = 1) [148] (Figure 2).

Objective II: similarities and differences

Sixty-four of 146 records described SBE without the provision of a definition of simulation within the articles main body. The 82 remaining records provided explicit definitions (Supplementary Appendix 5). Similarities across the terms are broadly grouped into (a) educational terms, (b) context conducive to SBE and (c) embedding cognitive growth (Figure 3). For example, education terms were grouped where language explicated 'learning/teaching terms' such as *learning by doing*, *problem-based learning* [45], *experiential learning* [54] and *active learning experience* [76]. Context conducive to SBE terms, for example, reference the importance of SBE safety: *in safe true like setting* [49], *safe and controlled environment* [53], *controlled laboratory environment* [73], *safe environment* [74], *without risk* [95]. Finally embedding cognitive growth terms, for example, included: *independent critical thinking skills* [99], *problem solving and critical thinking skills* [118], *sharpening their critical thinking* [120], *enhance knowledge, skills and attitudes or to analyse and respond* [125].

Figure 2: SBE records identified by speciality in AP programmes

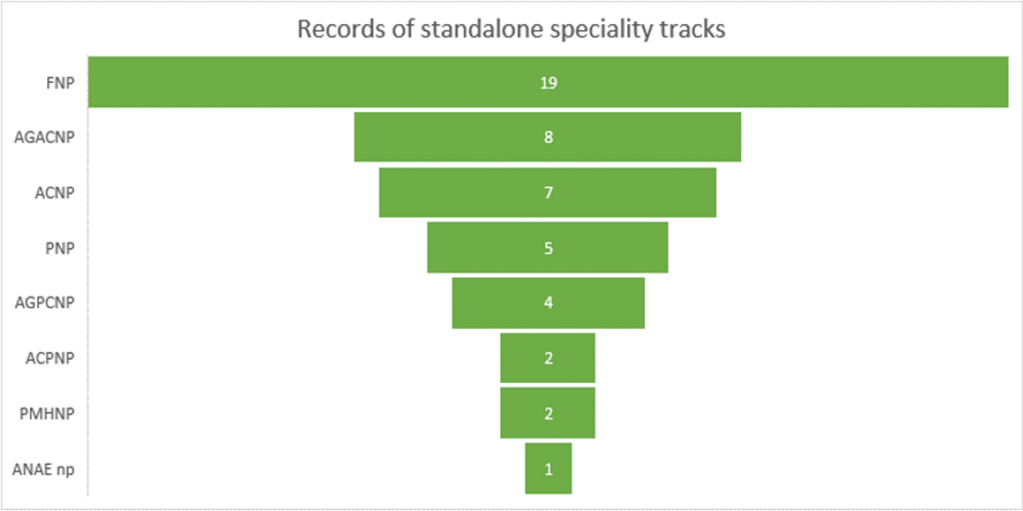

Figure 3: Summary of terms used to define simulation

Objective III: characteristics of SBE

Standards of SBE are a set of characteristics or indicators to communicate consistency in the development, implementation and review of SBE practices in healthcare education [169]. Examples of standards include the International Nurse Association for Clinical Simulation and Learning (INACSL) published standards from 2011 which were updated in 2021 [170], as well as Association for Simulation Practice in Healthcare standards (ASPiH), updated in 2023 [171]. These standards provide a framework for simulation in research and thus informs the evidence base for those adopting SBE in teaching and learning [170]. Nye et al. assert that these standards 'strive to enhance the consistency of developing and implementing simulation in nursing programs' [18, p.5]. Forty (27.3%) of the 146 included records explicitly reported the inclusion of the INACSL standards in the design, development and implementation of SBE in the research [18,30,31,33,38,43,44,47–50,54,58,64,67,79,82,88,90,94,95,104,107–109,117,122,124,129,134,135,138–140,146,149,154,156,159,161] and 16 records predated the INACSL/ASiPH standards of best practice [28,37,41,53,77,92,111,116,120,121,127,128,132,145,148,152]. None of the studies included in this review reported the adoption of the ASiPH standards of best practice. Of the included evidence syntheses none reported on simulation standards of best practice as an outcome of the syntheses. The guidance on simulation research is clear that standards must be reported otherwise it limits the advancement of science on simulation in healthcare [170,171].

Aspects of AP education taught in programmes

In the AP curriculum, 60 included records described teaching, learning and assessment of the principals and practice of obtaining a health history, advanced physical health assessment, clinical decision-making, differential diagnosis and patient care planning in the SBE activity [26,31,32,34,36,38,39,41,42,43,45,48,50,51,52,53,56,60,64,67,68,70,71,75,77,79,82,84,87,90,95,102–104,105,107,108,109,112,114,119,122,123,125,127,131,134,135,137–139,144,145,147,149,150–153,156,159]. Other content included critical thinking and decision-making competencies as standalone learning outcomes (n = 18) [29,31,33,37,40,42,47,88,92,96,97,99,101,113,120,121,126,146], advanced practice of skills specific to the role on the AP (n = 16) [35,54,66,69,72–74,81,85,92,94,100,128,129,136,148], three records that focused on skills related to using information technology, electronic healthcare records and accessing research for real-time review and critique in practice during an SBE experience [49,78,80] and one record where the focus of SBE was advanced practice management/leadership [141]. Another prominent theme identified in the included records, particularly in the last 5 years, was the focus on advanced communications skills (n = 36) [30,46,51,55,57–59,61,62,65,76,83,86,89,91,93,98,106,110,111,115–118,124,130,133,143,155,157,158,160–163]. Topics include interprofessional communication, motivational interviewing, patient education, conflict resolution and breaking bad news. Sensitive issues included advanced care planning for end-of-life care, substance abuse/misuse, gender and sexuality conversations, interviewing competencies incorporating abuse such as child or adult sexual abuse and violence was the focus of the SBE experience. Other areas explored included weight-based conversations for obesity, behavioural and mental health interviewing techniques/counselling.

Learning theories

There was a range of adult learning theories and learning frameworks reported in 64 records. Eighteen different theories were identified, and ten frameworks or models adopted in SBE teaching and learning practices in the programmes (Table 3). The most popular learning theories include Kolb's experiential learning theory (n = 16) [18,29,31,38,44,45,47,54,76,88,94,109,139,151,154,157], and the NLN Jeffries simulation theory (n = 9) [43,67,90,114,122,129,138,140,161] (Supplementary Appendix 3). Two evidence syntheses reported on learning theories/frameworks [21,162].

Table 3: Reported learning theories and frameworks

Theory reported in primary studies	
Kolbs experiential learning theory	16
NLN Jeffries simulation theory	9
Ericsson theory of learning	3
Problem-based learning theory	2
Cognitive learning theory	2
Transfer of learning theory	2
Social learning theory	2
Situated cognition	2
Cognitive flexibility theory	2
Critical thinking theory	1
Millers theory	1
Self-efficacy theory	1
Deliberate practice theory	1
Ecological psychology perspective	1
Dual processing theory	1
Theory of engagement	1
Motivational interviewing theory	1
Humanistic philosophy of education	1
Frameworks	
Benners model	2
Finks model	1
Blooms taxonomy	1
COPA framework	1
IPE competencies	1
Team STEPPS framework	1
Roys adaptation model	1
Barracolough skills acquisition	1
NONPF simulation guideline	1
Daley and Campbell's framework for simulation	1

Learning outcomes

The use of SBE in AP programmes underpinned both formative and summative learning and assessment. Formative assessment refers to the cyclical processes to evaluate student progress during the programme for the purpose of improvement [172]. Formative assessment was identified in 102 records. Whereas summative assessment refers to the final means in which the learning outcomes of a programme are assessed [173]. This was identified in 29 records. SBE for both forms of assessment were identified in three primary studies [35,68,142], in one [167] evidence synthesis and in one guideline [12] (Supplementary Appendices 3 and 4).

AP experience of SBE

Fourteen qualitative studies were included in this scoping review [140–153]. The focus was on simulation, to explore AP students' experience of its use to support AP competencies. Despite the differences in the objectives or aim of the simulation (communication [140,143,144], health assessment [142,147,149–153], leadership, decision-making/diagnostic reasoning [141,145,145] and advanced procedural skills [148], all AP students reported that SBE identified new learning as they reflected on the challenges of their expanded scope of practice. The theme of exposure of the SBE experience in a safe environment underscored by debriefing after the interaction was identified positively for the AP student.

Discussion

This scoping review identified the types and scope of studies on SBE in AP student education, albeit with respect to nursing only, as no records that focused on advanced midwifery practice were identified. The findings have relevance applicability for AP education broadly, however, and especially as the growth in AP roles expands in other healthcare professions [174]. As the delivery of healthcare becomes more complex and the student population becomes more diverse, healthcare education stakeholders will be required to consider flexible teaching and learning strategies that meet the needs of the healthcare workforce. APs are a cohort of the healthcare eco system that are motivated through continuous professional and personal development to navigate complex healthcare challenges. This scoping review highlights an increasing expansion of evidence on SBE to scaffold teaching and learning for AP education. The COVID-19 pandemic was a pivotal catalyst for transitional change from traditional teaching and learning methodologies to SBE, which occurred to ensure that disruption to education was minimal to enable continuing resourcing for AP roles [15,34,45]. The rise in literature on SBE, is evident from the records identified in the last 3 years, as a finding of the review. This surge is likely related to the challenges to AP education and the solution focused approaches implemented in an unprecedented time in healthcare [39,90]. Additionally, there is evidence of the continued strive to advance knowledge, skills and competencies, required for the autonomous AP role. This is in part due to the enforced changes at the time of the pandemic, notably the move to incorporate more e-health and technology as well as the strategic reflection on the complex and future healthcare needs of the population [14,15,90]. The response from educators is to integrate, through simulation design practices, SBE experiences into the curriculum of AP programmes in terms of providing a solid foundation for safe quality care delivery. Additionally, as the pace of change in healthcare accelerates, SBE provides a safe testing ground to reflect in and on AP delivery. This can offer students of AP programmes added confidence in their abilities and strengthens their scope of healthcare practice delivery [143,153]. This scoping review identified 14 qualitative studies which highlights the need for more research to explore AP student experiences and perceptions of SBE. Emphasis on the importance of debriefing from the student AP's perspective was highlighted [140–153]. Four records [31,47,94,141] were found where debriefing as a standard of best practice, was explored as an aim or objective of AP SBE research.

The review also mapped the countries where research is conducted on SBE in relevant programmes. Recognizing that the role of the AP is a contemporary role in many geographical locations, reported in the ICN Report [4], it is not surprising that countries like the USA, where AP roles are well established lead the way in the conduct of primary research. Countries faced with health disparities, due to social and economic factors, strive to develop the AP role. However, support in these countries to deliver the fundamentals of AP education is lacking [4]. Abandoned AP education initiatives and underfunding of the AP role, impact on the global reach of SBE which also impacts or hinders the conduct of SBE-related research. Where an AP role with broad AP competencies, for example advanced health history and physical assessment competencies, is established, it would facilitate the exploration of the SBE experience and thus replicability of studies outside of the USA.

Of note evidence syntheses included in the review, the yield and origin of publication are dispersed more geographically albeit in small numbers. Primary research on SBE in AP programmes with a wide geographical reach will add to a more robust perspective of the scientific discussion where consideration of the cultural nursing and midwifery nuances of AP education of nations become embedded.

In advancing the science on SBE, the publication of simulation standards provides a foundation or blueprint for conducting and reporting research in this area [170]. In Europe, the recent publication of the ASPiH standards, highlight the requirements for robust and rigour in design of SBE experiences and underscoring the need for best practice [171]. Furthermore, for readers of SBE research, the standards provide a template to benchmark the quality of the SBE experience to objectively critique emerging research. Through the coordination of SBE experiences in planning, implementation and evaluation of SBE, the INACSL and ASPiH standards provide a road map, for all nursing and midwifery educators, to provide a common understanding and language. This guidance is of particular importance for novel simulation educators seeking to initiate and integrate

SBE within AP curriculum but lack the resourcing and expertise because of economic or geographical constraints. In a recent consensus publication, simulation-based practice in healthcare, the authors advocate for greater communication of the benefits of SBE with policy makers, healthcare leaders and health education institutions [174]. Understanding that SBE is delivered across the spectrum of modalities, from low cost to expensive technologies, lends itself to adopting a creative approach in the design and implementation of SBE experiences. Most importantly, the principles and adherence to the standards of best practice, when applied, may transcend the cost barriers underpinned with knowledge of simulation practices and educational theory in active teaching and learning.

In considering the design, characteristics traits and implementation of SBE, there is evidence of expansion of SBE into underexplored areas and topics that were previously associated with actual clinical practice exposure. This includes the array of communication competencies which includes difficult conversations or delivering bad news, mental health advanced communication skills, sexual health, sexual violence and conversations on sexual identity and obesity thus recognising and addressing the diversity of needs within the health population [43,60,106,157]. Study reports, on diversification of SBE AP content, described student participants' acknowledgement of the challenges of the experience. The safe zone of practice and feedback from SP, often with personal insight, was important for the participants to directly influence practice [89,108]. Another point of note identified in this scoping review, is the acknowledgement of the need for interprofessional SBE. Quality healthcare delivery does not occur in isolation. It occurs because of diverse professional collaboration and SBE experiences should mirror the realities of working in healthcare teams. The emerging research with SBE at the interprofessional level, that includes the AP attests to the commitment of all healthcare educators in addressing the same goals of safe quality healthcare. Furthermore, interprofessional SBE recognizes the similarities and the difference perspectives of the healthcare professions in training before engaging in real clinical interactions [175]. One of the challenges in the delivery of interprofessional SBE is the logistical and coordination skills required to amalgamate SBE teaching and learning opportunities given the diversity in college or university timetables and is also reliant on the commitment of educators to support and facilitate these SBE experiences.

This scoping review found an explicit under-representation of guiding education theories as a foundation in the research process of the included studies. Less than 50% (n = 53) of included records referenced an educational theory. Fey et al. identified this important criterion in the overall quality assessment of primary SBE research and it has been raised in the nursing and midwifery education literature where educators in the professions are charged with falling short of educational scholarship when the theory or conceptual frameworks are not evidenced [176,177,178,179]. This lack of scholarships limits the impact and future direction of nurse and midwifery educational research in simulation. In contrast educational scholarship is recognized as the concentrated effort through the robust and rigorous execution of research in adding to the evidence base for the purposes of discovery and implementing change [179].

Strengths and limitations

The strengths of our scoping review include the comprehensive search strategy of the current state of SBE in programmes leading to the award of AP on programme completion. In addition, the extensive search included both nursing and midwifery databases as well as general educational databases which were searched by an expert subject librarian with extensive JBI scoping and systematic review search skills. The broad aims and objectives of the scoping review identified several gaps in knowledge that justified the conduct of this scoping review. This review also identified areas in AP programmes that integrate SBE into previously underexplored health topics. Topics that involve challenging or difficult conversations, such as sexual health, mental health, women's health, violence, abuse and end of life care are examples for further research. This is evident from the expansion of content in programmes to address population specific needs. One notable limitation of the review is the absence of literature on SBE in the context of midwifery AP with no records identified. Furthermore, it is apparent that the modalities used for SBE have evolved, however this review did not focus on these nuances, rather it examined the principal foundations of SBE methodologies. Adhering to scoping review methodology [22,23], a quality assessment of included studies, was not undertaken; this may, however, limit the interpretation of the findings as the quality on which the findings are based is unknown. Both Fey et al. [176] and Cheng et al. [178] have raised concerns about the reporting conventions of SBE research. Although the depth of the reporting was not explored in this review, for example, design and method elements beyond that of the overall study design, our reporting elucidated educational theories and reported standards of best practice which will inform future SBE development. All studies included were reported in English, with minimal to no representation from economically and budgetary constrained countries. This potentially limits the applicability of the review findings to these geographical areas. Furthermore, the role of the AP is a contemporary role in many countries further limiting the geographical representation of SBE in AP education primary research.

Conclusion

This scoping review examined the extent and types of available evidence on SBE for nurse and midwife AP education. SBE as an educational methodology is recognized as an educational research area that is growing. Recent global events have triggered healthcare educators to look beyond traditional education methodologies. The change and willingness to adapt in times of healthcare uncertainty demonstrates leadership is navigating healthcare education that continues to ensure that the AP is adequately prepared. However, the available evidence is limited to the USA mainly.

The generalisability of the findings for other countries that are adopting the use of SBE at the AP level needs to be explored.

Implications for research and implications for education

The adoption of SBE in advance practice programmes is growing. Further research is needed, however, for SBE as a teaching and learning methodology in other geographical locations. The publication of the Global Consensus Statement is the culmination of a substantial body of work by a community of practice. Funding research in SBE healthcare education must be prioritized by funders and other key stakeholders with responsibility for healthcare delivery oversight. Furthermore, this scoping review highlights the need for research to include speciality tracks that include mental health, intellectual disabilities and paediatrics and professions such as the midwifery to include women healthcare needs. The impact of debriefing models or frameworks, in AP education, is an area for further investigation. In addition, the methodological choice of primary studies identified in this scoping review are representative of studies adopting quantitative methods but there was a lack of consistency in reporting the required standards of best practice such as those developed by INACSL or ASPiH. Additionally, there is a need to broaden the evidence base and understanding of the concept of SBE through different methodological paradigms including qualitative and mixed methods enquiry.

Supplementary material

Supplementary data are available at *Journal of Healthcare Simulation* online.

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Declarations

Authors' contributions

The authors collectively contributed to the conceptions, planning, reviewing and reporting of the review. Drafts of the manuscript were written by KMcT. All authors (PM, CMcC, VS and MT) commented on iterations of the manuscript. CMcC, VS and MT contributed to the final production of this document. All authors read and approved the final manuscript (KMcT, PM, CMcC, VS, MT and JEC).

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References

1. Lame G, Dixon-Woods M. Using clinical simulation to study how to improve quality and safety in healthcare. British Medical Journal. 2020;6:87–94. doi: 10.1136/bmjstel-2018-000370
2. Mclaughlin H. What's in a name? 'Client' 'patient', 'customer', 'consumer', 'expert by experience', 'service user' – what's next? British Journal of Social Work. 2008;39:1101–1117. doi: 10.1093/bjsw/bcm155
3. Warren JN, Luctkar-Flude M, Godfrey C, Lukewich J. A systematic review of the effectiveness of simulation-based education on satisfaction and learning outcomes in nurse practitioner programs. Nurse Education Today. 2016;46:99–108. doi: 10.1016/j.nedt.2016.08.023
4. International Council of Nurses (ICN). Guidance on advanced practice nursing [Internet]. Switzerland: International Council of Nurses [updated 2020 May 16; cited 2021 Dec 12]. Available from: https://www.icn.ch/sites/default/files/inline-files/ICN_APN%20Report_EN_WEB.pdf [Accessed 02 December 2023].
5. National Council of State Boards of Nursing. Boards of nursing professional licensure requirements [Internet]. NCSBN. n.d. [cited 2022 May 18]. Available from: https://www.ncsbn.org/index.htm [Accessed 11 November 2023].
6. Kerr L, Macaskill A. The journey from nurse to advanced nurse practitioner: applying concepts of role transitioning. British Journal of Nursing. 2020;29(10):561–565. doi: 10.12968/bjon.2020.29.10.561
7. American Association of Nurse Practitioners. Historical timeline [Internet]. Austin: AANP. 2021 [cited 2021 Nov 10]. Available from: https://www.aanp.org/about/about-the-american-association-of-nurse-practitioners-aanp/historical-timeline [Accessed 03 December 2023].
8. Keeling A. Historical perspectives on an expanded role for nursing. Online Issue in Nursing. 2015;20(2). doi: 10.3912/OJIN.Vol20No02Man02
9. Blair KA, Jansen MP, editors. Advanced practice nursing: core concepts for professional development. 5th edition. New York: Springer Publishing Company. 2015.
10. Crisp N. Nursing and midwifery: key to implementing Alma-Ata 40 years on. Health System Reform. 2018;4(3):183–187. doi: 10.1080/23288604.2018.1483683
11. Loomis JA. Expanding the use of simulation in nurse practitioner education: a new model for teaching physical assessment. Journal of Nurse Practitioners. 2016;12(4):151–157. doi: 10.1016/j.nurpra.2015.11.010
12. Lioce L, Conelius J, Brown K, Schneidereith T, Nye C, Weston C, et al. Simulation guidelines and best practice for nurse practitioner programs [Internet]. Washington: National Organisation of Nurse Practitioners Faculties. [updated 2020 Oct 22; cited 2022 Jan 12]. Available from: https://cdn.ymaws.com/www.nonpf.org/resource/resmgr/docs/simulationnewfolder/20201022_sobp_final.pdf [Accessed 10 October 2023].
13. Standards for quality nurse practitioner education. 6th edition. A report of the national task force on quality nurse practitioner education (2022) [Internet]. Washington: National Organisation of Nurse Practitioner Faculties. 2022 [cited 2022 May10]. Available from: https://cdn.ymaws.com/www.nonpf.org/resource/resmgr/2022/ntfs_/20220201-NTFS_draft.pdf [Accessed 10 October 2023].

14. Peachey L, McParland T, Goldsworthy S, Williams V. P stands for pivot: pivoting face-to-face practicum to virtual simulation during the pandemic. Clinical Simulation in Nursing. 2021;57:53–58. doi: 10.1016/j.ecns.2021.04.021
15. Tung H-H. Embracing renovation and innovation during the pandemic: application of virtual simulation technology in nurse practitioner education. Hu Li Za Zhi. 2021;68(5):7–12. doi: 10.6224/jn.202110_68(5).02
16. Waxman K, Bowler F, Forneris SG, Kardong-Edgren S, Rizzolo MA. Simulation as a nursing education disrupter. Nursing Administration Quarterly. 2019;43(4):300–305. doi: 10.1097/NAQ.0000000000000369
17. Anderson M, Hetzel S, Diaz D. Simulation in advanced practice education: let's dialogue! Clinical Simulation in Nursing. 2019;26:81–85. doi: 10.1016/j.ecns.2018.10.011
18. Nye C, Hetzel Campbell S, Henley Herbert S, Short C, Thomas M. Simulation in advanced practice nursing programs: a North American survey. Clinical Simulation in Nursing. 2019;26:3–10.
19. Lioce L (ed.), Lopreiato J (founding ed.), Anderson M, Deutsch ES, Downing D, Robertson JM, Diaz DA, Spain AE (assoc. eds.), the Terminology and Concepts Working Group (2024). Healthcare simulation dictionary. 3rd edition. Rockville, MD: Agency for Healthcare Research and Quality. 2025. AHRQ Publication No. 24-0077. Available from: https://www.ahrq.gov/patient-safety/resources/simulation/terms.html [Accessed 02 January 2025].
20. Chabrera C, Dobrowolska B, Jackson C, Kane R, Kasimovskaya N, Kennedy S, et al. Simulation in nursing education programs: findings from an international exploratory study. Clinical Simulation Nursing. 2021;59:23–31. doi: 10.1016/j.ecns.2021.05.004
21. El Hussein MT, Favell D. Simulation-based learning in nurse practitioner programs: a scoping review. Journal for Nurse Practitioners. 2022;18(8):876–885. doi: 10.1016/j.nurpra.2022.04.005
22. Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil, H. Chapter 10: scoping reviews (2020). In: Aromataris E, Lockwood C, Porritt K, Pilla B, Jordan Z, editors. JBI manual for evidence synthesis. Adelaide: JBI. 2024. Available from: doi: 10.46658/JBIMES-24-09
23. Peters MDJ, Casey M, Tricco AC, Pollock D, Munn Z, Alexander L, et al. Updated methodological guidance for the conduct of scoping reviews. JBI Evidence Synthesis 2021;18(10):2119–2126. doi: 10.11124/jbies-20-00167
24. McTague K, Smith V. Simulation based education for nurse and midwife advanced practitioner education: a scoping review. JBI Evidence Synthesis. 2023;21(7):1453–1460. doi: 10.11124/jbies-22-00111
25. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Annals of Internal Medicine. 2018;169(7):467–473. doi: 10.7326/m18-0850
26. Hickey MT. Objective structured clinical examinations as a method of competency evaluation in primary care nurse practitioner program. Nurse Educator. 2021;46(5):317–321. doi: 10.1097/NNE.0000000000000951
27. Rutherford-Hemming T, Nye C, Coram C. Using simulation for clinical practice hours in nurse practitioner education in the United States: a systematic review: Nurse Education Today. 2016;37:128–135. doi: 10.1016/j.nedt.2015.11.006
28. Sherman JE, Miller AG, Farrand LL, Holzemer WL. A simulated patient encounter for the family nurse practitioner. The Journal of Nursing Education. 1979;18(5):5–15.
29. Davies TL, Merrilate L. Evaluating use of practice interview simulations in an online psychiatric mental health advanced practice nursing course. Clinical Simulation in Nursing. 2024;87:1–4. doi: 10.1016/j.ecns.2023.101479
30. Ainslie M, Capozzoli M, Bragdon C. Efficacy of distant curricular models: comparing hybrid versus online with residency outcomes in nurse practitioner education. Nurse Education Today. 2021;107:105–146. doi: 10.1016/j.nedt.2021.105146
31. Alhaj Ali A, Miller E, Ballman K, Bakas T, Geis G, Ying J. The impact of debriefing modalities on nurse practitioner students' knowledge and leadership skills in managing fatal dysrhythmias: a pilot study. Nurse Education in Practice. 2020;42:102687. doi: 10.1016/j.nepr.2019.102687
32. Anderson M. Effect of integrated high-fidelity simulation in knowledge, perceived self-efficacy and satisfaction of nurse practitioner students in newborn assessment. PhD Dissertation, Texas Women University, 2007. https://twu-ir.tdl.org/bitstreams/42871a5b-f7e0-4de4-8300-fa283a360040/download [Accessed 08 December 2023].
33. Anderson M, Guido-Sanz F, Díaz DA, Lok B, Stuart J, Akinnola I, et al. Augmented reality in nurse practitioner education: using a triage scenario to pilot technology usability and effectiveness. Clinical Simulation in Nursing. 2021;54:105–112. doi: 10.1016/j.ecns.2021.01.006
34. Arends R, Gibson N, Marckstadt S, Britson V, Nissen MK, Voss J. Enhancing the nurse practitioner curriculum to improve telehealth competency. Journal of the American Association of Nurse Practitioners. 2021;33(5):391–397. doi: 10.1097/jxx.0000000000000303
35. Avadhani A. Should procedural skills be a part of the acute care nurse practitioner curriculum? Nurse Education Today. 2017;50:115–118. doi: 10.1016/j.nedt.2016.12.018
36. Barnes ER, Vance BS. Transitioning a graduate nursing physical examination skills lab to an online learning modality. Nurse Educator. 2022;47(6):322–327. doi: 10.1097/nne.0000000000001220
37. Becker DE. The effect of patient simulation on the critical thinking of advanced practice nursing students. 2007. PhD Dissertation, Drexel University, May 2007. doi: 10.17918/etd-1758
38. Berrier F, Hellier S. Addressing telehealth education in a family nurse practitioner program through simulation-based learning. Journal of the American Association of Nurse Practitioners. 2022;34(11):1204–1211. doi: 10.1097/jxx.0000000000000764
39. Boardman C, Knight EP, Gavilanes JS, MacMillan C, Chatelain T, Vick E, et al. Disseminated tele-OSCE during a pandemic: one university's experience. Journal of Nursing Education. 2022;61(2):107–110. doi: 10.3928/01484834-20211128-01
40. Boyle WA, Murray DJ, Beyatte MB, Knittel JG, Kerby PW, Woodhouse J, et al. Simulation-based assessment of critical care "front-line" providers. Critical Care Medicine. 2018;46(6):516–522. doi: 10.1097/CCM.0000000000003073
41. Bramble K. Nurse practitioner education: enhancing performance through the use of the objective structured

clinical assessment. The Journal of Nursing Education. 1994;33(2):59–65. doi: 10.3928/0148-4834-19940201-05
42. Bricker C, Canale M, Hay B, Taylor T, Maguire D, Remo E, et al. Pandemic response: the identification of alternative clinical hours to ensure advanced practice nursing students meet program requirements. Journal of the American Association of Nurse Practitioners. 2022;34(8):1008–1015. doi: 10.3928/0148-4834-19940201-05
43. Brown KM, Swoboda SM, Gilbert GE, Horvath C, Sullivan N. Integrating virtual simulation into nursing education: a roadmap. Clinical Simulation in Nursing. 2022;72:21–29. doi: 10.1016/j.ecns.2021.08.002
44. Burt L, Fitz SD, Kiser B. Evidence-based simulation: fostering competency through structured multisource feedback. Journal of the American Association of Nurse Practitioners. 2024;35:638–641. doi: 10.1097/JXX.0000000000001004
45. Burt L, Kilroy S. Nurse practitioner student perceptions of a multimodal telemedicine clinical course. Nurse Educator. 2021;46(5):122–126. doi: 10.1097/nne.0000000000001019
46. Carpenter JG, Ersek M. Developing and implementing a novel program to prepare nursing home-based geriatric nurse practitioners in primary palliative care. Journal of the American Association of Nurse Practitioners. 2021;34(1):142–152. doi: 10.1097/jxx.0000000000000565
47. Casler K, Bobek H, Pittman O, Tornwall J. The effect of asynchronous group discussions on nurse practitioner student debriefing experience in virtual simulation. Journal of the American Association of Nurse Practitioners. 2022;34(7):901–908. doi: 10.1097/jxx.0000000000000720
48. Cassiday OA, Nickasch BL, Mott JD. Exploring telehealth in the graduate curriculum. Nursing Forum. 2021;56(1):228–232. doi: 10.1111/nuf.12524
49. Choi J, Bove LA, Tarte V, Choi WJ. Impact of simulated electronic health records on informatics competency of students in informatics course. Healthcare Informatics Research. 2021;27(1):67–72. doi: 10.4258/hir.2021.27.1.67
50. Chrostowski SK, Tietze M. Using a telemedicine cart for an objective structured clinical examination (OSCE) in nurse practitioner education. Clinical Simulation in Nursing. 2022;70:21–27. doi: 10.1016/j.ecns.2022.06.002
51. Coates J. Assessing acute care nurse practitioner students' readiness to engage in difficult conversations upon entry to practice. PhD Dissertation, Wilmington University. doi: 10.17918/etd-1758
52. Conelius J, Grossman S, Becht LG. Interprofessional "on-call" e-learning for family nurse practitioner students: preparing for primary care across the life span. Journal of the American Association of Nurse Practitioners. 2019;31(2):104–109. doi: 10.1097/JXX.0000000000000120
53. Corbridge SJ, McLaughlin R, Tiffen J, Wade L, Templin R, Corbridge TC. Acute care advisor: using simulation to enhance knowledge and confidence. Nurse Practitioner. 2008;33(6):12–13.
54. Corbridge SJ, Robinson FP, Tiffen J, Corbridge TC. Online learning versus simulation for teaching principles of mechanical ventilation to nurse practitioner students. International Journal of Nursing Education Scholarship. 2010;7(1):Article12. doi: 10.2202/1548-923X.1976
55. Corcoran AM, Lysaght S, LaMarra D, Ersek M. Pilot test of a three-station palliative care observed structured clinical examination for multidisciplinary trainees. Journal of Nursing Education. 2013;52(5):294–298. doi: 10.3928/01484834-20130328-02
56. Cormack CL, Jensen E, Durham CO, Smith G, Dumas B. The 360-degree evaluation model: a method for assessing competency in graduate nursing students. A pilot research study. Nurse Education Today. 2018;64:132–137. doi: 10.1016/j.nedt.2018.01.027
57. Cross WF, West JC, Crean HF, Rosenberg E, LaVigne T, Caine ED. Measurement of primary care providers' suicide prevention skills following didactic education. Suicide and Life-Threatening Behavior. 2021;52(3):373–382. doi: 10.1111/sltb.1282
58. Culpe-Roche A, Vaughn J, Arms T, Roberto A, Hubbell S, Link T. Medication for opioid use disorders: an interactive educational program developed for the nurse practitioner. Journal of the American Association of Nurse Practitioners; 2023;35:638–641. doi: 10.1097/jxx.0000000000000897
59. Curtis JR, Back AL, Ford DW, Downey L, Shannon SE, Doorenbos AZ, et al. Effect of communication skills training for residents and nurse practitioners on quality of communication with patients with serious illness: a randomized trial. JAMA. 2013;310(21):2271–2281. doi: 10.1001/jama.2013.282081
60. Daher S, Hochreiter J, Schubert R, Gonzalez L, Cendan J, Anderson M, et al. The physical-virtual patient simulator: a physical human form with virtual appearance and behavior. Simulation in Healthcare: Journal of the Society for Simulation in Healthcare. 2020;15(2):115–121. doi: 10.1097/sih.0000000000000409
61. Daly S. Implementation and evaluation of an end-of-life standardized participant simulation in an adult/gerontology acute care nurse practitioner program. Nurse Education Perspectives; 2024:45(3):172–173. doi: 10.1097/01.nep.0000000000001167
62. Davis A, Moore L, Farmer J, Lewis S. Development and implementation of virtual clinical skills experiences for psychiatric nurse practitioner students. Journal of the American Association of Nurse Practitioners. 2021:34(3):537–541. doi: 10.1097/jxx.0000000000000669
63. Berta M, Burt L, Carlucci M, Corbridge S. Breaking bad news via telehealth: simulation training for nurse practitioner students. The Journal of Nursing Education. 2022;61(9):528–532. doi: 10.3928/01484834-20220705-08
64. Diaz D. Discovery of methods to enhance the care of the LGBTQ community. The Journal for Nurse Practitioners. 2021:17:1085–1090. doi: 10.1016/j.nurpra.2021.07.005
65. Doucette JA, Rousseau J, Vondracek H. Addressing health equity through a telehealth maternal-newborn home visit for nurse practitioner students. Journal of the American Association of Nurse Practitioners. 2022;35(1):63–70. doi: 10.1097/jxx.0000000000000810
66. Ford K, Weltin A, Knox K. Comparing task trainers to standardized patients for gynecologic assessment skills. Journal for Nurse Practitioners. 2022;18(10):1107–1110. doi: 10.1016/j.nurpra.2022.09.010
67. Garrido M, Dlugasch L, Graber PM. Integration of interprofessional education and culture into advanced practice simulations. Clinical Simulation in Nursing. 2014;10(9):461–469. doi: 10.1016/j.ecns.2014.06.001

68. Gibbons SW, Adamo G, Padden D, Ricciardi R, Graziano M, Levine E, et al. Clinical evaluation in advanced practice nursing education: using standardized patients in health assessment. The Journal of Nursing Education. 2002;41(5):215–221. doi: 10.3928/0148-4834-20020501-07
69. Golinveaux J, Gerbert B, Cheng J, Duderstadt K, Alkon A, Mullen S, et al. Oral health education for pediatric nurse practitioner students. Journal of Dental Education. 2013;77(5):581–590. Available from: https://pubmed.ncbi.nlm.nih.gov/23658403/ [Accessed 10 April 2025].
70. Griffith PB, Kelly MM, Becker D. On-call simulation for adult gerontology acute care nurse practitioner students: a comparative descriptive study. Journal of the American Association of Nurse Practitioners. 2019;33(6):429–440. doi: 10.1097/jxx.0000000000000355
71. Grossman S, Conelius J. Simulation pedagogy with nurse practitioner students: impact of receiving immediate individualized faculty feedback. Creative Nursing. 2015;21(2):100–109. doi: 10.1891/1078-4535.21.2.100
72. Haber J, Hartnett E, Allen K, Crowe R, Adams J, Bella A, et al. The impact of oral-systemic health on advancing interprofessional education outcomes. Journal of Dental Education. 2017;81(2):140–148. PMID: 28148604.
73. Hallas D, Biesecker B, Brennan M, Newland JA, Haber J. Evaluation of the clinical hour requirement and attainment of core clinical competencies by nurse practitioner students. Journal of the American Academy of Nurse Practitioners. 2012;24(9):544–553. doi: 10.1111/j.1745-7599.2012.00730.x
74. Hauglum SD, Crenshaw NA, Gattamorta KA, Mitzova-Vladinov G. Evaluation of a low-cost, high-fidelity animal model to train graduate advanced practice nursing students in the performance of ultrasound-guided central line catheter insertion. The Society of Simulation in Healthcare. 2018;13(5):341–347. doi: 10.1097/sih.0000000000000337
75. Haut C, Akintade B. Using high-fidelity simulation to teach acute care pediatric nurse practitioner students. The Journal of Nurse Practitioners. 2014;10(10):88–91. doi: 10.1016/j.nurpra.2014.09.012
76. Hutson E, Zeno R. Clinical competence for youth suicide: use of simulation in pediatric and psychiatric-mental health nurse practitioner programs. Journal of Psychosocial Nursing and Mental Health Services. 2021;59(8):7–13. doi: 10.3928/02793695-20210617-01
77. Jeffries PR, Beach M, Decker SI, Dlugasch L, Groom J, Settles J, et al. Multi-center development and testing of a simulation-based cardiovascular assessment curriculum for advanced practice nurses. Nursing Education Perspectives. 2011;32(5):316–322. doi: 10.5480/1536-5026-32.5.316
78. Johnson HL, Fontelo P, Olsen CH, Jones KD, Gimbel RW. Family nurse practitioner student perception of journal abstract usefulness in clinical decision making: a randomized controlled trial. Journal of the American Association of Nurse Practitioners. 2013;25(11):597–603. doi: 10.1111/1745-7599.12013
79. Johnson MP, Hickey KT, Scopa-Goldman J, Andrews T, Boerem P, Covec M, et al. Manikin versus web-based simulation for advanced practice nursing students. Clinical Simulation in Nursing. 2014;10(6):317–323. doi: 10.1016/j.ecns.2014.02.004
80. Whitt KJ. Effectiveness of screen-based simulation as a strategy to improve nurse practitioner students' access to electronic health records in clinical education. CIN: Computers, Informatics, Nursing. 2023;41(8):621–627. doi: 10.1097/cin.0000000000000987
81. Kaganovskaya M, Wuerz L. Development of an educational program using ultrasonography in vascular access for nurse practitioner students. British Journal of Nursing. 2021;30(2):34–42. doi: 10.12968/bjon.2021.30.2.s34
82. Keiffer M, Anderson M, Eckhoff DO, Blackwell CW, Talbert S, Parker AM. Standardizing nurse practitioner student evaluation during high-stakes clinical examinations. Journal of the American Association of Nurse Practitioners. 2020;33(12):1240–1246. doi: 10.1097/jxx.0000000000000514
83. Kelly MM, Blunt E, Nestor K. After-hours/on-call experience during primary care nurse practitioner education utilizing standard scenarios and simulated patients. Journal of the American Association of Nurse Practitioners. 2017;29(12):725–732. doi: 10.1002/2327-6924.12526
84. Kesten KS, Brown HF, Meeker MC. Assessment of APRN student competency using simulation: a pilot study. Nursing Education Perspectives. 2015;36(5):332–334. doi: 10.5480/15-1649
85. Kim J, Lewallen S. Teaching nurse practitioner students about polypharmacy through a novel simulation. Nurse Educator. 2022;48(3):100–102. doi: 10.1097/nne.0000000000001312
86. Knight EP, Prettyman AV. Rural telehealth team education for baccalaureate and nurse practitioner students. The Journal of Nursing Education. 2020;59(5):274–277. doi: 10.3928/01484834-20200422-07
87. Kurz JMPRN, Mahoney KPC, Martin-Plank LMSNC, Lidicker JMA. Objective structured clinical examination and advanced practice nursing students. Journal of Professional Nursing. 2009;25(3):186–189. doi: 10.1016/j.profnurs.2009.01.005
88. Kuszajewski ML, Vaughn J, Bowers MT, Smallheer B, Hueckel RM, Molloy MA. Embracing disruption: measuring effectiveness of virtual simulations in advanced practice nurse curriculum. Clinical Simulation in Nursing. 2021;57:41–47. doi: 10.1016/j.ecns.2021.04.017
89. Kuzma EK, Boucher N, Gray B, Burmester K, Ploutz-Snyder R, Strobbe S. Preparing advanced practice registered nursing students to deliver adolescent SBIRT for substance use. The Journal of Nursing Education. 2018;57(12):736–741. doi: 10.3928/01484834-20181119-06
90. LaManna JB, Eckhoff DO, Duncan J, Anderson M. Nurse practitioner student perceptions of a pilot simulated gerontologic telehealth visit. The Journal of Nursing Education. 2021;60(7):408–413. doi: 10.3928/01484834-20210616-10
91. Lin ECL, Chen SL, Chao SY, Chen YC. Using standardized patient with immediate feedback and group discussion to teach interpersonal and communication skills to advanced practice nursing students. Nurse Education Today. 2013;33(6):677–683. doi: 10.1016/j.nedt.2012.07.002
92. Loar RS. The impact of a computer simulated case study on nurse practitioner students' declarative knowledge and clinical performance. 2007. PhD Dissertation, University of Illinois. Available from: http://hdl.handle.net/2142/87791 [Accessed 12 August 2024].
93. Lowery B, Corbett RW, King CA, Brown ST, Faser KE. Virtual clinic – opening the clinic door to interprofessional education and practice. The Journal for Nurse Practitioners. 2014;10(10):69–76. doi: 10.1016/j.nurpra.2014.08.021

94. Mabry JL, Lee E, Cass C. Effect of preclinical simulation on family nurse practitioner student's readiness for practice. Journal for Nurse Practitioners. 2022;18(9):999–1002. doi: 10.1016/j.nurpra.2022.05.01
95. McDermott KL, Pfister JK, Kuester JC, Talbert L, Schindler CA. Integration of a simulation curriculum across semesters in an acute care pediatric nurse practitioner program. Journal of Pediatric Health Care. 2022;36(6):611–617. doi: 10.1016/j.pedhc.2022.05.004
96. Merritt LS. Preparing nurse practitioner students for virtual visits: an innovative computer-based text-messaging simulation. Clinical Simulation in Nursing. 2020;43:17–20. doi: 10.1016/j.ecns.2020.02.006
97. Merritt LS, Brauch AN, Bender AK, Kochuk D. Using a web-based e-visit simulation to educate nurse practitioner students. The Journal of Nursing Education. 2018;57(5):304–307. doi: 10.3928/01484834-20180420-10
98. Mitchell AM, Mahmoud KF, Puskar K, Hagle H, Lindsay D, Knapp E. Teaching screening, brief intervention, and referral to treatment techniques to nurse practitioner students. The Journal for Nurse Practitioners. 2016;12(7):311–317. doi: 10.1016/j.nurpra.2016.03.018
99. Mompoint-Williams D, Brooks A, Lee L, Watts P, Moss J. Using high-fidelity simulation to prepare advanced practice nursing students. Clinical Simulation in Nursing. 2014;10(1):5–10. doi: 10.1016/j.ecns.2013.07.005
100. Moore J, Hawkins-Walsh E. Evaluating nurse practitioner student competencies: application of entrustable professional activities. The Journal of Nursing Education. 2020;59(12):714–720. doi: 10.3928/01484834-20201118-11
101. Moore J, Montejo L. Case-based learning: facilitating nurse practitioner clinical learning with virtual patient cases. Journal of the American Association of Nurse Practitioners. 2022;34(1):129–134. doi: 10.1097/jxx.0000000000000560
102. Moote R, Claiborne M, Galloway A. Interprofessional education telephone simulation for campus-based pharmacy students and distance-learning family nurse practitioner students. Currents in Pharmacy Teaching and Learning. 2019;11(3):264–269. doi: 10.1016/j.cptl.2018.12.008
103. Mueller R, DeSimone ME. Bringing gender-affirming care to primary care: use of a multimodal curriculum to educate nurse practitioners and nurse practitioner students. Nurse Educator; 2023:48(6):304–309. doi: 10.1097/nne.0000000000001427
104. Nadeau C, Snowden K, Gattamorta KA, Foronda CL. Use of simulation for global health pre-departure training. Nurse Education Today. 2020;95:104597. doi: 10.1016/j.nedt.2020.104597
105. Ndiwane AN, Baker NC, Makosky A, Reidy P, Guarino AJ. Use of simulation to integrate cultural humility into advanced health assessment for nurse practitioner students. The Journal of Nursing Education. 2017;56(9):567–571. doi: 10.3928/01484834-20170817-11
106. Nesbitt BJ, Murray DA, Mensink AR. Teaching motivational interviewing to nurse practitioner students: a pilot study. Journal of the American Association of Nurse Practitioners. 2014;26(3):131–135. doi: 10.1002/2327-6924.12041
107. Nimmo C, Behnke L, Creech C, Schellenberg K, Turkelson C, Cooper D. Using simulation to educate rural NP students about cultural congruence. Journal for Nurse Practitioners. 2021;17(4):476–480. doi: 10.1016/j.nurpra.2020.11.019
108. Oliver TL. Weight bias reduction intervention among nurse practitioner students using simulation-based experiences. Journal of the American Association of Nurse Practitioners. 2023:1–7. doi: 10.1097/JXX.0000000000000956
109. Pal AD, Bowler F, Flynn Makic MB, Estes KR. Virtual simulation for advanced practice registered nurse students: adapting to shortage of clinicals. Journal for Nurse Practitioners. 2022;18(5):563–568. doi: 10.1016/j.nurpra.2022.02.005
110. Palumbo MV, Gagne JC, Murphy G. Interprofessional care of elders: utilizing the virtual learning environment. Journal of the American Association of Nurse Practitioners. 2016;28(9):465–470. doi: 10.1002/2327-6924.12368
111. Phillips SJ, Lie D, Encinas J, Ahearn CS, Tiso S. Effective use of interpreters by family nurse practitioner students: is didactic curriculum enough? Journal of the American Academy of Nurse Practitioners. 2011;23(5):233–238. doi: 10.1111/j.1745-7599.2011.00612.x
112. Phillips TA, Munn AC, George TP. Assessing the impact of telehealth objective structured clinical examinations in graduate nursing education. Nurse Educator. 2020;45(3):169–172. doi: 10.1097/nne.0000000000000729
113. Pierce LM, Weber MJ, Klein CJ, Stoecker BA. Transitioning an advanced practice fellowship curriculum to elearning during the COVID-19 pandemic. The Journal of Nursing Education. 2020;59(9):514–517. doi: 10.3928/01484834-20200817-07
114. Reyes I, Close S, Rodriguez J, Evans D. Progressive dosing of observed real-life clinical exposure for nurse practitioner training. Journal of Nursing Education. 2017;56(9):552–555. doi: 10.3928/01484834-20170817-07
115. Richmond A, Pfieffer ML, McClure N, Parker D. Adaptation to virtual format of an advanced practice registered nurse pediatric physical abuse simulation. The Journal for Nurse Practitioners. 2022;19(5):1–5. doi: 10.1016/j.nurpra.2022.09.020
116. Rosenzweig M, Hravnak M, Magdic K, Beach M, Clifton M, Arnold R. Patient communication simulation laboratory for students in an acute care nurse practitioner program. American Journal of Critical Care. 2008;17(4):364–372. PMID: 18593836.
117. Roth RL, Lis G, O'Connor N, Aseltyne KA. Evaluation of COMFORT in strengthening perceived communication confidence of advanced practice registered nurses. Journal of Hospice & Palliative Nursing. 2017;19(1):59–66. doi: 10.1097/NJH.0000000000000309
118. Rudolph A, Vaughn J, Crego N, Hueckel R, Kuszajewski M, Molloy M, et al. Integrating telepresence robots into nursing simulation. Nurse Educator. 2017;42(2):1–4. doi: 10.1097/nne.0000000000000329
119. Rutherford-Hemming T. Learning in simulated environments: effect on learning transfer and clinical skill acquisition in nurse practitioner students. Journal of Nursing Education. 2012;51(7):403–406. doi: 10.3928/01484834-20120427-04
120. Scherer YK, Bruce SA, Runkawatt V. A comparison of clinical simulation and case study presentation on nurse practitioner students' knowledge and confidence in managing a cardiac event. International Journal of Nursing Education Scholarship. 2007;4(1):Article22. doi: 10.2202/1548-923x.1502

121. Schleutermann JA, Holzemer WL, Farrand LL. An evaluation of paper-and-pencil and computer-assisted simulations for nurse practitioners. Journal of Nursing Education. 1983;22(8):315–323. doi: 10.3928/0148-4834-19831001-02
122. Schram AP, Mudd S. Implementing standardized patients within simulation in a nurse practitioner program. Clinical Simulation in Nursing. 2015;11(4):208–213. doi: 10.1016/j.ecns.2015.02.002
123. Shaw RJ. Telepresence robots for pediatric clinical simulations: feasibility and acceptability. Pediatric Nursing. 2018;44(1):39–43.
124. Shifrin MM, Widmar SB, Ashby NE. Adult gerontology acute care nurse practitioner student and prelicensure registered nurse student perceptions of intradisciplinary, high-fidelity rapid response team simulations. Clinical Simulation in Nursing. 2019;26:32–37. doi: 10.1016/j.ecns.2018.09.006
125. Shue-McGuffin KD, Powers K. Dermatologic simulations in nurse practitioner education: improving skin cancer knowledge, confidence, and performance. Journal of the American Association of Nurse Practitioners. 2022;34:489–498. doi: 10.1097/JXX.0000000000000637
126. Smith TS, Jordan J, Li P. Video-based interactive clinical simulation: preparing nurse practitioner students for clinical. Journal for Nurse Practitioners. 2022;18(9):995–998. doi: 10.1016/j.nurpra.2022.07.014
127. Talashek ML, Gerace LM, Miller AG, Lindsey M. Family nurse practitioner clinical competencies in alcohol and substance use. Journal of the American Academy of Nurse Practitioners. 1995;7(2):57–63. doi: 10.1111/j.1745-7599.1995.tb00994.x
128. Theroux R, Pearce C. Graduate students' experiences with standardized patients as adjuncts for teaching pelvic examinations. Journal of the American Academy of Nurse Practitioners. 2006;18(9):429–435. doi: 10.1111/j.1745-7599.2006.00158.x
129. Tiffen J, Corbridge S, Shen BC, Robinson P. Patient simulator for teaching heart and lung assessment skills to advanced practice nursing students. Clinical Simulation in Nursing. 2011;7(3):91–97. doi: 10.1016/j.ecns.2009.10.003
130. Vance SR, Dentoni-Lasofsky B, Ozer E, Deutsch MB, Meyers MJ, Buckelew SM. Using standardized patients to augment communication skills and self-efficacy in caring for transgender youth. Academic Pediatrics. 2021;21(8):1441–1448. doi: 10.1016/j.acap.2021.05.010
131. VanGraafeiland B, Busch DW, Mudd SS, McIltrot K, Brown K, Abshire Saylor M, et al. A mock telephone triage experience for nurse practitioner students. Journal for Nurse Practitioners. 2022;18(3):320–323. doi: 10.1016/j.nurpra.2021.10.023
132. Vessey JA, Huss K. Using standardized patients in advanced practice nursing education. Journal of Professional Nursing. 2002;18(1):29–35. doi: 10.1053/jpnu.2002.30898
133. Vinluan CM, Verdell A, Ibarra C, Giri N, Thai D. Interprofessional perceptions and attitudes among pharmacy and family nurse practitioner students. Journal of Pharmacy Practice. 2020;33(6):815–819. doi: 10.1177/0897190019840100
134. Wesemann D, Posey K, Wilson C. Clinical simulation to evaluate students' intraprofessional telehealth skills between multiple university campuses. Clinical Simulation in Nursing. 2021;54:35–39. doi: 10.1016/j.ecns.2021.01.011
135. Weston C, Jones-Schubart K, Hare M, Gosselin K, Cook S. Benefits of a pediatric clinic simulation using standardized patients in family nurse practitioner education. Nursing Education Perspectives. 2021;42(6):31–33. doi: 10.1097/01.NEP.0000000000000871
136. Wilbeck J, Phillippi J, Schorn M. Teaching management of the unexpected birth: application of multimodal techniques. Advanced Emergency Nursing Journal. 2014;36(1):87–96. doi: 10.1097/TME.0000000000000006
137. Wolf L. Family nurse practitioner students' readiness for board certification utilizing a full board review course and simulation. SAGE Open Nursing. 2023;9(1):1–6. doi: 10.1177/23779608231186031
138. Woodruff K, O'Neill SP, Walton-Moss BJ. Exploring APN students' perceptions, self-confidence, and satisfaction with clinical simulation. Nursing Education Perspectives. 2017;38(6):347–349. doi: 10.1097/01.NEP.0000000000000176
139. Woroch RA, McNamara M. Intimate partner violence standardized patient simulation for nurse practitioner students. Journal of the American Psychiatric Nurses Association. 2021;29(4):338–343. doi: 10.1177/10783903211023557
140. Abram MD, Guilamo-Ramos V, Forbes MO. Buprenorphine induction simulation: focus on patient safety and quality care. Clinical Simulation in Nursing. 2020;44:35–41. doi: 10.1016/j.ecns.2019.11.009
141. Ali AA, Miller E, Musallam E, Ballman K. Acute care nurse practitioner students' perceptions of a debriefing experience after a cardiac emergency high-fidelity simulation: a qualitative study. AACN Advanced Critical Care. 2021;32(3):264–274. doi: 10.4037/aacnacc2021376
142. Brommelsiek M, Peterson JA. Preparing nurse practitioner students to practice in rural primary care. The Journal of Nursing Education. 2020;59(10):581–584. doi: 10.3928/01484834-20200921-08
143. Defenbaugh N, Chikotas NE. The outcome of interprofessional education: Integrating communication studies into a standardized patient experience for advanced practice nursing students. Nurse Education in Practice. 2016;16(1):176–181. doi: 10.1016/j.nepr.2015.06.003
144. Estes K, Gilliam E, Knapfel S, Lee C, Skiba D. Discovering eHealth technology: an innovative interprofessional graduate student learning experience. Studies in Health Technology and Informatics. 2016;225:242–246. doi: 10.3233/978-1-61499-658-3-242
145. Goolsby MJ. The role of computer-assisted simulation in nurse practitioner education. Journal of the American Academy of Nurse Practitioners. 2001;13(2):90–96. doi: 10.1111/j.1745-7599.2001.tb00224.x
146. Griffith PB. The effect of structured reflection on nurse practitioner students' diagnostic reasoning within simulation: qualitative outcomes of a mixed methods experiment. Clinical Simulation in Nursing. 2023;79:6–19. doi: 10.1016/j.ecns.2023.02.014
147. Harris J, Shoemaker K, Johnson K, Tompkins-Dobbs K, Domian E. Qualitative descriptive study of family nurse practitioner student experiences using high-fidelity simulation. Kansas Nurse. 2016;91(2):12–15.

148. Henrichs B, Rule A, Grady M, Ellis W. Nurse anesthesia students' perceptions of the anesthesia patient simulator: a qualitative study. AANA Journal. 2002;70(3):219–225.
149. Kowitlawakul Y, Chow YL, Salam ZH, Ignacio J. Exploring the use of standardized patients for simulation-based learning in preparing advanced practice nurses. Nurse Education Today. 2015;35(7):894–899. doi: 10.1016/j.nedt.2015.03.004
150. Kuzma EK, Graziano C, Shea E, Schaller FV, Pardee M, Darling-Fisher CS. Improving lesbian, gay, bisexual, transgender, and queer/questioning health: using a standardized patient experience to educate advanced practice nursing students. Journal of the American Association of Nurse Practitioners. 2019;31(12):714–722. doi: 10.1097/JXX.0000000000000224
151. Posey L, Pintz C, Zhou Q, Lewis K, Slaven-Lee P. Nurse practitioner student perceptions of face-to-face and telehealth standardized patient simulations. Journal of Nursing Regulation. 2020;10(4):37–44.
152. Richardson L, Resick L, Leonardo M, Pearsall C. Undergraduate students as standardized patients to assess advanced practice nursing student competencies. Nurse Educator. 2009;34(1):12–16.
153. Taylor I, Bing-Jonsson PC, Johansen E, Levy-Malmberg R, Fagerström L. The objective structured clinical examination in evolving nurse practitioner education: a study of students' and examiners' experiences. Nurse Education in Practice. 2019;37:115–123. doi: 10.1016/j.nepr.2019.04.001
154. Berta M, Burt L, Carlucci M, Corbridge S. Breaking bad news via telehealth: simulation training for nurse practitioner students. The Journal of Nursing Education.2022;61(9):528–532. doi: 10.3928/01484834-20220705-08
155. Estes KR, Robinson MV, Madigosky W. Advanced practice nursing students' perspectives of an interprofessional advanced physical assessment learning experience. The Journal for Nurse Practitioners. 2016;12(5):219–224.
156. George TP, Munn AC, Phillips TA, Marty Hucks J. The impact of telehealth objective structured clinical evaluations in intraprofessional nursing education: a mixed methods study. Nurse Education Today. 2021;103:104978. doi: 10.1016/j.nedt.2021.104978
157. Harrington CC, Neil JA, Hardin SR, Roberson DW. Is perception reality? Using person-in-context simulation to promote empathic understanding of dementia among nurse practitioner students. Nursing Education Perspectives. 2021;42(6):377–379. doi: 10.1097/01.NEP.0000000000000780
158. Jo M. Effects of advance care planning training on advanced practice nurse students' knowledge, confidence, and perception of end-of-life care: a mixed-method study. Nurse Education in Practice. 2023;67:1–8. doi: 10.1016/j.nepr.2023.103555
159. Keiser MM, Turkelson C. Using simulation to evaluate clinical performance and reasoning in adult-geriatric acute care nurse practitioner students. The Journal of Nursing Education. 2019;58(10):599–603. doi: 10.3928/01484834-20190923-08
160. McMorrow MC, Chang YP. Motivational interviewing training for advanced practice nursing students to address prescription opioid use disorder: a mixed methods approach. Journal of Addictions Nursing. 2021;32(2):141–151. doi: 10.1097/JAN.0000000000000401
161. Perez A, Gaehle K, Sobczak B, Stein K. Virtual simulation as a learning tool for teaching graduate nursing students to manage difficult conversations. Clinical Simulation in Nursing. 2022;62:66–72. doi: 10.1016/j.ecns.2021.10.003
162. Strauch K. Use of simulation to integrate behavioral health into primary care nurse practitioner programs. Educational Innovations. 2024;63(2):128–133. doi: 10.3928/01484834-20230815-03
163. Tankimovich M, Swails J, Hamburger M. Nurse practitioner and medical students' perceptions of teamwork before and after a standardized patient pilot simulation. Nursing Education Perspectives. 2020;41(3):171–173. doi: 10.1097/01.NEP.0000000000000503
164. Chua CMS, Nantsupawat A, Wichaikhum OA, Shorey S. Content and characteristics of evidence in the use of standardized patients for advanced practice nurses: a mixed-studies systematic review. Nurse Education Today. 2022;120:105621. doi: 10.1016/j.nedt.2022.105621
165. dos Santos Ribeiro V, Garbuio DC, Zamariolli CM, Appoloni Eduardo AH, Campos de Carvalho E. Clinical simulation and training for advanced nursing practices: an integrative review. Acta Paulista de Enfermagem. 2018;31(6):659–666. doi: 10.1590/1982-0194201800090
166. Gartz J, O'Rourke J. Telehealth educational interventions in nurse practitioner education: an integrative literature review. Journal of the American Association of Nurse Practitioners. 2020;33(11):872–878. doi: 10.1097/JXX.0000000000000488
167. Griffith PB, Mariani B, Kelly MM. Diagnostic reasoning outcomes in nurse practitioner education: a scoping review. The Journal of Nursing Education. 2022;61(10):579–586. doi: 10.3928/01484834-20220803-08
168. Piot MA, Dechartres A, Attoe C, Romeo M, Jollant F, Billon G, et al. Effectiveness of simulation in psychiatry for nursing students, nurses and nurse practitioners: a systematic review and meta-analysis. Journal of Advanced Nursing. 2022;78(2):332–347. doi: 10.1111/jan.14986
169. Sittner BJ, Abersold ML, Paige JB, Graham, LML, Schram AP, Decker, SI, Lioce L. INACSL standards of best practice for simulation: past, present and future. Nurse Education Today. 2015;36(5):294–98. doi: 10.5480/15-1670
170. INACSL Standards Committee. Healthcare simulation standards of best practice. Clinical Simulation in Nursing. 2021;58:1–66. doi: 10.1016/j.ecns.2021.08.018
171. Diaz-Navarro C, Laws-Chapman C, Moneypenny M, Purva M. The ASPiH Standards – 2023: guiding simulation-based practice in health and care. Available from https://aspih.org.uk [accessed 10 October 2024].
172. Beccaria L, Kek MY, Huijser H. Exploring nursing educators use of theory and methods in search for evidence-based credibility in nursing education. Nurse Education Today. 2018;65:60–66. doi: 10.1016/j.nedt.2018.02.032
173. Arrogante O. Gonzales-Romero GM, Lopes-Torre EM, Carrion-Garcia L, Alberto P. Comparing formative and summative simulation-based assessment in undergraduate nursing students: nursing competencies acquisition and clinical simulation satisfaction. BMC Nursing. 2021;20(90):1–11. doi: 10.1186/s12912-021-00614-2
174. Diaz-Navarro C, Armstrong R, Charnestski M, Freeman KJ, Koh S, reedy G, Smitten J, Ingrassia PL, Matos, FM. Global consensus statement on simulation-based practice in

healthcare. Advances in Simulation. 2024;9(19):1–10. doi: 10.1186/s41077-024-00288-1

175. Collins JC, Chong WW, de Almeida Neto AC, Moles RJ, Schneider CR. The simulated patient method: design and application in health services research. Research in Social and Administrative Pharmacy. 2021;17:2108–2115. doi: 10.1016/j.sapharm.2021.04.021
176. Fey MK, Gloe D, Mariani B. Assessing the quality of simulation bases research articles: a rating rubric. Clinical Simulation in Nursing. 2015;11:496–504. doi: 10.1016/j.ecns.2015.10.005
177. Cant RP, Levett-Jones T, James, A. Do simulation studies measure up? A simulation study quality review. Clinical Simulation in Nursing. 2018;21:23–39. doi: 10.1016/j.ecns.2018.06.002
178. Cheng A, Kessler D, Mackinnon R, Chang TP, Nadkarni VM, Hunt EA, Duval-Arnould J, Lin Y, Cook DA, Pusic M, Hui J, Moher D, Egger M, Auerbach M. Reporting guidelines for health care simulation research; extensions to the CONSORT and STROBE statements. Clinical Simulation in Nursing. 2016;12:3–13. doi: 10.1097/SIH.0000000000000150
179. Ming NC, Goldenberg LB. Research worth using re(framing) research evidence quality for educational policymaking and practice. Review of Research Education. 2021;45(1):129–169.