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Teaching methods in wound care in nursing education: A scoping review

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ABSTRACT

Background: In wound care education, there is evidence of competence areas and learning goals. However, evidence of teaching methods needs to be determined.
Aim: To describe the teaching methods used in wound care education for nursing professionals and students, and to describe how these methods affect or are related to their competence and other outcomes in wound care and prevention.
Methods: The scoping review followed JBI methodology. Two researchers searched databases including MEDLINE (PubMed), CINAHL (EBSCO), Cochrane Library, Scopus, and ERIC in November 2024. Evidence was selected by screening titles and abstracts, and then reviewing full texts. Evidence was categorised by themes, with outcomes summarised narratively. The search was updated in March 2026.
Results: The authors of the 48 articles focused on undergraduate nursing education and pressure ulcer prevention. The six main teaching methods were: technology-enhanced methods, gaming, lecturing, simulation, reflective methods, and workshops. Simulation was most common. Teaching methods indicated mainly positive results, although some outcomes showed no change in students' or professionals' wound care competence.
Conclusions: All teaching methods resulted in positive outcomes in at least one dimension of competence among nurses and students. Nurse educators can use these to enhance knowledge and skills. However, findings should be interpreted cautiously due to the scoping nature of the review.

Introduction

Nursing professionals play a key role in wound care and prevention. Wound care requires nursing professionals to have diverse and extensive competence (Kielo et al., 2019), and the care should be based on the latest and highest quality evidence available (Ahtiala & Kielo-Viljamaa, 2024). However, previous studies have shown that nursing students (Kielo et al., 2018) and nursing professionals (Welsh, 2018) have limited competence in wound care.

Effective teaching improves competence (Gao et al., 2024; Satterlee et al., 2008). Previous studies have identified and developed wound care curricula for both pre-graduation (Lindahl et al., 2021) and post-graduation (Probst et al., 2019) levels. In addition, competence areas, learning goals and content have been identified for bachelor's level nursing education (Kielo et al., 2019; Kielo-Viljamaa, Suhonen, et al., 2022; Kielo-Viljamaa, Viljamaa, et al., 2022). A recent scoping review of teaching methods for managing venous leg ulcers among nursing professionals and students (Durán-Sáenz et al., 2022) was conducted, indicating that the teaching interventions varied greatly in modality, content, and duration, including methods such as e-learning, workshops, and demonstrations. Still, there is a lack of evidence on teaching methods in wound care education in general (Kielo-Viljamaa & Stolt, 2024).

Teaching methods are the methods or strategies that a teacher or educator uses to help students achieve learning objectives. Teaching methods in nursing education include, for example, lecturing, simulation and problem-based learning (Breytenbach et al., 2017; Westerdahl et al., 2022). Teaching methods that activate students and learners by combining both classroom and self-learning, also called blended or flipped classrooms, have shown positive results in nursing education (Barranquero-Herbosa et al., 2022), especially in wound care, where theoretical and practical knowledge are combined (Bobbink, Teixeira,

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et al., 2022). In addition, the COVID-19 pandemic has changed nursing education in that theoretical teaching is increasingly delivered online and on the students' and learners' own initiative, and classroom teaching focuses on practical skills through simulations and workshops that cannot be studied online (Kielo-Viljamaa & Stolt, 2024; Probst et al., 2024). Assessing the effectiveness of various teaching methods is challenging due to inconsistent definitions, with terms like teaching and learning often used interchangeably, reflecting different educational paradigms.

The scoping review provides new information by examining different teaching methods and their impact or associations on improving the wound care competence of nursing professionals and students, which in turn could be used to develop wound care education at both undergraduate and postgraduate levels. The study defines competence as a combination of knowledge (theoretical), performance and skills (practical), as well as values and attitudes (Cowan et al., 2005). In addition, the effects or associations of teaching methods in this review include their outcomes on, for example, nursing professionals' or students' clinical reasoning, confidence and satisfaction with their own competence (Stolt et al., 2024).

A scoping approach was chosen for this review because the literature on teaching methods in wound care education is expected to be diverse, encompassing various research designs (Kielo-Viljamaa & Stolt, 2024). Additionally, the review aims to provide an overview of teaching methods in wound care education for future research directions.

Review questions

The scoping review aims to describe the teaching methods used in wound care education for nursing professionals and students, and to describe how these methods affect or are related to their competence and other outcomes in wound care and prevention. Review questions were: a) What teaching methods have been used to educate nursing professionals and students about wound care and prevention? b) How do these teaching methods affect or are related to the competence or other outcomes of nursing professionals and students in wound care and prevention?

Inclusion criteria

Types of participants

Studies were included in this review if participants were nursing professionals or nursing students at all levels and with various qualifications. Nursing professionals include, for example, the following: registered nurses, practical nurses, nurse practitioners, clinical nurse specialists, advanced practice registered nurses, and specialist nurses, such as tissue viability nurses. In addition to registered nurses, nursing professionals in this review include midwives, public health nurses, and paramedics (for example, in some Nordic countries, paramedics are also nursing professionals). Nursing students include those studying at vocational or diploma level (EQF 4 and 5), bachelor level (EQF 6), master level (EQF 7), and doctoral level (EQF 8) (EU, n.d.). Nursing or nurse assistants without a vocational or professional degree in nursing were excluded from this review due to the lack of standardized education and consistent competence requirements, as well as studies where nursing professionals or students could not be distinguished from other data or participants, such as physicians.

Concept

The focus of this review is on teaching methods. The teaching methods refer to the principles, methods, and modalities used to enable student learning (Mousavinasab et al., 2020). In this review, teaching methods focus on the strategies or techniques that teachers or educators use to plan and deliver specific courses or units of study, enabling students to meet defined learning goals. These methods include, for example, lecturing, simulation, demonstration, learning cafés, games, workshops, problem-based learning, and mentoring. The review examines the teaching methods chosen by teachers or educators, not the learning methods adopted by students. *E*-learning and web-based learning were excluded if they did not specify any teaching methods used. If e-learning was combined with a particular teaching method, such as teacher-led lectures or simulations, it was included. Studies assessing nurses' or students' wound care competence (e.g., knowledge, skills, attitudes) without relating to teaching methods were excluded, as well as studies focusing on wound care education content, structure, goals, or material without examining teaching methods. For instance, studies presenting wound care courses or educational packages were excluded if they lacked details about specific teaching methods used in the education.

Context

The review focuses on nursing education at both undergraduate and graduate levels, particularly regarding wound care education for any type of wound or wound management. Undergraduate nursing education encompasses vocational or higher education institutions, such as vocational schools, universities, and universities of applied sciences or polytechnics. For example, in Europe, bachelor-level nursing students are educated at universities, but in some countries at universities of applied sciences or polytechnics, which are more practice-oriented higher education institutions. Wound care education in these programmes may be offered as a separate course or module, or it may be integrated into a broader course or curriculum. Graduate nursing education involves continuing professional development after graduation (postgraduate education) or lifelong learning in wound care, through specialised education (e.g., in tissue viability), master's or doctoral programmes, or individual courses and training events organised by educational institutions, companies, or employers. Studies that examined wound care alongside other clinical education, or where the data or results related to wound care education could not be distinguished, were also excluded.

Types of sources of evidence

The scoping review considered empirical studies using both quantitative and qualitative research designs. Quantitative research includes experimental designs, such as randomized controlled trials or crossover studies, and quasi-experimental designs, like pretest/post-test studies. Analytical observational studies, such as longitudinal studies, prospective and retrospective cohort studies, case-control studies, and analytical cross-sectional studies, were also considered. Additionally, the review included descriptive observational study designs, including case series, individual case reports, and descriptive cross-sectional studies. Qualitative studies included, for example, designs such as phenomenology, grounded theory, ethnography, qualitative description, and action research. Textual evidence (narrative or policy) and expert opinions were also considered for inclusion in this scoping review. Review and protocol articles, as well as conference abstracts, were excluded from this review. The review included articles published in English, Finnish, and Swedish, as these are the languages accessible to the authors.

Methods

The scoping review was conducted in accordance with the JBI methodology for scoping reviews (Peters et al., 2020) and followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist (Tricco et al., 2018). A preliminary search of MEDLINE (PubMed), Prospero, the Cochrane Database of Systematic Reviews, and JBI Evidence Synthesis was conducted in July 2024, and no current or ongoing systematic reviews or scoping reviews on the topic were identified. The protocol for this scoping review was published on the OSF Register at doi.org/10.17605/OSF.IO/W27K6.

Search strategy

A three-step search strategy was used in this review. First, a limited initial search of MEDLINE (PubMed) and CINAHL (EBSCO) was conducted to identify articles on the topic. The keywords in the titles and abstracts of relevant articles and the index terms used to describe them were used to develop a full search strategy for MEDLINE (PubMed), CINAHL (EBSCO), Cochrane Library, Scopus, and ERIC (See Supplementary file 1) in November 2024. Second, this search strategy, including all identified keywords and index terms, was adapted for each database. Third, the reference list of all included sources of evidence was screened for additional studies. The authors did not set any limits on publication dates, as they considered all evidence relevant, given the scoping nature of the review. The database search spanned from November 1967 to November 2024. An information specialist from the university library was consulted for assistance and guidance in designing the search strategy. The search was updated in March 2026 to cover publications between November 2024 and mid-March 2026.

Source of evidence screening and selection

Following the search, all identified citations were collated and uploaded into Rayyan, MA (Ouzzani et al., 2016), and duplicates were removed automatically in Rayyan. Subsequently, two researchers pilot tested the title and abstract screening with 50 records, then independently assessed the relevance of all titles and abstracts against the review's inclusion and exclusion criteria (Supplementary file 2). If a record was excluded, a code of exclusion was applied, or it was labelled as "irrelevant" if the record did not refer to the review topic at all. After the initial screening, the researchers reviewed the selected and excluded records and discussed any discrepancies in judgment.

The full-text screening was pilot tested with 23 full texts by two researchers, who then examined the full texts of selected citations in detail as independent reviewers against the inclusion criteria. At this stage, a screening and selection tool was completed for each full-text article, serving as a checklist for inclusion or exclusion based on the article's participants, concept, context, and study type. After independent full-text screenings, the researchers reviewed the records and discussed any discrepancies in judgment. Two of the full texts were further assessed for eligibility by a third reviewer. Sources for the manual search included reference lists from eligible studies and review articles identified during the systematic search process, which were independently screened by two reviewers.

Data extraction

The data extraction following the initial search and selection of 35 articles was carried out independently by two researchers using a data extraction tool developed by the reviewers specifically for this study. The extraction process covered detailed information on study characteristics and metadata, inclusion criteria, and evidence details. Study characteristics and metadata included author, year, and country information, as well as the aim, purpose, or objective of each study. Details regarding the inclusion criteria encompassed participant information, teaching methods, and the teaching context in each study. Additionally, the researchers collected data related to the study design, the content of the teaching, and the main outcomes concerning the effects or associations of the teaching on participants' competence. Outcomes included the method's effects or associations with knowledge, skills, performance, attitudes, and values (Cowan et al., 2005), as well as other outcomes such as clinical reasoning, critical thinking, self-confidence/efficacy, and student/learner satisfaction. A single researcher conducted the data extraction following the updated search, which identified 13 new studies. Another researcher then verified the extracted data.

Before the actual data extraction, the data extraction tool was pilot tested with five articles by the same two researchers, and the tool was modified slightly, for example, by adding guiding questions, to improve its effectiveness. The researchers did not encounter any disagreements during the data extraction process, meaning that a third reviewer was not required. The authors of the original papers were not contacted to request missing or additional data.

Analysis and presentation of results

The data extracted from the original articles answering the research questions were analysed in three steps. First, the identified teaching methods from each article (e.g., simulation, lecture) were compiled into a table. All teaching methods presented in each article are included in this table, regardless of whether the method was the sole method used, an intervention method, or a control method. In this review, intervention or experiment teaching methods in experimental or quasi-experimental studies were analysed equally to their control teaching methods.

Second, the effects and relations of each teaching method were compiled in the table, with a color code of green, yellow, or red assigned to each teaching method and its effect or relation to participants' competence or other outcomes, such as student or learner satisfaction. Color green indicated a positive, red a negative, and yellow signified no change. At this stage, certain dimensions of competence and other outcomes were also categorised, such as skills, performance, and behavior, as well as self-confidence and self-efficacy. Although these are not exactly identical, it was observed that they were frequently used concurrently in the studies. Additionally, researchers in some original studies sometimes conflated, for example, the concepts of skills and performance.

Third, the identified teaching methods were grouped into six main categories: 1) Technology-enhanced methods, 2) Gaming, 3) Lecturing, 4) Simulation, 5) Structured and reflective methods, and 6) Workshops.

Results

Search results

A total of 1044 records in November 2024 and 203 in March 2026 were identified from the databases, of which 350 records were duplicates. A total of 897 records were screened based on their titles and abstracts, and 123 records were selected for full-text screening. During the full-text review, 75 articles were excluded, mainly because they examined either the educational content, structure, goals, or material without addressing teaching methods. These articles often presented or examined a single wound education course and its content but lacked information on teaching methods. Additionally, e-learning courses or modules were excluded if they did not specify any concrete teaching methods. The systematic search identified 46 articles, supplemented by two additional articles found through manual searching, resulting in a total of 48 articles (Fig. 1).

Inclusion of sources of evidence

The included studies were published between 2002 and 2026, of which the majority ($n = 31$) were published in the 2020s. Most of the studies were from Türkiye ($n = 11$) (Baran et al., 2025; İşeri & Ursavaş, 2024; Kabak Solak et al., 2026; Küçükakça Çelik et al., 2023; Sengul et al., 2024; Sengul & Kaya, 2024; Sezgunsay & Basak, 2025a, 2025b; Yamaç & Alcan, 2025; Yilmazer et al., 2020, 2022), and the United States ($n = 7$) (Cox et al., 2011; Desmond et al., 2025; Goudy-Egger & Dunn, 2018; Harding et al., 2014; Huff, 2011; Lister et al., 2018; Sinclair et al., 2004), followed by Brazil ($n = 5$) (Borges et al., 2025; Mazzo et al., 2018; Moura & Caliri, 2013; Silva et al., 2020; Silva & Oliveira-Kumakura, 2018), the Republic of Korea ($n = 4$) (Jeon & Jeong, 2025, 2026; Seo & Roh, 2020; Lee & Kim, 2016), the United Kingdom (n = 4) (Hemingway et al., 2013, 2014; Hollinworth & Hawkins, 2002;

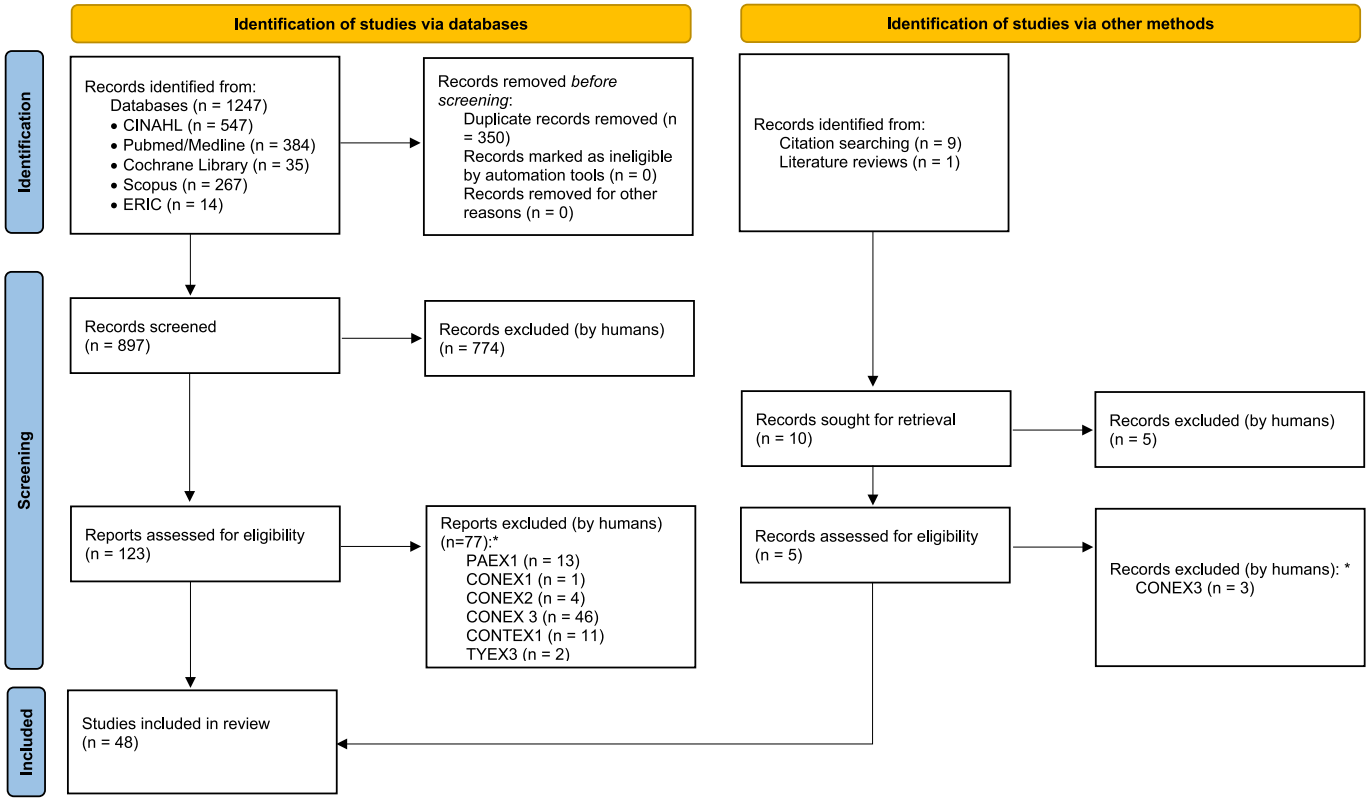

Fig. 1. PRISMA flow chart.
*PAEX1 (Participants, exclusion 1) = Studies examining nursing or nurse assistants who do not have a vocational/professional degree in nursing, or nursing professionals or students, cannot be distinguished from the other data/participants.
CONEX1 (Concept, exclusion 1) = Studies examining learning methods selected by the students.
CONEX2 (Concept, exclusion 2) = Studies examining wound care competence (e.g. knowledge, skills, attitudes) of nursing professionals or students without any connection to teaching methods.
CONEX3 (Concept, exclusion 3) = Studies examining wound care education content, structure, goals or material without examination of teaching methods.
CONTEX1 (Context, exclusion 1) = Studies examining wound care as part of other clinical education, and the data/results regarding wound care education cannot be distinguished.
TYEX3 (Type of Study, exclusion 3) = Study protocols.
Source: Page MJ, et al. BMJ 2021;372:n71. doi:10.1136/bmj.n71.

Hollinworth et al., 2008) and Taiwan (n = 4) (Chao et al., 2025; Chao & Liao, 2025; Tseng et al., 2025; Yang et al., 2025). From the following countries, two studies were published: Switzerland (Bobbink et al., 2023; Bobbink, Gschwind, et al., 2022), Iran (Fard et al., 2020; Nekouei et al., 2024), Australia (MacLean et al., 2024; Mather et al., 2022), and Spain (Rodríguez-Abad et al., 2022; Sánchez-Gálvez et al., 2024). Single studies were conducted in Jordan (Almashayek et al., 2022), Hong Kong (Choi, 2019), Nigeria (Ekama Ilesanmi & Morohunfoluwa, 2016), Israel (Tidhar et al., 2017), and Ireland (Redmond et al., 2020). Most of the studies (n = 25) were quasi-experimental pre-test and post-test studies (Almashayek et al., 2022; Bobbink et al., 2023; Borges et al., 2025; Chao & Liao, 2025; Cox et al., 2011; Ekama Ilesanmi & Morohunfoluwa, 2016; Fard et al., 2020; Goudy-Egger & Dunn, 2018; Hemingway et al., 2013, 2014; Huff, 2011; İşeri & Ursavaş, 2024; Lee & Kim, 2016; Rodríguez-Abad et al., 2022; Sánchez-Gálvez et al., 2024; Sengul et al., 2024; Sengul & Kaya, 2024; Seo & Roh, 2020; Sinclair et al., 2004; Tidhar et al., 2017; Tseng et al., 2025; Yamaç & Alcan, 2025; Yang et al., 2025; Yilmazer et al., 2020, 2022). (See Table 1.)

The number of participants ranged from 2 to 1102. In 19 studies, participants were nursing professionals (Almashayek et al., 2022; Chao et al., 2025; Chao & Liao, 2025; Cox et al., 2011; Desmond et al., 2025; Goudy-Egger & Dunn, 2018; Hollinworth & Hawkins, 2002; Hollinworth et al., 2008; Ekama Ilesanmi & Morohunfoluwa, 2016; Jeon & Jeong, 2025, 2026; Lee & Kim, 2016; Seo & Roh, 2020; Sinclair et al., 2004; Tidhar et al., 2017; Tseng et al., 2025; Yamaç & Alcan, 2025; Yang et al., 2025; Yilmazer et al., 2022), and in 27 studies, nursing students (Baran et al., 2025; Bobbink et al., 2023; Bobbink, Gschwind, et al., 2022; Borges et al., 2025; Fard et al., 2020; Harding et al., 2014; Hemingway et al., 2014; Huff, 2011; İşeri & Ursavaş, 2024; Kabak Solak et al., 2026; Küçükakça Çelik et al., 2023; Lister et al., 2018; MacLean et al., 2024; Mather et al., 2022; Mazzo et al., 2018; Moura & Caliri, 2013; Nekouei et al., 2024; Redmond et al., 2020; Rodríguez-Abad et al., 2022; Sánchez-Gálvez et al., 2024; Sengul et al., 2024; Sengul & Kaya, 2024; Sezgunsay & Basak, 2025a, 2025b; Silva et al., 2020; Silva & Oliveira-Kumakura, 2018; Yilmazer et al., 2020). In two studies (Choi, 2019; Hemingway et al., 2013), both professionals and students were examined. (See Table 1.)

Review findings

Setting and content of teaching in the original studies

In most (n = 25) of the studies, the teaching content focused on pressure ulcers or injuries and their prevention, either as the sole topic or alongside other wounds (Almashayek et al., 2022; Baran et al., 2025; Bobbink et al., 2023; Chao et al., 2025; Chao & Liao, 2025; Cox et al., 2011; Desmond et al., 2025; Ekama Ilesanmi & Morohunfoluwa, 2016; İşeri & Ursavaş, 2024; Jeon & Jeong, 2025, 2026; Lee & Kim, 2016; Mather et al., 2022; Mazzo et al., 2018; Moura & Caliri, 2013; Sengul & Kaya, 2024; Seo & Roh, 2020; Sezgunsay & Basak, 2025a; Silva & Oliveira-Kumakura, 2018; Silva et al., 2020; Sinclair et al., 2004; Yamaç

Table 1
Description of the original studies ($n = 48$).

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
Almashayek et al., 2022, Jordan	To investigate the effectiveness of game-based learning versus traditional lecturing on the knowledge acquisition of newly employed nurses.	Quasi-experimental, pretest-post-test	$n = 156$ newly employed nurses (Bachelor of Nursing)	Educational game cards (intervention, 4 h) and lecture (control, 2 h)	Orientation period for newly employed nurses in a nonprofit oncology center	Pressure injuries	Significant difference ($p < 0.001$) between pretest and post-test in both groups. The lecture group had significantly higher scores ($p = 0.003$) in the post-test than the game group.
Baran et al., 2025, Turkey	To compare the effects of education using standardized patients and medium-fidelity simulation on nursing students' knowledge, staging, and satisfaction related to pressure injuries.	Pre- and post-test, double-blind, randomized controlled trial	$n = 79$ final year nursing students	Simulation session (4 h) with groups of 4–5 participants	Care management course at a university	Pressure injuries	Both simulation methods improved students' knowledge of pressure injuries ($p < 0.05$) and staging levels ($p = 0.016$, 0.002). Students' satisfaction in the standardized patient group was higher ($p = 0.047$).
Bobbink, Teixeira, et al., 2022, Switzerland	To explore students' perceptions of the three-step learning unit presented during the COVID-19 pandemic.	NA	$n = 68$ second-year bachelor-level nursing students	Blended learning including an e-learning unit and two workshops (4 + 4 h)	University of Applied Sciences	Leg ulcers, compression therapy	Students were mainly satisfied with the material and methods. The workshops were highly appreciated.
Bobbink et al., 2023, Switzerland	To assess first-year bachelor's degree in nursing students' knowledge about pressure injury etiology, classification, prevention, and management following blended learning and clinical practice.	Quasi-experimental design with three time points	$n = 21$ first-semester bachelor's level nursing students	Blended learning, including an e-learning lesson and a workshop (4 h)	University of Applied Sciences	Pressure injuries	Knowledge scores increased from 45.8% correct at baseline to 59.2% after the blended-learning unit (T0-T1; 95% CI, −4.89 to −1.81; p = 0.00).
Borges et al., 2025, Brazil	To assess nursing students' skills in surgical wound care before and after clinical simulation.	Quasi experimental pretest/post-test design	$n = 50$ 3rd and 4th year bachelor's level nursing students	Clinical simulation	Federal public university	Surgical wound care	Simulation positively impacted students' skills across most assessed dimensions ($p < 0.05$).
Chao et al., 2025, Taiwan	To evaluate the effectiveness of a pressure injury educational intervention on nurses' knowledge, attitudes, self-efficacy and perceived barriers.	A single-center, partially randomized participant preference-controlled trial	$n = 335$ nurses	Workshops (160 min) together with a self-learning manual and study groups (experiment), compared to a self-learning manual only (control)	Regional teaching hospital	Pressure injuries	Both groups improved in knowledge, attitudes, and self-efficacy after the intervention ($p < 0.05$). The experimental group scored higher on the post-test than the control ($p < 0.05$).
Chao & Liao, 2025; Taiwan	To evaluate the long-term effectiveness of different educational strategies on nurses' self-efficacy in managing pressure injuries in acute medical institutions.	A single-blind, multi-center, two-group parallel quasi-experimental design with four time points	$n = 404$ nurses	Workshops (160 min) together with digital self-directed learning (experiment), compared to a self-directed learning only (control)	Seven regional and acute care hospitals	Pressure injuries	Both groups showed a significant increase in self-efficacy ($p < 0.05$). The intervention group scored higher across all domains, with lasting improvements for three months and

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Table 1 (*continued*)

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
							greater learning satisfaction.
Choi, 2019, Hong Kong	To present the application of virtual reality for wound dressing training.	Initial user study	n = 2 (a registered nurse and a nursing student)	Virtual reality simulation	NA	Wound dressing change	User feedback indicated the virtual training was interesting and helpful.
Cox et al., 2011, USA	To determine whether there was a difference in retention of knowledge about pressure ulcers with a traditional lecture versus computer-based instruction.	Quasi-experimental pretest/post-test with three time points	*n* = 60 staff nurses (32 critical care nurses and 28 medical-surgical nurses)	Computer-based self-learning and traditional classroom lecturing (interventions ~6 h), and no education (control)	Community teaching hospital	Pressure ulcers	Pretest/post-test: The greatest score gains were in the lecture and computer-based groups, with $p = 0.043$; lecture vs. control, $p = 0.000$; computer-based vs. control, $p = 0.000$. Post-test to 3 months: significant differences between lecture and control ($p = 0.000$) and between computer-based and control ($p = 0.000$), but not between lecture and computer-based ($p = 0.717$). 3 to 6 months: no significant differences.
Desmond et al., 2025, USA	To develop and assess a simulation for registered nurses to apply knowledge, skills, and attitudes in conducting a focused assessment in the clinic setting to prevent community-acquired pressure injuries in individuals living with spinal cord injury.	NA	n = 4 post-baccalaureate registered nurse residents	Educational program, including modules and simulation	Healthcare facility	Pressure injuries	Participants reported improvements in knowledge, skills, and attitudes toward preventing pressure injuries.
Ekama Ilesanmi & Morohunfoluwa, 2016, Nigeria	To evaluate the effect of 2 pressure ulcer prevention education strategies on nurses' pressure ulcer knowledge.	Quasi-experimental, pretest/post-test study: three time points.	*n* = 193 nurses	Interactive lecture (5x4h) including brainstorming, small-group discussion (intervention), and education/ discussion (control, 4 h)	Surgical, medical and neurological wards from three hospitals	Pressure ulcers	Knowledge scores significantly increased after intervention for the intervention group ($p < 0.001$). At 12 weeks, both groups' scores increased significantly ($p < 0.001$).
Fard et al., 2020, Iran	To compare and investigate the effect of a peer education method, a mentor-led education method versus a traditional faculty-led method for instruction regarding surgical wound care skills among nursing students.	Pretest/post-test design<	*n* = 102 first- and second-year nursing students	Mentoring (5 h) using peer-led education (PL) and mentor-led education (ML) (interventions) and faculty-led education (FL) (traditional supervision, control)	University	Wound dressings, surgical wounds	No significant differences in skills were found between the mentor group and the faculty group, nor between the peer group and the faculty group ($p > 0.05$). However, the performance in all groups increased significantly ($p = 0.001$) after the intervention.
Goudy-Egger & Dunn, 2018, USA	To determine whether nurses' knowledge	Pretest/post-test design	n = 31 nurses	Educational workshop (8 h) using discussions,	Long-term care facilities and	Chronic wounds	The workshop increased participants'

(*continued on next page*)

Table 1 (*continued*)

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
	regarding current chronic wound care management would differ after attending an educational workshop that emphasised evidence-based clinical practices in chronic wound management.			brainstorming and debates	home care agencies		knowledge from the pretest ($p < 0.005$).
Harding et al., 2014, USA	NA	Textual evidence	$n = 20$ nursing students in each session (total amount of participants unclear	Courtroom/mock trial simulation (1 h)	First medical-surgical nursing course at a university	Wound documentation, surgical wounds	Pretest and post-test assessing students' most common errors showed no change in the average score.
Hemingway et al., 2013, UK	To report the outcomes of a workshop aimed at increasing the knowledge and skill of mental health nurses in wound care assessment and management.	Pretest/post-test design	$n = 35$ mental health nurses and student nurses in their final weeks of undergraduate studies	Workshop (1 day) including guided reading, multiple-choice questions, demonstration, and videos	Mental health trust and university	Wound assessment and management	Pre- and post-scores revealed a statistically significant difference in knowledge ($p < 0.001$). Participants were satisfied with the workshop and felt it was suitable for their clinical work.
Hemingway et al., 2014, UK	To develop and deliver an evidence-based educational package with a physical and mental health focus to clinicians and other health care workers in mental health settings.	Pretest/post-test design	n = 50 nurses and students participated in the wound care workshop, of whom 39 completed the questionnaire.	Mixture of taught, interactive content and simulated practice workshop	University skills laboratories	Acute and chronic wounds	The workshop resulted in statistically significant improvements to the baseline knowledge scores ($p < 0.001$). All participants were 'satisfied' or 'very satisfied' with the workshop.
Hollinworth & Hawkins, 2002, UK	NA. Research question: Can teaching counselling skills enable nurses caring for patients with wounds to support better their patients holistically?	NA	$n = 39$ nurses	Workshop (1,5 h) including reflective diaries before and after the workshop	Acute and community hospitals, hospice and nursing homes	Psychological support of patients with wounds	After the workshop, some of the nurses experienced a significant change in their understanding and provision of psychological support for patients with wounds.
Hollinworth et al., 2008, UK	To describe an educational initiative that aimed to raise the knowledge and practice of nurses at one hospital where staff had become deskilled in wound care.	NA	n = 39 nurses attended the workshop and answered the questionnaire	Workshop (2 h) together with a case study approach	Health trust	Evidence-based wound care	Nurses' subjective knowledge increased following the workshop, and feedback from participants on the teaching sessions was highly positive.
Huff, 2011, USA	To evaluate a 2-hour lecture and laboratory class on wound care by a nurse wound specialist.	Quasi-experimental nonrandomised cohort design	$n = 65$ second-year (4-year program) and $n = 55$ first-year (2-year program) nursing students	Lecture (2 h) and laboratory class (intervention) and standard wound care education (control)	Public college	Chronic wounds	The intervention group's knowledge scores (84% ± 13.2%) were significantly higher ($p = 0.000003$) than those of the control group (73.6% ± 13%).
İşeri & Ursavaş, 2024, Türkiye	To investigate the influence of the online education	Quasi-experimental	n = 50 second-year nursing students	Six hat thinking method (SHTM) (2 h) and a training	University	Pressure injuries	The SHTM group had higher knowledge and

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Table 1 (*continued*)

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
	given to nursing undergraduate students using the Six Thinking Hat Method (STHM) on their knowledge and attitudes related to pressure injury prevention.	design with three time points		session (6 h) (intervention), and same education without the SHTM (control)			attitude scores at the first and third months ($p < 0.05$). The education led to a significant, moderate effect: an 11.7% increase in knowledge scores ($\eta 2 = 0.117$; $p = 0.003$) and a 29.5% increase in attitude scores ($\eta 2 = 0.295$; $p = 0.000$).
Jeon & Jeong, 2025, Republic of Korea	To evaluate the effectiveness of an immersive 360-video-based VR simulation program for pressure injury management and explore new nurses' perceptions and learning experiences qualitatively.	A non-equivalent control group pretest-post-test design	$n = 69$ nurses	Virtual reality simulation (experiment) vs traditional lecture and group discussion (control)	Tertiary hospital	Pressure injuries	The experimental group showed significant improvements in knowledge ($p < 0.001$) and confidence ($p < 0.001$). The control group had no change in knowledge but increased confidence ($p < 0.001$). Focus groups found VR immersive and beneficial for complex scenarios.
Jeon & Jeong, 2026; Republic of Korea	To compare a self-determination theory-based mixed reality pressure injury nursing simulation with case-based education on nurses' competencies and explore their learning experiences.	A non-equivalent control group pretest–post-test design	$n = 73$ nurses	Mixed reality simulation (experiment) vs lecture, including a case-study (control)	University hospital	Pressure injuries	Knowledge improved in both groups ($p < 0.001$). Post-test confidence and clinical performance were higher in the experiment group ($p = 0.013$, $p = 0.022$). Clinical reasoning improved in both ($p < 0.001$), with no between-group difference. Qualitative findings showed enhanced realism, skill mastery, engagement, and technical and ergonomic challenges.
Kabak Solak et al., 2026, Turkey	To examine the effect of wound care education based on the Jigsaw IV learning technique on nursing students' knowledge, collaborative learning attitudes and motivation.	A randomized controlled trial with pretest and post-test measurements	$n = 87$ second-year nursing students	Jigsaw Technique (90 min) (experiment) vs traditional lecture-based instruction (90 min) (control)	Surgical nursing course at a university	Wound care in general	Knowledge scores improved in both groups ($p < 0.05$). The experiment group also showed positive attitude toward learning in greater increases in intrinsic motivation – 'to know,' 'to accomplish,' 'to experience stimulation' – and identified regulation ($p < 0.05$).
Küçükakça Çelik et al., 2023, Türkiye	To examine the nursing students' opinions and motivations regarding the wound care escape	Descriptive design	$n = 105$ second-year nursing students	Escape room game using clue questions	Surgical nursing course at a university	Surgical wounds	Students' average opinion and motivation score was ≥4.5 (on a scale of 1–5)

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Table 1 (*continued*)

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
	room teaching game.						regarding the teaching method.
Lee & Kim, 2016, Republic of Korea	To evaluate the effect of pressure ulcer classification system education on clinical nurses' knowledge and visual differential diagnostic ability of pressure ulcer classification and incontinence-associated dermatitis.	Pretest/post-test design	$n = 407$ nurses	Lecture (50 min) including case studies	Pressure ulcer continuing education programme for nurses at medical, surgical, ICU, ER and other units	Pressure ulcers and incontinence-associated dermatitis	Nurses' knowledge scores ($t = -11{\cdot}437$, $p < 0.001$) and the visual discrimination ability ($t = -21{\cdot}11$, $p < 0.001$) improved after the training.
Lister et al., 2018, USA	To evaluate pre-licensure students' introduction to telenursing through a patient simulation that used a telepresence robot with video-conferencing technology.	NA	n = 73 prelicensure nursing students	Telepresence simulation with home care scenario	Rotation practice	Wound assessment and dressing change	Students improved in their ability to assess a wound, to perform wound care and dressing changes ($p < 0.001$). Students demonstrated high satisfaction and confidence scores toward the simulation as a method.
MacLean et al., 2024, Australia	To explore the acceptability of working with simulated patients with moulaged wounds to improve students' wound care skills.	Qualitative description	$n = 14$ final-year student nurses	Simulation, which involved (a) content design, (b) training and moulage, (c) student preparation, (d) simulation sessions, (e) debriefing and (f) individual interviews.	Advanced wound Care speciality unit at university	Venous leg ulcers	Students' decision-making and task focus increased. Students learned from others' practice and mistakes and reflected on their own knowledge and skills, leading to improvement. Students' knowledge and skills improved.
Mather et al., 2022, Australia	To investigate knowledge and attitudes of first-year nursing students to pressure injury prevention, and to explore whether additional educational interventions augmented learning.	Cross-sectional study with three cohorts	$n = 1102$ first-year nursing students	1st cohort: online learning content, which included theory and activities (10 h) and a simulation (2 h). 2nd cohort: An additional online learning and teaching intervention was included. 3rd cohort: An additional image-based educational learning was provided within a simulation environment.	University	Pressure ulcers	Significant differences in mean knowledge scores between the 1st and 3rd cohorts ($p = 0.04$). The 1st cohort scored lower on the attitude survey than others ($p < 0.001$). Online resources and simulation experiences marginally improved students' knowledge and attitudes toward pressure injury prevention.
Mazzo et al., 2018, Brazil	To describe the construction of a high-fidelity clinical scenario simulation of "Pressure injury patient nursing care".	NA	$n = 100$ undergraduate nursing students	Simulation with four scenarios, including recognition of the environment, the development of the scenario and respective debriefings.	Public university	Pressure injuries	High scores (>89%) of satisfaction and self-confidence were found.
Moura & Caliri, 2013, Brazil	To analyze the perception of undergraduate nursing students on simulation	Qualitative description	$n = 29$ final-year undergraduate nursing students	Clinical simulation	Simulation laboratories at two higher-education institutions	Pressure ulcer prevention	The students were satisfied with the simulation.

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Table 1 (*continued*)

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
	strategies in the teaching-learning process for developing competence in risk assessment for pressure ulcers.				(public and private).		
Nekouei et al., 2024, Iran	To determine the effect of education based on the 7E learning cycle model on the knowledge of diabetic foot ulcer prevention, critical thinking, and self-efficacy in nursing students.	Randomized, single-blind, parallel-group control trial	$n = 98$ 4th-semester bachelor's level nursing students	7E learning cycle model (intervention, 2 × 45–60 min) and conventional teaching method (such as lectures, control)	Endocrinology and diabetes nursing course at a university and hospitals	Diabetic foot ulcer prevention	The 7E group showed significant improvements in knowledge ($Z = -6.232$, $p < 0.001$), critical thinking ($t(50) = -4.382$, $p < 0.001$), and self-efficacy ($Z = -4.427$, $p < 0.001$) from before to one month after the intervention. The lecture group did not show improvements in these areas.
Redmond et al., 2020, Ireland	To describe the development and educational evaluation of a virtual patient to supplement undergraduate learning of wound care.	Cross-sectional study	$n = 148$ 3rd-year nursing students	Virtual patient case simulation	Wound care unit at a university	Venous leg ulcers	Most students rated the virtual patient highly for educational value and its support of learning. They felt more confident and capable of meeting wound care competency outcomes. It also helped develop their clinical reasoning skills.
Rodríguez-Abad et al., 2022, Spain	To test the effectiveness of an AR-based methodology for teaching-learning aspects of the nursing curriculum (leg ulcer care), as well as to describe how AR influences different learning determinants of nursing students.	A quasi-experimental study	$n = 137$ 2nd-year nursing students	AR-based teaching methods, including an interactive practical session (3 h) in four learning stations (40 min each) (intervention) and traditional teaching methods (control)	University	Leg ulcers	Significantly higher scores (7.68 vs. 6.14) were found in the knowledge post-test in the AR group ($p \leq 0.001$). Students also rated high in attention, autonomous learning, understanding, and motivation to achieve learning objectives using AR.
Sánchez-Gálvez et al., 2024, Spain	To identify the barriers to the acquisition of knowledge about skin integrity impairment.	A quasi-experimental pre-test and post-test	$n = 304$ final-year bachelor's degree nursing students	Theoretical online learning sessions (5x2h) using lectures and discussions (intervention).	Elective course at a university	Skin integrity	The intervention group achieved statistically significantly higher scores in the knowledge test ($p < 0.001$) in both pre- and post-tests.
Sengul et al., 2024, Türkiye	To assess nursing students' knowledge levels and attitudes toward the etiology, risk factors, and preventive measures of incontinence-associated dermatitis using an escape room game.	Mixed-methods research, incorporating both quantitative (pre-post-test quasi-experimental design and qualitative data	$n = 32$ 3rd and 4th-year bachelor's degree nursing students	Escape room game with theoretical lessons (6 h) and an escape room in groups with questions in the form of puzzles and visuals.	Chronic Wound Management elective course at a university	Incontinence-associated dermatitis	A significant difference between the total post-test and pre-test scores (knowledge, attitudes, practices) ($Z = -4.392$, $p < 0.001$). Students were satisfied with the method, and it increased their knowledge, decision-making, critical thinking and collaboration.

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Table 1 (*continued*)

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
Sengul & Kaya, 2024, Türkiye	To determine if an escape room game approach, which has emerged as a novel and engaging education tool, is an effective method to improve nursing students' knowledge of pressure injury (PI) prevention and attitudes toward the care of patients with a PI.	Quasi-experimental pretest/post-test design with three time points	n = 33 3rd -and 4th-year nursing students	Escape room game including written and visual puzzles (1 h)	Elective course: Chronic Wound Management at a University	Pressure injury prevention	After the intervention, students' mean scores on their self-reported knowledge, objective knowledge, and attitudes all increased significantly ($p < 0.001$). Additionally, the mean score for anxiety levels was significantly lower post-intervention ($p < 0.001$), indicating reduced anxiety.
Seo & Roh, 2020, Republic of Korea	To identify the effects of pressure ulcer prevention training on nurses' knowledge, behaviours, and attitudes regarding pressure ulcer prevention.	A comparison group pretest-post-test design	n = 60 nurses	Team-based learning including discussions and testing (intervention, 4 h) and lecture-based learning (control 1 h).	Long-term care hospitals	Pressure ulcer prevention	Both groups showed improved scores in knowledge, behaviours and attitudes in the post-test (p < 0,001). No significant difference between the groups in the post-test in knowledge ($p = 0.269$), behaviours ($p = 0.362$) or attitudes ($p = 0.685$).
Sezgunsay & Basak, 2025a, Turkey	To investigate the effects of a mobile augmented reality application on nursing students' knowledge, skills, and motivation related to pressure injuries.	A pre-test and post-test parallel group randomized controlled design	$n = 130$ first-year nursing students	Lectures (4 * 45 min) and group laboratory training (3 h) (experiment and control), and an augmented reality application for self-learning (experiment group)	Fundamentals of Nursing course at a university	Pressure injuries	Both groups showed improvements in knowledge scores, but there were no statistically significant differences between them.
Sezgunsay & Basak, 2025b, Türkiye	To explore the perceptions and experiences of senior nursing students who participate in a real patient simulation designed for the assessment of diabetic foot ulcers.	Qualitative design	n = 11 final-year nursing students	Theoretical instruction (2 * 45 min), hands-in-skill training session (2 * 45 min) and a standardized patient simulation (approx. 1 h)	Simulation in Nursing course at a university	Diabetic foot ulcers	The students experienced anxiety, fear and sense of uncertainty, but also excitement, sense of competence, preparedness, helpfulness, satisfaction, safety, comfort and enhanced confidence. They also reported positive attitude change, improved skills and performance and knowledge retention.
Silva & Oliveira-Kumakura, 2018, Brazil	To report the experience of constructing and applicating clinical simulation scenarios for the evaluation and	Experience report	n = 9 4th and 5th-year nursing students	Two simulations including problem solving, clues and debriefing (15 min each)	Elective course Topics of Nursing Education at a university	Pressure injuries and venous leg ulcers	Students were mainly satisfied with the simulations.

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Table 1 (*continued*)

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
	treatment of wounds.						
Silva et al., 2020, Brazil	To analyze the effect of clinical simulation on the development of clinical reasoning and on nursing students' acquisition of knowledge on wound evaluation and treatment.	Single-blinded, two-arm, randomized clinical trial	$n = 78$ nursing students, of whom most were bachelor's degree students	Clinical simulation (2 stations + 2 clinical cases) scenarios, 6 min each) using a role-playing technique and lectures (3.5 h) (intervention) and interactive lectures (3.5 h) only (control)	Clinical simulation laboratory at a private university	Venous ulcers, pressure injuries, diabetic foot ulcers	Comparison between the simulation and lecture groups' knowledge scores before and after showed no significant difference, but both improved ($p < 0.001$). Both groups improved in clinical reasoning for venous and diabetic foot ulcer care, but the difference wasn't significant. The simulation group, however, scored higher on pressure injury cases ($p < 0.008$).
Sinclair et al., 2004, USA	To implement and evaluate a standardized education workshop for 2 levels of nursing staff.	Quasi-experimental design with three time points	$n = 654$ nurses	Workshop (3.5 h) including role-play, discussion, video, and handouts.	Three acute care hospitals	Pressure ulcer prevention	Knowledge scores were significantly higher from pre to post 1 and from pre to post 2 ($p < 0.0001$), but significantly lower from post 1 to post 2. RNs scored significantly higher than LPNs from pre to post 1 ($p < 0.0001$).
Tidhar et al., 2017, Israel	To evaluate the effectiveness of a training workshop on compression bandaging among wound care nurses who had no previous experience in application of compression bandages, immediately post-training and six months after training.	A quasi-experimental design, with three time points	$n = 37$ community nurses who are in charge of wound care	Educational workshop (4 h) consisting of a 1-hour lecture and a bandaging demonstration.	One health care service	Compression bandaging	Before training, 5.4% of nurses bandaged in the optimal range; after training, 58%, and six months later, 37%. There was a significant increase from pre- to post-training ($p \leq 0.001$) and from pre- to six months ($p \leq 0.001$). No significant difference between post- and six months ($p = 0.454$).
Tseng et al., 2025, Taiwan	To evaluate the effect of a situated simulation teaching strategy for negative-pressure wound therapy (NPWT) on surgical nurses' knowledge of care for patients who receive NPWT.	A quasi-experimental study used a one-group pretest/post-test design	n = 31 surgical nurses	Situational simulation (3 h) including briefing (60 min), simulation and cues (90 min), and debriefing (30 min)	District hospital	Negative-pressure wound therapy	Knowledge test scores increased statistically significantly after the simulation intervention ($p < 0.001$).
Yamaç & Alcan, 2025, Turkey	To evaluate the effect of training on pressure injury staging provided to intensive care nurses with two different teaching techniques: a traditional teaching method	A pretest/post-test, quasi-experimental study, 4 weeks retention test	n = 60 intensive care nurses	Analogy-based training practice (40 min) (experiment) vs traditional lecture (40 min) (control)	Intensive care unit at a university hospital	Pressure injuries	Knowledge test scores showed a statistically significant increase for the experiment group ($p < 0.001$), while no change was observed in the control group.

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Table 1 (*continued*)

Authors, country, and year	Aim of the study	Study design	Participants	Teaching method	Teaching setting	Content of teaching	Main outcomes or results
	and the analogy-based technique.						
Yang et al., 2025, Taiwan	To explore the effectiveness of an immersive educational strategy based on the Community of Inquiry framework in enhancing nurses' knowledge retention and learning satisfaction in pressure injury prevention.	A single-blind, two-group quasi-experimental study with pre- and post-intervention assessments and 3 months post intervention	$n = 123$ registered nurses	Digital self-learning material and a workshop (160 min) with hand-on training (experiment) vs self-learning only (control)	Regional teaching hospital	Pressure injuries	Knowledge test scores increased significantly in the experimental group ($p < 0.001$). Learning satisfaction was higher in the intervention group ($p < 0.05$).
Yilmazer et al., 2020, Türkiye	To explore the effects of education on the performance and knowledge of undergraduate nursing students with respect to pressure ulcer prevention.	Quasi-experimental study	$n = 38$ nursing students	Simulation with standardized patient including lecture (1 h) preliminary assessment, standardized patient practice, assessment after 3 months.	University	Pressure ulcers	Knowledge test scores ($p < 0.001$) and performance scores ($p < 0.001$) were significantly higher in the post-test. Students were satisfied with the method.
Yilmazer et al., 2022, Türkiye	To determine the effect of training given to nurses with algorithm-guided in-situ simulation on preventing pressure ulcers.	Pretest and post-test design, 3 months follow-up	n = 10 post-licensure nurses	Simulation including 1) pre-simulation period, 2) in-situ simulation with an algorithm-guided standardized patient, 3) post-simulation period.	A university hospital's orthopaedic and traumatology department	Pressure ulcer prevention	Nurses' post-simulation and third-month knowledge scores were higher than pre-simulation ($p < 0.05$), with similar scores between post-simulation and third month ($p = 0.069$). Performance improved significantly after 3 months. Pressure ulcer prevention practices increased post-simulation ($p < 0.05$), but pressure ulcer incidence remained unchanged ($p = 0.136$).

NA = not available.

& Alcan, 2025; Yang et al., 2025; Yilmazer et al., 2020, 2022). Other content of teaching included, for example, leg ulcers and compression therapy (Bobbink, Gschwind, et al., 2022), psychological support for patients with wounds (Hemingway et al., 2014), surgical wounds (Küçükakça Çelik et al., 2023), and incontinence-associated dermatitis (Sengul et al., 2024). (See Table 1.) In each study, the main content of teaching was introduced, for example, venous leg ulcers. However, in some studies, more detailed content related to the main subject was also provided, such as pain assessment, nutrition, wound dressings, and documentation.

The most common teaching setting was universities, colleges or universities of applied sciences ($n = 27$), as most of the studies were conducted in undergraduate education (Baran et al., 2025; Bobbink et al., 2023; Bobbink, Gschwind, et al., 2022; Borges et al., 2025; Fard et al., 2020; Harding et al., 2014; Hemingway et al., 2014; Huff, 2011; İşeri & Ursavaş, 2024; Kabak Solak et al., 2026; Küçükakça Çelik et al., 2023; Lister et al., 2018; MacLean et al., 2024; Mather et al., 2022; Mazzo et al., 2018; Moura & Caliri, 2013; Nekouei et al., 2024; Redmond et al., 2020; Rodríguez-Abad et al., 2022; Sánchez-Gálvez et al., 2024; Sengul et al., 2024; Sengul & Kaya, 2024; Sezgunsay & Basak, 2025a, 2025b; Silva et al., 2020; Silva & Oliveira-Kumakura, 2018; Yilmazer et al., 2020). Graduate education settings included, for instance, an orientation period for newly employed nurses (Almashayek et al., 2022), long-term care facilities and home care agencies (Goudy-Egger & Dunn, 2018), and surgical, medical and neurological wards (Ekama Ilesanmi & Morohunfoluwa, 2016). All graduate education settings consisted of individual courses or educational events designed for professionals, rather than specialization programs or other more extensive educational formats.

Teaching methods in wound care education

The six main teaching methods were: 1) Technology-enhanced methods, 2) Gaming, 3) Lecturing, 4) Simulation, 5) Structured and reflective methods, and 6) Workshops. The most common teaching method in the selected studies was simulation ($n = 19$), either as the sole method or in combination with another method (Baran et al., 2025; Borges et al., 2025; Choi, 2019; Desmond et al., 2025; Harding et al., 2014; Jeon & Jeong, 2025, 2026; Lister et al., 2018; MacLean et al.,

2024; Mather et al., 2022; Mazzo et al., 2018; Moura & Caliri, 2013; Redmond et al., 2020; Sezgunsay & Basak, 2025b; Silva et al., 2020; Silva & Oliveira-Kumakura, 2018; Tseng et al., 2025; Yilmazer et al., 2020, 2022). Most of the simulations were traditional classroom simulations. Other common teaching methods were lecturing and workshops. Lecturing was used in 14 studies (Almashayek et al., 2022; Cox et al., 2011; Ekama Ilesanmi & Morohunfoluwa, 2016; Huff, 2011; Jeon & Jeong, 2025, 2026; Kabak Solak et al., 2026; Lee & Kim, 2016; Nekouei et al., 2024; Sánchez-Gálvez et al., 2024; Seo & Roh, 2020; Sezgunsay & Basak, 2025a; Silva et al., 2020; Yamaç & Alcan, 2025). Lecturing included traditional classroom lectures and interactive lectures, as well as lectures combined with practical training. Lecturing, especially traditional classroom lecturing, was often used as a control teaching method in experimental and quasi-experimental studies. Workshops were used in nine studies (Bobbink et al., 2023; Chao et al., 2025; Chao & Liao, 2025; Goudy-Egger & Dunn, 2018; Hemingway et al., 2013; Hollinworth & Hawkins, 2002; Sinclair et al., 2004; Tidhar et al., 2017; Yang et al., 2025). Most of the workshops were theoretical and interactive. Other workshops were practical training workshops and those that combined theory with practice. (See Table 2.)

The less common teaching methods included technology-enhanced methods, gaming, and structured and reflective methods. Technology-enhanced methods included augmented reality (Rodríguez-Abad et al., 2022), e-learning, or computer-based methods (Bobbink et al., 2023; Bobbink, Gschwind, et al., 2022; Cox et al., 2011; Mather et al., 2022; Sánchez-Gálvez et al., 2024). Gaming involved game cards (Almashayek et al., 2022) and escape room games (Küçükakça Çelik et al., 2023; Sengul et al., 2024; Sengul & Kaya, 2024). Lastly, structured and reflective methods included the following methods, each used in individual studies: 7E learning cycle model (Nekouei et al., 2024), Analogy-based teaching (Yamaç & Alcan, 2025), Jigsaw technique (Kabak Solak et al., 2026) mentoring (Fard et al., 2020), six hat thinking method (İşeri & Ursavaş, 2024), and team-based learning (Seo & Roh, 2020). (See Table 2.)

Effects or associations of different teaching methods on wound care competence and other outcomes

Knowledge was regarded as an outcome in nearly all teaching methods. Most ($n = 33$) of the studies reported increased knowledge as a result (Almashayek et al., 2022; Baran et al., 2025; Bobbink et al., 2023; Chao et al., 2025; Cox et al., 2011; Desmond et al., 2025; Ekama Ilesanmi & Morohunfoluwa, 2016; Goudy-Egger & Dunn, 2018; Hemingway et al., 2013, 2014; Hollinworth & Hawkins, 2002; Huff, 2011; İşeri & Ursavaş, 2024; Jeon & Jeong, 2025, 2026; Kabak Solak et al., 2026; Lee & Kim, 2016; MacLean et al., 2024; Mather et al., 2022; Nekouei et al., 2024; Rodríguez-Abad et al., 2022; Sánchez-Gálvez et al., 2024; Sengul et al., 2024; Sengul & Kaya, 2024; Seo & Roh, 2020; Sezgunsay & Basak, 2025a, 2025b; Silva et al., 2020; Sinclair et al., 2004; Tseng et al., 2025; Yang et al., 2025; Yilmazer et al., 2020, 2022), although in some ($n = 6$) studies no change was reported after the education (Harding et al., 2014; Nekouei et al., 2024), or mixed results – both improvements and no change – were reported in participants' knowledge (Hollinworth & Hawkins, 2002; Jeon & Jeong, 2025; Yamaç & Alcan, 2025; Yilmazer et al., 2022). In most studies, the knowledge was assessed objectively using validated knowledge tests. (See Table 2.)

Numerous studies ($n = 17$), particularly those focused on simulation as a teaching method, have evaluated student or learner satisfaction, all demonstrating positive outcomes (Bobbink, Gschwind, et al., 2022; Chao & Liao, 2025; Choi, 2019; Hemingway et al., 2013, 2014; Hollinworth & Hawkins, 2002; Küçükakça Çelik et al., 2023; Lister et al., 2018; Mazzo et al., 2018; Moura & Caliri, 2013; Redmond et al., 2020; Rodríguez-Abad et al., 2022; Sengul et al., 2024; Sezgunsay & Basak, 2025b; Silva & Oliveira-Kumakura, 2018; Yang et al., 2025; Yilmazer et al., 2020). Attitudes were assessed in nine studies across all teaching method categories, mainly showing positive results (Chao et al., 2025; Desmond et al., 2025; Hollinworth & Hawkins, 2002; İşeri & Ursavaş, 2024; Mather et al., 2022; Sengul et al., 2024; Sengul & Kaya, 2024; Seo & Roh, 2020; Sezgunsay & Basak, 2025b), indicating that students' or professionals' attitudes improved toward the teaching content, such as pressure ulcer prevention. Skills, performance, and behavior were evaluated in 13 studies (Baran et al., 2025; Borges et al., 2025; Desmond et al., 2025; Fard et al., 2020; Lee & Kim, 2016; Lister et al., 2018; MacLean et al., 2024; Sengul et al., 2024; Seo & Roh, 2020; Sezgunsay & Basak, 2025b; Tidhar et al., 2017; Yilmazer et al., 2020, 2022), particularly in simulation methods, demonstrating positive results in participants' practical competence. Clinical reasoning, decision-making, and critical thinking were evaluated in five studies (Jeon & Jeong, 2026; MacLean et al., 2024; Nekouei et al., 2024; Redmond et al., 2020; Silva et al., 2020), while self-confidence and self-efficacy were examined in 10 studies (Chao et al., 2025; Chao & Liao, 2025; Jeon & Jeong, 2025, 2026; Lister et al., 2018; MacLean et al., 2024; Mazzo et al., 2018; Nekouei et al., 2024; Redmond et al., 2020; Sezgunsay & Basak, 2025b), both mainly through simulations and lectures, with predominantly positive results. Anxiety was assessed in two studies, with one (Sengul & Kaya, 2024) showing a decrease in anxiety levels, indicating positive outcomes, while the other (Sezgunsay & Basak, 2025b) reported students experiencing anxiety. (See Table 2.)

Discussion

Discussion of the results

The scoping review aimed to describe the teaching methods used in wound care education for nursing professionals and students, and to describe how these methods affect or are related to their competence and other outcomes in wound care and prevention. In this review, 48 original studies were identified, most of which focused on teaching methods in undergraduate nursing education. Most studies conducted within undergraduate settings can be explained by the fact that, in nursing research, educational research focuses mainly on undergraduate studies (O'Connor, 2024), although it would be important to also examine graduate education and its methods, because the nursing profession involves lifelong learning, and professionals need to update their competencies regularly as new evidence emerges.

Most of the original studies in this scoping review focused on teaching about pressure ulcers or injuries, including their prevention and care. Preventing pressure ulcers is a key aspect of nursing education and is typically emphasised throughout nursing programmes (Holloway et al., 2024). These wounds predominantly occur in care settings and can often be prevented through evidence-based nursing interventions (EPUAP/NPIAP/PPPIA, 2019). Previous research on nursing students' competence in wound care has also primarily focused on pressure ulcer prevention rather than other types of wounds (Kielo et al., 2019).

Six main categories of teaching methods were identified in this review: 1) Technology-enhanced methods, 2) Gaming, 3) Lecturing, 4) Simulation, 5) Structured and reflective methods, and 6) Workshops, with simulation being the most common teaching method. Simulation is an effective teaching method to imitate real-life situations, provide a safe learning environment, and prepare students for real-world scenarios (Mishra et al., 2023). In the studies reviewed, simulation was mainly utilised in undergraduate nursing education, likely because educational institutions typically have simulation environments and trained staff to use this method. However, it would be valuable to expand the use of simulation into graduate education as well, since simulation can be arranged without the need for very high-fidelity environments or equipment, and both high-fidelity and low-fidelity simulations have their place in education (Hill et al., 2023). The simulation of the identified teaching methods provided the strongest evidence. Moreover, research on simulation as a teaching method was relatively recent, and simulation studies have addressed improvements across all dimensions of competence, notably improving students' knowledge, skills, and self-

confidence. Students also reported satisfaction with simulation as a teaching approach. However, previous literature has indicated that simulation can cause stress and anxiety among learners (Holland et al., 2017; Judd et al., 2019), which was only identified in one study of this review.

The review suggests that lecturing, particularly traditional classroom lecturing, remains a widely utilised teaching method, even though lecturing was often used as an adjunctive or secondary teaching method or as a control method in the identified original studies in this review. However, students' or learners' competence mainly improved through the method. The improvements suggest that lecturing still has a role in teaching, particularly when delivering theoretical content, which is also supported by the previous literature (Poirier, 2017; Loughlin & Lindberg-Sand, 2023).

The review also identified workshops as a widely used teaching method in wound care education. The term 'workshop' is not commonly defined in pedagogy and usually encompasses various teaching methods, such as lectures, discussions, and practical skills training (Mukurunge et al., 2021; Seighali et al., 2015). In the original studies identified, it was often described what the content of the workshop was, but the methods used by the teacher or educator were often described narrowly. Limited descriptions suggest that workshops could be more accurately regarded as an umbrella term for skills training and interactive theoretical sessions, where students and learners actively participate and the teacher's role is more likely to be that of a supervisor or facilitator for the session.

The review also identified some modern methods, such as escape room games. Escape rooms are games that use clues, questions, and tasks to progress and ultimately solve the case by 'getting out' of the room (Guckian et al., 2020). Escape rooms can either be high-fidelity environments using simulation or be more theoretical 'rooms' without the simulation environment or equipment. In this review, escape room games were suggested to increase competence, and they were also well-received by students and learners, indicating that this method could warrant further study to gather more robust evidence of its effectiveness.

In this review, e-learning was combined with other teaching methods in the selected studies, as solely e-learning was excluded. Studies that used only e-learning were not included because researchers viewed e-learning more as a learning approach than a teaching method. Most studies focused on describing the content of teaching; however, future research should emphasise that teaching methods can also be characterised, such as using simulations in virtual environments. Those studies that used e-learning showed improved competence, indicating that this kind of blended learning, which combines self-studying online or in a virtual environment, for example, prior to simulation training, could be beneficial (Kielo-Viljamaa & Stolt, 2024).

Limitations

The review has some limitations. First, it used a scoping approach, which means it covered a broader topic with less restrictive inclusion criteria for the original studies (Aromataris et al., 2024; Munn et al., 2018). Although the search, selection, and data extraction were conducted systematically by two researchers, all types of study designs and

Table 2
Teaching methods and their effect or association on different outcomes.

Teaching method	Positive (green), unchanged (yellow), or negative (red) effect or association on						
	Knowledge	Skills/performance/ behavior	Attitudes	Clinical reasoning/decision making/critical thinking	Self-confidence/self-efficacy	Student/learner satisfaction	Anxiety
Technology-enhanced methods							
Augmented reality (AR) based methods	Rodríguez-Abad et al. 2022					Rodríguez-Abad et al. 2022	
E-learning and computer-based methods	Bobbink et al. 2023, Cox et al. 2011, Mather et al. 2022, Sánchez-Gálvez et al. 2024		Mather et al. 2022			Bobbink et al. 2022	
Gaming							
Game cards	Almashayek et al. 2022						
Escape room	Sengul et al. 2024, Sengul & Kaya 2024	Sengul et al. 2024	Sengul et al. 2024, Sengul & Kaya 2024			Küçükakça Çelik et al. 2023, Sengul et al. 2024	Sengul & Kaya 2024*
Lecturing							
Traditional classroom lectures, e.g., using PowerPoint presentations	Almashayek et al. 2022, Cox et al. 2011, Lee & Kim 2016, Sánchez-Gálvez et al. 2024, Seo & Roh 2020; Kabak Solak et al. 2026 Nekouei et al. 2024; Yamaç & Alcan 2025	Lee & Kim 2016, Seo & Roh 2020	Seo & Roh 2020	Nekouei et al. 2024	Nekouei et al. 2024		
Lectures combined with practical training	Sezgunsay & Basak 2025a; Huff 2011						
Interactive lectures, e.g., with discussions and brainstorming	Ekama Ilesanmi & Morohunfoluwa Oluwatosin 2016, Jeon & Jeong 2026; Silva et al. 2020 Jeon & Jeong 2025			Jeon & Jeong 2026, Silva et al. 2020	Jeon & Jeong 2025 & 2026		

Simulation							
Virtual reality (VR) simulation	Jeon & Jeong 2025 & 2026			Jeon & Jeong 2026, Redmond et al. 2020	Jeon & Jeong 2025 & 2026, Redmond et al. 2020	Choi 2019, Redmond et al. 2020	
Classroom simulation	Baran et al. 2025, Desmond et al. 2025; MacLean et al. 2024, Mather et al. 2022, Yilmazer et al. 2020 & 2022**, Sezgunsay & Basak 2025b; Silva et al. 2020; Tseng et al. 2025 Harding et al. 2014, Yilmazer et al. 2022**	Baran et al. 2025, Borges et al. 2025; Desmond et al. 2025; Lister et al. 2018, MacLean et al. 2024, Yilmazer et al. 2020 & 2022; Sezgunsay & Basak 2025b	Desmond et al. 2025; Mather et al. 2022, Sezgunsay & Basak 2025b	MacLean et al. 2024, Silva et al. 2020	Lister et al. 2018, MacLean et al. 2024, Mazzo et al. 2018; Sezgunsay & Basak 2025b	Lister et al. 2018, Mazzo et al. 2018, Moura & Caliri 2013, Silva & Oliveira-Kumakura 2018, Yilmazer et al. 2020; Sezgunsay & Basak 2025b	Sezgunsay & Basak 2025b
Structured and reflective methods							
7E learning cycle model	Nekouei et al. 2024			Nekouei et al. 2024	Nekouei et al. 2024		
Analogy-based teaching	Yamaç & Alcan 2025						
Jigsaw technique	Kabak Solak et al. 2026						
Mentoring		Fard et al. 2020					
Six hat thinking method	İşeri & Ursavaş 2024		İşeri & Ursavaş 2024				
Team-based learning	Seo & Roh 2020	Seo & Roh 2020	Seo & Roh 2020				
Workshop							
Practical training workshops	Bobbink et al. 2023; Chao et al. 2025; Yang et al. 2025	Tidhar et al. 2017	Chao et al. 2025		Chao et al. 2025	Bobbink et al. 2022; Yang et al. 2025	
Theoretical, interactive workshops	Goudy-Egger & Dunn 2018, Hemingway et al. 2013, Hollinworth & Hawkins 2002**, Sinclair et al. 2004		Hollinworth & Hawkins 2002**			Hemingway et al. 2013, Hollinworth & Hawkins 2002	
	Hollinworth & Hawkins 2002**		Hollinworth & Hawkins 2002**				
Combined practical and theoretical workshops	Hemingway et al. 2014				Chao & Liao 2025	Chao & Liao 2025; Hemingway et al. 2014	

*A decrease (a negative outcome) is interpreted as a positive change or result.
**Both positive and unchanged outcomes were reported.

other textual evidence were included, which limits the generalisability and the level of evidence of this review. Additionally, the search was carried out in international databases, which limited the ability to find grey literature on the topic, such as dissertations. In contrast, a broader view of the current literature related to the topic was obtained.

In this review, a critical appraisal or risk of bias assessment of the original studies was not conducted because it is not required in scoping reviews (Khalil et al., 2016). However, most of the original studies employed a quasi-experimental pre-test post-test design, but many only collected data at two time points, before and immediately after the intervention, raising questions about the true effectiveness of the teaching method and the review's inability to conclude cause-and-effect relationships for the teaching method. Nonetheless, the review did not focus on the effectiveness of the teaching method itself, but rather on whether the method, intervention or control, produced positive, negative, or neutral outcomes in competence or other outcomes. Additionally, the number of participants in most studies was relatively low, fewer than 100, which limits the generalisability of the review's findings. Still, the original studies were relatively recent, increasing the relevance of the review's results.

The concept of teaching methods can also be understood in different ways. In literature, teaching methods and learning methods are sometimes considered the same, or they are interpreted differently. It is possible that researchers have missed relevant studies because of the varying definitions and interpretations of teaching methods. Additionally, e-learning methods were excluded from this review if the original study did not provide any information about the teaching methods used in e-learning. The exclusion limits the evidence related to the use of e-learning in wound care education.

Lastly, the participants in this review included all nursing professionals and nursing students. The reason why the participants in this review were not limited to more specific groups, such as professionals or students only, was that wound care involves continuous learning, and the researchers wanted to gather results from both professionals and students. However, teaching at different levels of nursing education, such as in vocational and bachelor's levels, might be somewhat different. Furthermore, excluding nursing assistants without a professional qualification reduces the generalisability of the review. The aim of this review, however, was to obtain a broader overview of teaching methods in general, so that future reviews could focus more specifically on participants or teaching methods and their effectiveness.

Implications for future research

Future research could evaluate the effectiveness of different teaching methods in increasing the wound care and prevention competence of nursing professionals and students. Additionally, follow-up studies could examine the long-term impacts of these teaching methods beyond

the immediate post-intervention phase. The perspectives of teachers and educators could also be examined, as none of the original studies included in this review focused on their views regarding the usability and feasibility of the teaching methods.

Implications for nursing education

Since the evidence from this literature review is limited due to its scoping design, the results cannot be generalised, and findings related to each teaching method and their ability to enhance competence should be interpreted with caution. However, this review concludes that many teaching methods have positive outcomes for wound care competence among both professionals and students, and teachers and educators could implement and combine these different methods in their teaching to improve students' and learners' theoretical and practical competence, while also considering various types of learners.

Conclusions

The scoping review identified six main categories of teaching methods used in both undergraduate and graduate nursing education for wound care and prevention. These categories are technology-enhanced methods, gaming, lecturing, simulation, structured and reflective methods, and workshops. Among these, simulation was the most frequently used teaching method. All identified methods enhanced students' and professionals' knowledge of wounds and their prevention. Many methods also improved practical skills and attitudes toward wound care and prevention among students and professionals. Moreover, students and professionals expressed satisfaction with the teaching methods, particularly with the use of simulation.

CRediT authorship contribution statement

Emilia Kielo-Viljamaa: Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Elina Wallius:** Writing – review & editing, Validation, Investigation, Data curation. **Minna Stolt:** Writing – review & editing, Validation, Project administration, Methodology.

Declarations

This study does not include any human subjects, meaning neither an ethical review nor research permission was required. The study follows the core practices of publication ethics.

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Declaration of competing interest

There is no conflict of interest in this project.

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Appendix A. Supplementary data

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