Review Article

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Impacts of Unfolding Case-Study Learning on Nursing Students' Performance Outcomes: A Scoping Review

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Introduction: The unfolding case study is an innovative teaching strategy that structures patient scenarios over time to enhance learner engagement and improve outcomes. However, its effectiveness in nursing education classroom settings worldwide remains underexplored. This review aimed to synthesize evidence on the impact of unfolding case-study learning on nursing students' knowledge, critical thinking, and self-efficacy.

Methods: A scoping review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses- Scoping Reviews (PRISMA-ScR) guidelines. Searches covered CINAHL (EBSCOhost), Cochrane Library (Wiley), Embase (Elsevier), ERIC (IES), MEDLINE (via PubMed), Scopus (Elsevier), and Web of Science Core Collection (Clarivate) for English-language studies published from January 2012 to September 2025. Study appraisal used the Mixed Methods Appraisal Tool (MMAT, 2018) and NHMRC levels of evidence for quantitative designs.

Results: The initial search identified 550 studies, of which 19 were included after rigorous screening. Findings indicated that unfolding case studies positively influenced knowledge acquisition by promoting active learning, enhancing integration of theory into practice, strengthening collaborative learning and communication, and improving long-term knowledge retention and recall. Evidence also supported improvements in critical thinking skills and self-efficacy among nursing students.

Conclusion: Integrating unfolding case-based learning into undergraduate nursing education offers substantial advantages in developing essential skills, particularly knowledge acquisition, critical thinking, and self-efficacy.

Keywords: Critical thinking, Nursing education, Self-efficacy

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Introduction

Nursing education must evolve to meet changing workforce demands, with programs integrating critical thinking to strengthen knowledge and self-confidence for real-world complexity (1-4). Within this shift toward student-centered learning, interactive case/scenario-based formats have shown benefits for engagement and reasoning (5-9). The unfolding case study (UCS) is a simulation-based approach that stages evolving patient information to foster "thinking like nurses," mirroring real-world uncertainty and complexity (10-14).

Despite growing use, it remains unclear whether UCS measurably improves knowledge, critical thinking, and self-efficacy in classroom settings, where formats, facilitation quality, and outcome measures vary widely (10-14). Implementation can be resource-intensive (faculty development, multi-episode authoring, AV/simulation support, schedule alignment), and outcomes may differ by culture, language, and learner preparedness—factors that likely contribute to heterogeneous results (15-17).

Current standards (INACSL; AACN 2021 Essentials) call for structured, evidence-based simulation; trials and program surveys indicate high-quality simulation which can replace up to 50% of clinical hours, with expanding use during COVID-19 (6, 7, 18). Evaluating UCS within this shift clarifies the effects on student performance and guides curriculum decisions that support practice readiness (1, 3). Rigorous outcome assessment also aligns with evidence-based education by providing dependable indicators of achievement (19, 20).

Despite growing UCS adoption, evidence is uneven: knowledge outcomes are measured more often, whereas critical thinking and especially self-efficacy are less frequently assessed and yield mixed effects, partly due to instrument variability. Classroom-only implementations are underrepresented relative to simulation/blended settings, and most studies are single-site, quasi-experimental, small-sample, short-follow-up, with heterogeneous measures, variable UCS "dose"/fidelity, and lecture comparators—limitations that lower certainty and produce inconsistent effect estimates (2, 21).

Thus, this review isolates UCS, details modality/dose/debriefing, and examines implementation outcomes not addressed in earlier syntheses (22-24). We focus on classroom-based UCS across diverse countries; jointly evaluate knowledge, critical thinking, and self-efficacy; and appraise quality with MMAT and NHMRC—explaining heterogeneity (designs, measures, UCS dose/fidelity, comparators, follow-up) to contextualize the certainty of evidence.

Methods

The Search Strategy

The scoping review was guided by Arksey and O'Malley (2005), refined by Levac, et al., and aligned with the JBI Manual for scoping reviews. A scoping review technique encompassing various research methodologies, such as quantitative, qualitative, and mixed methods, was employed. The research focused on the use of UCS in the academic field, specifically within nursing curricula. Different databases were used to retrieve published studies as follows**:** CINAHL (EBSCOhost), Cochrane Library (Wiley), Embase (Elsevier), ERIC (IES), MEDLINE (via PubMed), Scopus (Elsevier), and Web of Science Core Collection (Clarivate). The review protocol was prospectively registered in the International Prospective Register of Systematic Reviews (PROSPERO; CRD42024567135). English-language materials published from January 2012 to September 2025 were included. This timeframe captures the entry of unfolding case studies **(**UCS**)** into the peer-reviewed nursing literature (early reports by 2012) and aligns with key simulation milestones—the initial INACSL standards (2011) and subsequent field-wide adoption following the 2014 NCSBN National Simulation Study (25).

A reproducible, database-specific search strategy was developed, combining controlled vocabulary—MeSH (PubMed), CINAHL Headings, and ERIC Descriptors—with free-text terms. Boolean operators (AND/OR), phrase marks, truncation (*), and database-appropriate field tags were applied. Parentheses and quotation marks were used to preserve logical nesting and exact phrases; truncation captured word variants. The terms and their synonyms are listed in Table 1. The final strategy was validated for internal consistency and executed for studies published from 2012 to 2025, with the last search run on 15 September 2025; the search was limited to English and, where supported, to human studies.

Core logic: (Intervention terms) AND (Population) AND (Education/Teaching) AND (Outcomes)

- **Intervention terms:** "unfolding case" OR "unfolding cases" OR "unfolding scenario*" OR "serial case*" OR "multi-episode" OR "progressive disclosure" OR (("case-based" OR "scenario-based") AND unfolding)
- **Population:** nurse* OR "nursing student*" OR undergraduate* (plus controlled-vocabulary equivalents for Nursing Education and Nursing Students)

Table 1. Keywords and equivalents

Keywords	Equivalents
Unfolding case study	"Unfolding case" OR "unfolding cases" OR "unfolding scenario*" OR "serial case*" OR "progressive disclosure" OR "case-based unfolding" OR UCS
Nursing education	"Nursing education" OR "nursing pedagogy" OR "nursing teaching" OR "nursing curriculum" OR "undergraduate nursing" OR "prelicensure nursing"
Knowledge acquisition	Knowledge OR "knowledge acquisition" OR "knowledge gain" OR "learning outcome*" OR "cognitive outcome*"
Critical thinking	"Critical thinking" OR "higher-order thinking" OR "clinical reasoning" OR "clinical judgment" OR "clinical judgement"
Self-efficacy	Self-efficacy OR "self efficacy" OR "self-confidence" OR confidence

• **Education/Teaching:** education OR teaching OR curriculum OR classroom OR simulation OR "case method" OR "problem-based learning"

• **Outcomes:** knowledge OR "critical thinking" OR "clinical reasoning" OR "clinical judgment" OR "clinical judgement" OR "self-efficacy" OR "self-confidence" OR competence OR performance OR "learning outcome*" OR skill.

After selection of the study, we screened the reference lists of included relevant articles to identify additional eligible records. We then followed standard scoping-review procedures: we conducted comprehensive database searches tailored to each index's controlled vocabulary and keywords, screened titles/abstracts and full texts in duplicate against predefined eligibility criteria, extracted data using a piloted form, summarized results in evidence tables, and synthesized key recommendations/themes narratively. Because indexing terms differ across databases, search strings were customized for each source.

This scoping review used PRISMA-ScR (Preferred Items for Reporting Systematic Reviews and Meta-analyses- Scoping Reviews) guideline to ensure transparent and reproducible reporting of the search, screening, eligibility, and inclusion processes; accordingly, we provide a PRISMA-ScR flow diagram (Figure 1) (26).

Review question

The Population, Intervention, Comparison, and Outcomes (PICO) model was considered appropriate (27), and the following was included in this review: Participants=undergraduate nursing students; Intervention=Unfolding Case Study (UCS: multi-episode/scenario-based sequence with staged information and guided debrief); Comparison=(i) traditional teaching/ usual instruction (e.g., lecture, seminar, single-episode case, standard tutorial) in between-group studies; or (ii) the pre-intervention baseline in within-subject pre–post designs; Outcomes=knowledge, critical thinking, and

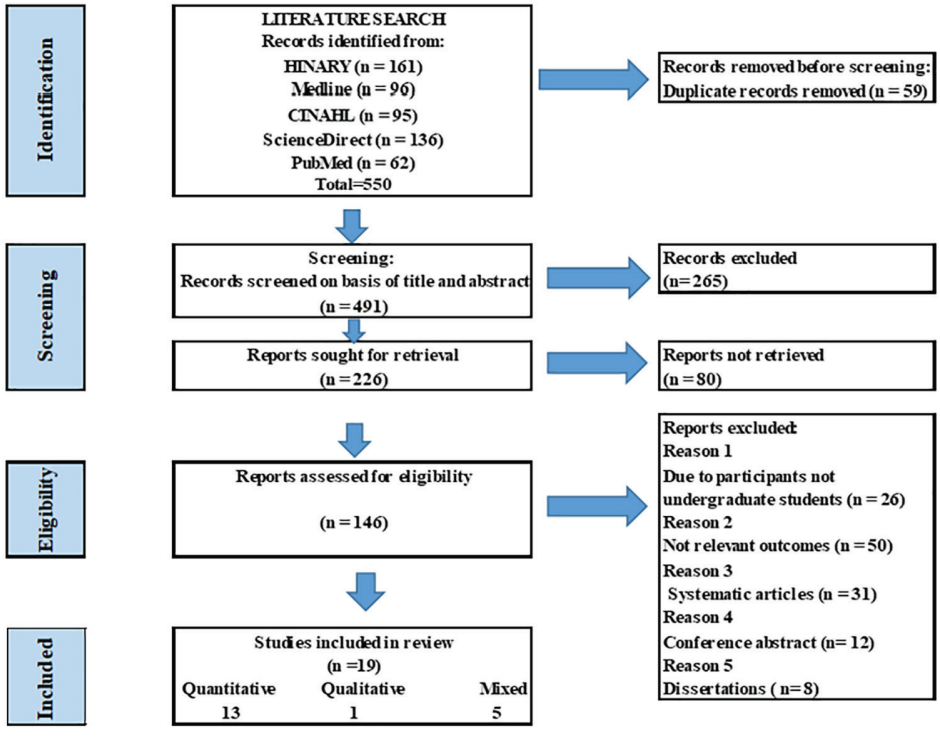

Figure 1. Flow Diagram illustrating PRISMA-ScR

self-efficacy (assessed with validated instruments or explicit course-based knowledge tests). The review question was: What is the impact of UCS on nursing students' knowledge, critical thinking, and self-efficacy, relative to the comparator defined above?

Inclusion and exclusion criteria
Inclusion criteria

The review's inclusion criteria targeted nursing students worldwide who were enrolled in UCS. The studies included several forms of research, including quantitative, qualitative, and mixed approaches. They were written in English and published between 2012 and 2025, with the last search conducted on September 15, 2025. This time frame allows for a more comprehensive and up-to-date analysis of the available evidence.

Exclusion criteria

The exclusion criteria included non-enrollment of nursing program students, nursing students who engaged in UCS for non-academic purposes, studies not written in English, and studies that aimed to assess specific technical/operator outcomes of UCSs. Review articles, letters/editorials, conference abstracts/proceedings, and records without full-text access were also excluded.

Data quality assessment

The quality of the nineteen papers was evaluated using the Mixed Method Assessment Tool (MMAT) (17, 28). Researchers in the past employed the MMAT to assess the validity of data from qualitative, quantitative, and mixed-method approaches (29). Two reviewers independently applied the MMAT to all nineteen studies, discussed discrepancies, and reached consensus; a third reviewer was available if required. Studies were not excluded based on MMAT judgments; instead, item-level findings informed interpretation of the results (e.g., instrument validity, outcome completeness, and integration in mixed methods). In accordance with the National Health and Medical Research Council (NHMRC, 2009) standards (30), quantitative studies were appraised, and levels of evidence were assigned only to quantitative comparative designs; qualitative or non-comparative quantitative studies (e.g., single-group pre–post) were marked N/A.

Screening procedure

The researchers separately evaluated the eligibility of the studies. Initially, two reviewers independently screened records in two stages (titles/abstracts, then full texts) against the prespecified eligibility criteria. Before full screening, we calibrated on a subset to align on inclusion decisions. Disagreements were resolved by discussion; a third reviewer adjudicated when needed. Duplicates were removed before screening. Reasons for full-text exclusion were documented, and the study flow is shown in the PRISMA-ScR diagram (Figure 1).

Data extraction

Two reviewers used a standardized, piloted extraction form capturing study identifiers, country/setting, design, sample, UCS type and "dose"/fidelity (episodes, pre-brief/debrief), comparator, instruments, outcomes (knowledge/critical thinking/self-efficacy), author-reported estimates (means/SDs, test statistics, and p-values/95% CIs). A subset was double extracted to verify consistency; discrepancies were resolved by consensus. We did not compute standardized effect sizes; the findings were synthesized narratively with explicit indication of whether estimates were adjusted or unadjusted. Because many studies used single-group pre–post designs, reported effect sizes (when available) are presented descriptively and should not be interpreted as causal estimates; they are susceptible to testing effects, maturation, and regression to the mean.

Ethical Consideration

This review was registered in PROSPERO (CRD42024567135).

Results

Search outcome

Figure 1 represents the PRISMA flow diagram, which illustrates the process of including and excluding studies incorporated into the scoping review, considering that the initial searching yielded 550 studies. As shown in the Figure, the reviewing and screening process resulted in inclusion of 19 studies for this review. Of these, 13 were quantitative studies (2, 15, 19, 21, 31-40), 1 was a qualitative study (41), and 5 were mixed-methods studies (42-46).

Table 2 (comparative matrix) highlights how outcomes varied by country, design, instruments, and UCS type. Simulation-based UCS—especially high-fidelity or repeated sessions with debriefing (36, 42, 43)—consistently showed strong improvements in self-efficacy and clinical confidence. Video-based UCS (33) outperformed written text-based UCS on knowledge outcomes, suggesting that audiovisual immersion enhances engagement and retention.

Table 2. Summary of the Reviewed Studies' Characteristics and Evaluation

No.	Author, year, country	Aim	Design	Sample size	Setting	Instrument(s) Used	Main Findings	Outcomes Measured	Comparator	Direction/ Significant	NHMRC Study Rating
1.	Yousey (2013) USA	Explore unfolding case studies as a novel way to improve online students' knowledge, clinical decision-making, critical thinking, and problem-solving.	Mixed-method approach	26	Online, undergraduate course (text-based unfolding cases)	Faculty evaluation/ self-developed, student assessments	Students enhanced their public health nursing knowledge, inventive problem-solving, and chronic disease interpretation. Faculty evaluation: the study improved formative and summative student assessment.	Knowledge, problem-solving, clinical reasoning	Text-based (online case)	Positive improvements in knowledge, problem-solving, and clinical reasoning; faculty noted benefits to formative/ summative assessment.	IV
2.	Meiers and Russell (2019) Canada	Identify challenges nursing students have while assessing client conditions and conducting clinical competencies.	Qualitative study, focus groups	14 students 6 faculty members	Simulation-based (COPD case); teacher–student focus groups	Thematic analysis	Teacher-student focus groups identified three themes regarding the benefits of unfolding case studies for students: knowledge synthesis, practice transferability, and clinical competence.	Knowledge synthesis, clinical competence	Simulation-based (COPD case)	Themes: knowledge synthesis, practice transferability, clinical competence (beneficial perceptions).	N/A
3.	McCormick, et al. (2013) USA	Evaluate the efficacy of unfolding case simulation and classroom lecture in educating nursing students about Parkinson's disease.	Quantitative study, comparative experimental design	48	Simulation lab (Parkinson's unfolding scenario)	Knowledge test (Parkinson's disease)/ self-developed	1. The within-group analysis demonstrated a significant increase for students in both groups ($p = 0.040$). 2. Compared to classroom lectures, unfolding case simulation students exhibited considerably superior knowledge ($p = 0.031$).	Knowledge acquisition	Simulation-based (lab, unfolding scenario)	Favors UCS on knowledge (between-group $p=0.031$); both groups improved within-group ($p=0.040$).	III-2
4.	Herron, et al. (2019) USA	Compare nursing students' satisfaction, self-confidence, and knowledge after conventional written and video simulation unfolding case studies.	Quantitative study, a quasi-experimental design	165	Classroom with video simulation vs written case	Knowledge test/ self-developed, satisfaction, self-confidence survey	1. The video simulation group always outperformed the written case study group on knowledge questions. 2. The written case study and video simulation groups showed similar satisfaction and self-confidence. 3. Introducing Case Studies Student Learning: Written or simulated video case studies enhanced knowledge, application, and visualization.	Knowledge, self-confidence, satisfaction	Written UCS vs. Video UCS	Video > written on knowledge; satisfaction/ self-confidence ~ similar (ns; $p=0.95$).	III-2

No.	Author, year, country	Aim	Design	Sample size	Setting	Instrument(s) Used	Main Findings	Outcomes Measured	Comparator	Direction/ Significant	NHMRC Study Rating
5.	Munn, et al. (2021) USA	analyze how unfolding case-study simulation affects undergraduate nursing students' clinical judgment/ decision-making confidence and nursing knowledge.	Mixed methods, comparative study	43	High-fidelity pediatric simulation (instructor-led & student-led)	Simulation assessment, thematic analysis/ self-developed	1. Students' pediatric nursing knowledge, skills, and decision-making confidence improve via case studies through instructor-led simulation and student-led simulation. 2. Themes of experience perception, pediatric nursing care, knowledge absorption, and critical thinking improved.	Pediatric knowledge, decision-making, critical thinking, self-efficacy	Simulation-based (pediatric high-fidelity)	Improved pediatric knowledge/skills; ↑ decision-making confidence; positive qualitative themes.	III-2
6.	Ma and Zhou (2022) China	Assess how case-based learning improves academic accomplishment, critical thinking, and self-confidence in the health assessment course compared to conventional techniques.	Quantitative, quasi-experimental study	115	Health-assessment course (medium-fidelity simulation)	Theory test, CCTDI, self-confidence scale	- Unfolding case-based learning enhanced health assessment academic performance, critical thinking, and self-confidence between and within groups analysis.	Knowledge, critical thinking, self-confidence	Simulation-based (medium-fidelity)	Favors UCS on knowledge ($p<0.041$), critical thinking, and self-confidence	III-2
7.	Carter and Welch (2016) USA	Compare the impact of unfolding case studies in renal and musculoskeletal issues to standard lectures in nursing students' knowledge and critical thinking abilities.	Quantitative, quasi-experimental study	84	Classroom (renal & musculoskeletal topics)	HSRT, test scores	-Both groups' knowledge improved from pre- to post-test, but no significant difference in test score improvement between the two teaching methods for both renal ($p <0.71$) and musculoskeletal ($p <0.12$) patients. - Both groups' HSRT scores were disappointing. - The control group's scores dropped more than the intervention group's.	Knowledge, critical thinking	Text-based UCS vs. Lecture	No difference vs lecture (renal $p=0.71$; MSK $p=0.12$).	III-2

No.	Author, year, country	Aim	Design	Sample size	Setting	Instrument(s) Used	Main Findings	Outcomes Measured	Comparator	Direction/ Significant	NHMRC Study Rating
8.	Hobbs and Robinson (2022) Alabama/ USA	Examine how unfolding case studies in adult health nursing courses affect student performance.	Quantitative, quasi-experimental study	86	Adult-health nursing classroom	Pre/post-test, transfer test/ self-developed	-Both slide lecture and UCS groups improved from the pretest to the posttest. - Both groups' transfer test results dropped. - Learning results were similar for both groups.	Knowledge, transfer performance	Text-based UCS in classroom	Both groups improved; between-group ≈ no difference; transfer declined.	III-2
9.	Hong and Yu (2017) China	Explore multi-episode/unfolding and single-episode case studies on critical thinking.	Quantitative, Randomized Controlled Trial (RCT)	122	Lecture/ classroom (multi-episode UCS vs single)	CTDI-CV	-The multi-episode case study group enhanced critical thinking more than the single-episode case study. - The single-episode case study improved in three of seven CTDI-CV characteristics, whereas the experimental group improved in six.	Critical thinking	Multi-episode UCS vs. Single-episode case	Favors multi-episode UCS on CTDI-CV (significant).	II
10.	Englund (2020) USA	Evaluate the feasibility and efficacy of unfolding case studies in nursing curriculum and their effects on critical thinking.	Quantitative, correlational study	302	Undergraduate nursing classroom/ curriculum use of (multiple-client) unfolding case studies.	Course tests/ self-developed	-The experimental group did better on course tests than the comparison group. -The research found that unfolding case studies boosted students' critical thinking.	Critical thinking, knowledge	Text-based UCS in curriculum. Traditional/ static case / comparison cohort (UCS cohort vs more traditional approach)	results suggest unfolding case studies more effectively develop critical thinking and improved course test performance than traditional/static cases.	IV
11.	Li, et al. (2019) China	Examine how "nursing case-based learning" of unfolding case studies affects nursing students' critical thinking.	Quantitative, Comparative study	80	Classroom (9-week case-based UCS)	CTDI-CV	-The experimental group utilizing unfolding case studies showed significant improvement in critical thinking after nine weeks compared to the control group utilizing lecture-based learning.	Critical thinking	Case-based UCS vs. Lecture based learning	Favors UCS on critical thinking (CTDI-CV) after 9 weeks.	III-2

No.	Author, year, country	Aim	Design	Sample size	Setting	Instrument(s) Used	Main Findings	Outcomes Measured	Comparator	Direction/ Significant	NHMRC Study Rating
12.	Leynes-Ignacio (2023) Philippines	- Use unfolding case studies to assess medical-surgical learning curriculum satisfaction and self-confidence. - Assess how recurring simulation-based case scenarios with debriefing affect self-efficacy.	Quantitative, cross-sectional approach	166	Medical-surgical course (simulation-based UCS)	Satisfaction & Self-Confidence Scale	-Nursing students expressed great satisfaction (M=22.02; SD=0.29 out of 25) and self-confidence (M=34.60; SD=0.48 out of 40) using unfolding case studies.	Self-confidence, satisfaction, self-efficacy	Simulation-based (medical-surgical)	High satisfaction (≈22/25) and self-confidence (≈34.6/40).	IV
13.	Al Gharibi,et al. (2021) USA	Assess self-efficacy after recurring simulation-based case scenarios with debriefing.	Quantitative, quasi-experimental	126	Simulation lab; repeated sessions + structured debriefing	Self-efficacy scale	-Repeating simulations increased self-efficacy in nursing student's clinical competence. - From the pre-test to mid-test, self-efficacy decreased. -After repeated simulations, self-efficacy improved.	Self-efficacy	Simulation-based (repeated with debriefing)	Self-efficacy decreased pre→mid, then ↑ after repetition; net increase post-intervention.	III-1
14.	Mills, et al. (2014) Australia	Assess the satisfaction of nursing students after instruction using unfolding case studies.	Mixed methods study, survey, semi-structured interviews	47	High-fidelity simulation + video playback	Surveys, interviews	-The average student satisfaction score was 4.6 (SD = 0.4), while the average student self-confidence score was 4.3 (SD = 0.7). - Video recording, playback, post-session conversations, and qualitative interview data verified students' high satisfaction with the educational strategy.	Satisfaction, self-confidence	Simulation-based (high-fidelity with video/ playback)	High satisfaction (M≈4.6/5) and self-confidence (M≈4.3/5); qualitative data support gains.	IV
15.	Gholami, et al. (2021) Iran	Compare multi-episode case-based learning (CBL) to lecture-based learning on motivation and problem-solving.	Quantitative, quasi-experimental design	43	Classroom; multi-episode CBL (UCS)	Problem-solving and motivation scales	-Multi-episode case-based learning (CBL) showed substantial variations in perceived problem-solving abilities ($p < 0.001$) and learning motivations ($p < 0.001$).	Problem-solving, learning motivation	Multi-episode UCS vs. Lecture	Favors UCS on problem-solving & motivation (both $p<0.001$).	III-2

No.	Author, year, country	Aim	Design	Sample size	Setting	Instrument(s) Used	Main Findings	Outcomes Measured	Comparator	Direction/ Significant	NHMRC Study Rating
16.	Baker and Blakely (2023) USA	Use unfolding case stories to assess students' self-efficacy in caring for community-dwelling older individuals.	Quantitative, Quasi-experiment	20	Simulation (community/ NP focus)	General Self-Efficacy Scale (GSE), CCDOASES	-NP (nurse practitioner) students' self-efficacy increased after completing an obligatory unfolding case study using two assessment tools: the General Self-Efficacy Scale (GSE) and the Caring for Community-Dwelling Older Adults Self-Efficacy Scale (CCDOASES). - The UCS assignment helps instructors create NP-focused teaching materials.	Self-efficacy in gerontology care	Simulation-based (community/ NP focus)	↑ Self-efficacy in gerontology care following UCS.	IV
17	Sultan, et al. (2023) Pakistan	Measure the effect of unfolding case studies on critical thinking dispositions and academic performance in a pathophysiology course.	Quasi-experimental, one-group pretest–post-test (within-group).	45 PR-BSN students	Classroom (pathophysiology course) at a private nursing college in Islamabad (one-group teaching sessions using unfolding cases)	Short-answer tests for academic performance/ self-developed; structured critical thinking disposition scale	Significant gains in 10/11 sessions; large effects for academics (Cohen's d≈3.64) and dispositions (d≈1.40).	Academic performance; critical thinking dispositions	Text-based unfolding case studies in classroom (progressive disclosure). Pre–post within-group (baseline vs post for each session)	posttest significantly higher in 10/11 sessions; very large effects (Cohen's d≈3.64 academics; d≈1.40 dispositions).	IV
18	Al Yazeedi, et al. (2024) Oman	Explore perceived efficacy of case analysis as an assessment method for clinical competencies.	Mixed methods (cross-sectional survey + focus groups).	67 students (quant); 4 focus groups (qual)	Assessment context (multi-segment written exam; case analysis)	Study-developed 13-item questionnaire; focus-group guide; descriptive & t-tests; framework analysis	≈80% agreement that case analysis aligns with and assesses competencies; themes favored case analysis over MCQs.	Perceived competency alignment; acceptability of assessment	Case analysis (multi-segment clinical written exam).	≈80% agreement that case analysis aligns with competencies.	IV

No.	Author, year, country	Aim	Design	Sample size	Setting	Instrument(s) Used	Main Findings	Outcomes Measured	Comparator	Direction/ Significant	NHMRC Study Rating
19	Cheng, et al. (2024) Taiwan	Test an unfolding case study's effects on clinical reasoning, self-directed learning, and team collaboration.	Mixed methods (pre/post + focus groups).	40 nursing students; 9 in focus groups	Classroom teamwork (text-based collaborative UCS)	Nurses Clinical Reasoning Scale; Self-Directed Learning Instrument; Group Responsibility & Cooperation Questionnaire	Significant improvements in clinical reasoning, SDL, and collaboration; themes highlighted patient-centered communication and reflective thinking.	Clinical reasoning; self-directed learning; team collaboration.	Text-based collaborative unfolding case study.	Significant ↑ in clinical reasoning, self-directed learning, and collaboration.	IV

NHMRC Level of Evidence (quantitative comparative studies only): I=systematic review of RCTs; II=RCT; III-1=pseudo-randomized; III-2=comparative study with concurrent controls (e.g., non-randomized controlled, cohort, case-control); III-3=comparative study without concurrent controls (e.g., historical control); *IV*=case series/non-comparative. *N/A* indicates NHMRC not applicable (qualitative or non-comparative quantitative designs, including single-group pre–post. Dose. Number and length of unfolding-case exposures (e.g., count of sessions; minutes per session). Fidelity. Realism/immersiveness of the learning modality (e.g., written case=low, medium-fidelity manikin/video=medium, high-fidelity sim=high). Near-transfer. Performance on tasks that closely resemble taught content (e.g., unit quizzes or immediate application tasks), as opposed to distant/novel tasks.

Text-based UCS, while sometimes beneficial, yielded mixed results for knowledge and critical thinking, underscoring the value of richer, interactive modalities. Multi-episode approaches (2, 21) were particularly effective for critical thinking and motivation relative to single-episode or lecture-based formats. Geographic patterns were also evident: Chinese and Iranian studies more often emphasized gains in critical thinking/problem-solving, whereas U.S. and Australian studies frequently reported improvements in self-efficacy and satisfaction. Sample sizes ranged from 14 to 1,639.

Quality assessment

All studies received an independent appraisal. NHMRC levels are reported with study characteristics in Table 2, and MMAT item-level judgments (Y/N/CT) in Table 3; appraisals provided information about interpretation, not study inclusion.

MMAT (item-level) summary

All studies met screening items. Quantitative studies generally used appropriate outcome measures; however, many non-randomized and descriptive designs relied on self-developed or insufficiently validated instruments, yielding frequent N/CT on measurement validity (NR2/D3). Reporting of follow-up/response rates was often incomplete (CT, occasional N on R3/NR4/D4). Mixed-methods reports adopt typically an aligned design with questions (M1=Y) but frequently lack detail on integration procedures and interpretation (M2–M5=CT/N). Qualitative studies showed appropriate sampling/analysis and grounding in data, with reflexivity less consistently addressed (Q5=CT/N). Confidence in effects is higher where validated measures and adequate follow-up are documented, and more tentative where instrument validity, integration, or outcome completeness are unclear.

NHMRC level of evidence

Across 19 studies, quantitative evidence clustered at Level III-2 (n=8) (non-randomized comparative with concurrent controls) and Level IV (n=8) (non-comparative designs, e.g., cross-sectional or one-group pre–post). Only one RCT (Level II) and one pseudo-randomized study (Level III-1) were identified; one qualitative study was N/A by definition. This distribution indicates that while some comparisons are present, the body of evidence is dominated by non-randomized and non-comparative designs, limiting causal inference. Greater weight is, therefore, placed on findings from Level II/III-2 studies that also demonstrate strong MMAT item performance (validated measures, adequate follow-up).

Table 3. MMAT (2018) Item-Level Appraisal of Included Studies (Y/N/CT)

MMAT Item	Yousey 2013 (USA)	Meiers & Russell 2019 (Canada)	McCormick, et al. 2013 (USA)	Herron, et al. 2019 (USA)	Munn, et al. 2021 (USA)	Ma & Zhou 2022 (China)	Carter & Welch 2016 (USA)	Hobbs & Robinson 2022 (USA)	Hong & Yu 2017 (China)	Englund 2020 (USA)	Li, et al. 2019 (China)	Leynes-Ignacio 2023 (Philippines)	Al-Gharibi, et al. 2021 (USA)	Mills, et al. 2014 (Australia)	Gholami, et al. 2021 (Iran)	Baker & Blakely 2023 (USA)	Sultan et al. 2023 (Pakistan)	Al Yazeedi et al. 2024 (Oman)	Cheng et al. 2024 (Taiwan)
Design (Qual/RCT/NonRand/Descr/Mixed)	Mixed	Qual	NonRand	NonRand	Mixed	NonRand	NonRand	NonRand	RCT	Descr	NonRand	Descr	NonRand	Mixed	NonRand	NonRand	NonRand		
S1: Research question clear	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
S2: Data address question	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Q1: Sources relevant (Qual)	Y	Y			Y									Y				Y	Y
Q2: Analysis appropriate (Qual)	Y	Y			Y									Y				Y	Y
Q3: Findings grounded in data (Qual)	Y	Y			Y									Y				Y	Y
Q4: Context described (Qual)	Y	Y			Y									Y				Y	Y
Q5: Reflexivity considered (Qual)	N	N			N									N				**N**	**N**
R1: Randomization appropriate (RCT)									Y										
R2: Groups comparable at baseline (RCT)									CT										
R3: Outcome data complete (RCT)									CT										
R4: Blinding/masking addressed (RCT)									CT										
R5: Intervention integrity/adherence (RCT)									CT										
NR1: Recruitment minimizes selection bias (NonRand)			CT	CT		CT	CT	CT			CT		CT		CT	CT	CT		
NR2: Measurements appropriate/validated (NonRand)			N	N		Y	Y	N		N	Y	Y	N		N	Y	N		
NR3: Groups comparable/adjusted (NonRand)			CT	CT		CT	CT	CT			CT		CT		CT	CT	CT		
NR4: Outcome data complete/follow-up acceptable (NonRand)			CT	CT		CT	CT	CT			CT		CT		CT	CT	CT		
NR5: Confounders accounted (NonRand)			CT	CT		CT	CT	CT			CT		CT		CT	CT	CT		
D1: Sampling strategy appropriate (Descr)										CT		CT						CT	CT
D2: Sample representative (Descr)										CT		CT						CT	CT
D3: Measurements appropriate/standardized (Descr)			N	N		Y	Y	N		N	Y	Y	N		N	Y	N	N	Y
D4: Response rate acceptable (Descr)										CT		CT						CT	CT
D5: Nonresponse bias considered (Descr)										CT		CT						CT	CT
M1: MM design fits questions (Mixed)	Y				Y									Y				Y	Y
M2: Integration appropriate (Mixed)	N				N									**N**				**N**	**N**
M3: Interpretation considers integration (Mixed)	N				N									**N**				**N**	**N**
M4: Discrepancies between strands addressed (Mixed)	N				N									N				**N**	**N**
M5: Limitations of integration discussed (Mixed)	N				N									N				**N**	**N**

a. Appraisal used the Mixed Methods Appraisal Tool (MMAT), 2018. Each study is judged at the item level as Y = Yes (criterion met), N = No (not met), CT = Can't tell (insufficient detail) for the relevant design block(s).

b. Design blocks: *Qualitative* (Q1–Q5); *Randomized* (RCT; R1–R5); *Non-randomized comparative* (NR; NR1–NR5); *Quantitative descriptive/cross-sectional* (D; D1–D5); *Mixed-methods integration* (M; M1–M5). Screening items S1–S2 apply to all studies. Mixed-methods studies are appraised across Q + (R/NR/D) + M.

Summary of the included studies

This review examines three domains: 1) unfolding case studies and knowledge acquisition, 2) unfolding case studies and critical thinking/ clinical reasoning, and 3) unfolding case studies and self-efficacy. To facilitate quick reference, a combined analytical summary of all three outcomes is presented in Table 4. In addition, the narrative contrasts UCS with single-case and lecture-based methods and considers implementations in both didactic classrooms and simulation laboratories.

Unfolding case study and knowledge acquisition

This part aims to explore the effectiveness of UCS in facilitating knowledge acquisition among nursing students. This domain is covered in eight reviewed studies, including five quantitative studies (15, 32-35, 47), one qualitative (41) and two mixed-method studies (43, 44, 48, 49). Evidence obtained from these studies consistently indicated the impact of UCS on knowledge acquisition in various ways:

a- Active Learning and Engagement

UCS promotes active learning by immersing students in realistic and complex patient scenarios. The impact of UCS on learning outcomes among nursing students in nursing education was investigated (44, 50-52). The utilization of UCSs was found to facilitate knowledge acquisition among nursing students, both in the context of high-fidelity simulation and online settings (33, 35, 43, 44, 48, 51, 53). For instance, a study by Herron, et al. (2019) (26) assessed the effects of traditional written case studies and UCS video simulation on 165 senior nursing students' knowledge. The findings showed that the UCS video simulation group scored higher in the knowledge questions compared to the traditional written case study group. Additionally, UCS group demonstrated better understanding, the ability to apply learning to a patient scenario, and better engagement in learning.

Table 4. Combined Analytical Summary — Unfolding Case Study (UCS) Outcomes

Outcome	Studies Included	Direction of Effect	Typical Designs	Effective UCS Profile	Less-Effective Profile	Instruments (Sensitivity)	Comparators	Key Moderators	Notes
Knowledge Acquisition	8	6/8 (75%) significant; 2/8 null	Mostly quasi-experimental; single-site	Video/simulation, multi-episode, structured pre-brief/debrief, active faculty facilitation	Text-only, single-episode, little/no debrief	Validated/application-focused measures > course near-transfer tests	Lecture or single-episode case	Modality, dose, facilitation (primary); learner level, measurement sensitivity (secondary)	One notably large effect from single-group pre–post; interpret cautiously
Critical Thinking / Clinical Reasoning	9	Skills (n=8): 7 significant (88%); Dispositions (n=1): direction-consistent	RCTs and quasi-experimental; some mixed-methods	Multi-episode or simulation/ video with guided pre-brief/ debrief	Single exposure or minimal facilitation	CCTDI / CTDI-CV more sensitive than instructor-made factual-recall tests	Lecture, single case, routine activities	Dose + facilitation; instrument sensitivity; setting (e.g., China; U.S. adult-health)	One single-group study showed very large effect; interpret cautiously
Self-Efficacy / Confidence	9	7/9 (78%) improved	Quasi-experimental; repeated-simulation cohorts	Simulation-based UCS, repeated sessions, structured debriefing	Written-only or one-off UCS; passive/low-immersion	Standard self-efficacy/ confidence scales; pre–post designs most informative	Lecture or written case; between-format (e.g., written vs video)	Realism, repetition, facilitated reflection drive gains; limited exposure constrains	Some studies showed no between-format differences (e.g., written vs video) or high confidence without pre–post

UCS=Unfolding Case Study; CCTDI/CTDI-CV=California Critical Thinking Disposition Inventory (and Chinese Version). Percentages reflect the proportion of studies within each outcome that reported statistically significant gains. Single-group pre–post effects should be interpreted with caution.

b- Integration of Theory into Practice

Studies supported the impact of UCS on students' ability to bridge the gap between theory and practice (32, 33, 35, 41). These studies revealed that UCSs provided valuable connection between theory and practice by presenting real-life patient scenarios. In a mixed-methods study conducted by Munn, et al. (2021) (43), the effectiveness of incorporating UCS scenarios into high-fidelity pediatric simulations was assessed in 43 nursing students at liberal arts university in the Southeastern United States. The study revealed that the majority of UCS students showed higher knowledge in pediatric nursing skills, decision-making abilities, and a greater integration of UCS knowledge into case study exercises. The qualitative part of the same study emphasized the beneficial impact of UCS simulation on student's capacity to improve knowledge assimilation, self-confidence, and clinical judgment.

In a quasi-experimental study conducted by Ma and Zhou (2022), 115 undergraduate nursing students were evaluated for their academic achievement, critical thinking, and self-confidence in the health assessment course after utilizing UCS learning compared to a traditional learning method. Students in the intervention group were given five UCS with multiple clinical scenarios and asked to analyze them in groups using medium-fidelity mannequins or "real patients" in each scenario (32). The conventional group was given a simple case with one clinical scenario. The findings indicated that UCS learning positively influenced academic achievement by enhancing the students' comprehension of health assessment knowledge. This is shown by the fact that the average score on the theory test was higher in the intervention group than in the control group (M=78.72, 76.01, respectively, P<0.041).

c- Improving Long-Term Knowledge Retention and Recall

The UCS encourages active learning and promotes retention of information by stimulating curiosity and engagement. For instance, in a qualitative study conducted by Meiers and Russell (2019) at North Island College, Canada, nursing students identified obstacles that impede the ability to link client conditions with pertinent assessments through demonstrating an UCS for a patient diagnosed with chronic obstructive pulmonary disease (COPD). The study found that UCS promoted knowledge retention and offered a secure learning environment (35). Another study by McCormick, et al. in 2013 compared pedagogical methods of UCS in the assessment laboratory skills related to Parkinson's disease at Towson University, USA. When comparing the posttest scores of both groups, students who took part in UCS had significantly higher levels of knowledge (p=0.031) compared to those who were taught through traditional classroom lectures (35). Likewise, a single-group pre–post study from Pakistan (PR-BSN pathophysiology; n=45) using 11 unfolding-case quizzes found posttest scores significantly higher in 10 out of 11 sessions ($p<0.05$), with a very large overall effect on academic performance (Cohen's $d\approx3.64$) (39). Interpretive caution is warranted: this very large estimate derives from a single-group pre–post classroom study without a concurrent comparator; such designs can inflate standardized effects (e.g., via small pretest SDs or repeat-testing gains) and do not control for maturation or instructor/course factors.

Despite positive impact of UCS on undergraduate students' knowledge, some research revealed no distinctive outcomes after implementing UCS at different courses and objectives. Similar outcomes were observed in a study conducted by Hobbs and Robinson (2022) which explored the impacts of integrating an UCS into undergraduate adult health nursing course on the academic accomplishments at Capstone College of Nursing, Alabama. The research analyzed the effectiveness of teaching using UCS against teaching through traditional lecturing. Study outcomes indicated that both approaches produced equivalent results in terms of student knowledge (34). These findings align with JAMEP reports that case- or scenario-based designs outperform lectures on knowledge and learning outcomes (9, 54).

Across eight knowledge-focused studies, six (75%) reported significant UCS-related knowledge gains—strongest when UCS was video-based or delivered as multi-episode simulations with structured pre-briefing/debriefing and active faculty facilitation (e.g., high-fidelity pediatric series; multi-scenario health-assessment sequences) across China, the United States, and Pakistan, whereas the two null-effect studies used text-only, single-episode implementations with little or no debriefing, early-program/associate-level cohorts, and near-transfer course tests given shortly after exposure. Overall, modality, dosage (multi-episode/repetition), and facilitation appear to be the primary levers for knowledge gains, with learner level and measurement sensitivity as secondary moderators; note that one notably large effect derives from a single-group pre-post design and should be interpreted cautiously.

Unfolding Case Study and Critical Thinking

In Taiwan, a mixed-methods pre-post study (n=40) found statistically significant gains in clinical reasoning, self-directed learning, and team collaboration after implementing an unfolding case study; qualitative themes highlighted patient-centered communication, group learning, reflective thinking, and application of theory to evolving patient needs (46). Consistent with these findings, quantitative studies also report improvements in critical thinking with UCS (2, 15, 19, 31, 32, 46, 55, 56). For example, Englund (2020) compared students receiving regular case studies (n=142) versus UCS (n=162) in adult health and found significantly higher critical-thinking scores in the UCS group ($p<0.001$). Sultan, et al. (2023) also reported a large improvement in critical-thinking dispositions (total score increased from 193.6±10.4 to 214.4±18.2; Cohen's $d\approx1.40$), with all subscales improving except perseverance ($p=0.110$) (39).

Li, et al. (2019) explored the influence of "nursing case-based learning" of UCS within a simulation course on the critical thinking skills of nursing students at Huzhou University in China. Out of 80 junior-level students, 40 picked the "nursing case-based learning" course and 40 took the normal teaching course. The critical thinking disposition inventory (CTDI-CV) assessed critical thinking at pre-, mid-, and post-tests. Pre-test thinking abilities were similar among the groups ($P>0.05$). Compared to the control group, the experimental group demonstrated significantly improved critical thinking after nine weeks ($P<0.05$). The study concluded that UCSs improved nursing students' critical thinking (31).

Another quasi-experimental study by Ma and Zhou (2022) assessed the nursing students' critical thinking skills in health assessment before and after using UCS simulation learning using the California Critical Thinking Disposition Inventory (CCTDI). The post-test assessment showed a considerable improvement in critical thinking abilities as evidenced by an 8.15 difference in the CCTDI scores ($P<0.001$). The study concluded that the UCS simulation laboratory improved undergraduate nursing students' learning of health assessment critical thinking skills (32).

Carter and Welch (2016) assessed the effectiveness of UCS on the associate degree nursing students' critical thinking skills. In this quasi-experimental study, two groups, intervention (n=40) and traditional control (n=44) groups, were compared in the post-test evaluation. The intervention group received UCSs on renal and musculoskeletal systems, while the control group received the same topics using traditional classroom lectures (15). The study found that the intervention group scored higher in critical thinking compared to the control. Similarly, in a study conducted by Hong and Yu (2017), two different case-based approaches were examined in which multi-episode/ UCS was compared to the single episode case study in a theoretical nursing course. The study found that students in the intervention group demonstrated higher critical thinking skills compared to the control group (2).

Across nine studies of critical thinking/clinical reasoning (skills n=8; dispositions n=1), 7.8 (88%) skills studies showed significant improvement with UCS. Effects clustered in multi-episode or simulation/video implementations with guided pre-briefing/debriefing—notably in studies from China and U.S. adult-health courses, whereas single-exposure designs or those with minimal facilitation yielded smaller or inconsistent changes. Instruments targeting reasoning skills/ dispositions (e.g., CCTDI/CTDI-CV) were more sensitive than instructor-made factual-recall tests. Another study showed direction-consistent improvement, and one single-group study reported a very large effect that warrants cautious interpretation (2, 19, 32).

Unfolding case study and self-efficacy and self-confidence

UCSs serve as a vital bridge connecting theoretical ideas with real-world applications. Numerous disciplines have investigated the effect of UCS on self-efficacy other than nursing such as psychology, business, training of athletes, occupational therapy, elementary schools, and politics (57, 58). The realistic situations that undergo progressive development may be modified to cater to the educational requirements of diverse healthcare students, hence cultivating problem-solving skills and enhancing self-efficacy. It is crucial to study self-efficacy in nursing students as it is an essential characteristic of resilient students and a significant indicator of motivation for education (59). Ma and Zhou (2022) indicated that the nursing students who received the intervention displayed higher levels of self-confidence compared to those in the control group. This study supported the premise that UCS learning is more effective than traditional methods in increasing self-confidence among undergraduate nursing students (32).

Nine studies included in this review handled the relationship between UCS and developing students' self-efficacy. Of these, seven studies

were quantitative (32, 33, 36-38, 47, 60-62), and two were mixed-method studies (42, 43).

Munn, et al. (2021) examined the effects of integrating UCSs using high-fidelity pediatric simulations for a cohort of undergraduate nursing students to assess its impact on knowledge, skills, and self-efficacy, considering a mixed-methods approach. The study revealed a substantial outcome related to the effectiveness of UCS on the students' level of confidence and self-efficacy in the field of pediatric nursing (43). Similarly, Herron, et al. (2019) examined the impact of traditional written UCS and video simulation UCS on nursing students' satisfaction and self-confidence. The study included 165 baccalaureate nursing students. The results revealed no significant differences between both groups about satisfaction ($p=0.32$) and self-confidence ($p=0.95$). The study suggested that utilizing UCSs, whether in written form or through simulated video, yields similar positive benefits in the learning outcomes (33).

In a cross-sectional study, the satisfaction and self-confidence levels of nursing students in a medical-surgical learning curriculum were examined using the UCS learning approach. The results showed a high level of satisfaction ($M=22.02$; $SD=0.29$ out of a possible 25) and self-confidence ($M=34.60$; $SD=0.48$ out of a possible 40) of participating students. Likewise, Mills and co-researchers (2014) carried out a mixed-method study to assess how well UCSs affect the satisfaction of first-year nursing students as they develop their clinical skills. Video recording and subsequent discussion with students' interactions and engagement in role-playing were implemented. The study outcomes indicated positive ratings in all aspects of the student survey. These included satisfaction and self-confidence scores. The interviews revealed that students expressed a desire to participate in simulations more often, as they believed it would boost their self-satisfaction and confidence (42).

Evidence obtained from three experimental studies confirmed that students' self-efficacy levels exhibited improvement subsequent to the repetition of the simulation scenario compared to the initial self-efficacy ratings before engaging in the UCSs exercise. Al-Gharibi, et al. (2021) (36) evaluated the influence of simulation-based UCSs accompanied by debriefing sessions on undergraduate nursing students' self-efficacy in 126 students; Gholami and colleagues (2021) (21) investigated how multi-episode case-based UCSs differ from lecture-based learning in terms of problem-solving skills and learning motivation in 43 third-year nursing students enrolled in the emergency care course; also, Baker and Blakely (2023) (38) involved 20 nurse practitioner (NP) students to assess their self-efficacy in caring for community-dwelling older adults using integrated UCS in the adult-gerontology primary care courses (63). All these studies supported the significant statistical improvements of perceived problem-solving ability and the level of confidence and motivation to learn. As a result, it is suggested that UCS showed positive students' outcomes, including their self-efficacy. This was also found congruent with Bandura's self-efficacy conceptualization by instilling individuals with the drive and perseverance to overcome challenges and boost their confidence (21).

Of the nine studies examining self-efficacy, seven (78%) reported measurable improvement, particularly in simulation-based UCS with repeated sessions and structured debriefings (e.g., studies in the USA, Iran, and Australia). Conversely, written case-based UCS without immersive or interactive components yielded weaker or nonsignificant changes. In contrast, studies using written-only or one-off UCS either found no between-format (43) differences (e.g., written vs video) or reported high self-confidence without pre-post change testing**.** The pattern highlights that realism, repetition, and post-simulation reflection are key factors for building confidence, while limited exposure or passive formats constrain effectiveness.

Discussion

This scoping review indicates that Unfolding Case Study (UCS) pedagogy is generally associated with improvements in nursing students' knowledge, critical thinking, and self-efficacy although effect sizes vary by implementation quality and study design. Because some estimates come from single-group pre-post studies, very large effects (e.g., $d\approx3.64$) are better viewed as descriptive signals than as causal impacts; standardized, comparative studies are needed to estimate the true effects with less bias (39). Synthesizing the pattern across studies, UCS appears most effective when the experiential cycle is completed (immersive encounter → guided sense-making → application), when exposure is repeated, and when outcomes are assessed with instruments sensitive to transfer rather than mere recall (4, 32, 43, 44, 51, 52, 64-66).

For knowledge, UCS fosters active, experiential engagement and integration of theory with practice by situating learning in evolving, realistic scenarios (4, 32, 43, 44, 51, 52, 64-66). Positive results were most consistent when UCSs were delivered via video or high-fidelity

simulation, in multi-episode sequences with guided pre-brief/debrief and active facilitation; null or modest findings were more common with single, text-only cases lacking structured debriefs and were assessed using near-transfer course tests in early-program cohorts (33-35, 39, 45). Learner characteristics and assessment sensitivity further moderated outcomes (66-70). This pattern supports the interpretation that learning gains hinge on adequate repetition, structured debriefing, and alignment between what is taught and what is measured, each aiming at application rather than recall.

For critical thinking/clinical reasoning, UCS implementations that scaffold reflection and evidence appraisal (often using validated instruments such as CCTDI/CTDI-CV) outperformed lecture or single-episode comparators, with the strongest gains in multi-episode or simulation/video formats and guided debriefing (2, 15, 19, 31-33, 39, 46, 55, 56, 71, 72). Mechanistically, the unfolding format elicits diagnostic thinking (progressive cue integration, differential generation, response evaluation), while it debriefs externalize reasoning, surface errors, and consolidate mental models—plausible pathways for the observed improvements.

Self-efficacy findings are in the same line with Bandura's sources of efficacy: repeated mastery opportunities (dose), vicarious learning via peer modeling (collaborative analysis), social persuasion during feedback, and better affect regulation through psychologically safe debriefs (57, 58, 73-76). Predictably, single-session or text-only implementations showed weaker or inconsistent self-efficacy gains, whereas realistic, iterated, and well-facilitated UCS produced more reliable improvements (32, 33, 36, 38, 40, 42, 43, 47, 61, 62).

A concise synthesis of mechanisms clarifies the observed heterogeneity: UCS formats (text, video, simulation) act through active-learning pathways—engagement; action–debrief cycles; collaboration; scaffolding/feedback; retrieval/elaboration; and self-regulation—to enhance knowledge, reasoning, and confidence. Effects are strongest when a "minimum effective package" is present: sufficient dose (multi-episode/repeated exposure), appropriate modality/fidelity, and high-quality facilitation with structured pre-brief/debrief—elements that complete Kolb's experiential cycle and align with Facione's reasoning operations (77, 78). Conversely, reducing dose, lowering modality/fidelity, or omitting debrief—particularly with novice cohorts or insensitive assessments—dampens effects. This synthesis explains divergence in findings without reiterating individual study results.

In sum, the evidence favors UCS when implemented as multi-episode, facilitated, and audiovisually rich experiences aligned with validated outcomes; future work should prioritize robust comparisons, delayed/transfer assessments, and clearer reporting of dose, modality, facilitation, learner level, and instrument validity to strengthen inferences and guide adoption (2, 21, 32-34, 39, 42-46, 55, 56).

Theoritical Integration

The UCS effects observed align with Kolb's experiential learning cycle: progressive patient updates provide concrete experience; guided pre-brief/debrief supports *reflective observation*; synthesis prompts foster abstract conceptualization; and subsequent UCS episodes enable active experimentation (77). Confidence gains track Bandura's four self-efficacy sources—mastery experiences (repeated UCS), vicarious experiences (video/peer modeling), social persuasion (facilitator/peer feedback), and regulation of affective states via psychologically safe debriefs (57). Improvements in reasoning map onto Facione's critical-thinking operations—interpretation, analysis, inference, evaluation, explanation, and self-regulation—scaffolded by the unfolding structure and reflective prompts (78). Accordingly, positive results cluster when UCS is multi-episode, facilitated, and simulation/video-based, whereas null findings are expected when the Kolb cycle is truncated, efficacy sources are limited, or assessments emphasize near-term.

Limitations

The applicability of these findings may be greater for undergraduate nursing students than for learners in other health disciplines (e.g., medicine, pharmacy, physiotherapy); replication in diverse cohorts is needed. Authentic cross-disciplinary UCS materials remain scarce and resource-intensive to develop, limiting interprofessional use. Methodologically, we did not conduct a meta-analysis due to substantial heterogeneity in study designs, comparators, and outcome measures; thus, a narrative synthesis was used. We could not formally assess publication bias or small-study effects. Many included studies were single-site with small samples and short follow-up, and outcome instruments varied widely, limiting cross-study comparability. Searches were restricted to English-language sources, which may introduce language bias.

Implications

Educational implications

When implemented as multi-episode

sequences with guided pre-/debrief and aligned assessment, unfolding case studies (UCSs) can strengthen nursing students' knowledge, critical thinking/clinical reasoning, and confidence. UCSs operationalize active learning by connecting theory to evolving clinical contexts, prompting reflection, synthesis, and application. In courses with limited resources, text-based UCSs can still be effective when paired with strong facilitation, small-group discussion, and structured reflective prompts. Assessment should prioritize validated reasoning measures and include delayed testing to capture transfer beyond short-term recall.

Policy/administrative implications

Programs should resource UCS design and delivery by allocating protected time for case authoring, facilitator training (especially in debriefing), and access to simulation/video infrastructure where feasible. UCSs should be mapped longitudinally across the curriculum, calibrated to learner level, and supported by quality criteria (e.g., number of episodes, debrief adequacy, student-to-facilitator ratios). Workload recognition for UCS preparation and facilitation, equitable access for students, and routine outcomes tracking (knowledge, reasoning, self-efficacy) will enable continuous improvement.

Research implications

We ranked priorities by impact on teaching, size of the evidence gap, and feasibility for multi-site work. Accordingly, we recommend: 1) comparing multi-episode, facilitated UCS with single-episode/text-only to identify gains in reasoning and knowledge; 2) using shared validated measures plus a delayed assessment (e.g., OSCE/transfer); 3) defining the minimum effective UCS package and reporting basic costs; and 4) adapting UCS for low-resource/multilingual settings with subgroup reporting.

Conclusion

Synthesizing across studies, unfolding case studies (UCS) can function as a transformative learning tool—particularly when delivered as multi-episode sequences with guided pre-/debrief and aligned assessments—by bridging theory and evolving clinical complexity, strengthening knowledge, clinical reasoning, and learner confidence. To move from promising results to programmatic impact, future work should adopt valid, standardized measures of knowledge and clinical reasoning (with delayed assessments for transfer), and explicitly map UCS outputs to competency-based education goals (e.g., clinical judgment, teamwork, communication) to demonstrate contribution to graduate capability profiles.

Recommendation

- **Longitudinal evidence:** Use cohort or stepped-wedge designs with follow-up to test durability, transfer to clinical performance, and readiness for practice.
- **Standardized assessment:** Employ validated instruments and shared rubrics for reasoning/CT and self-efficacy; integrate results into programmatic assessment and competency mapping (e.g., EPAs).
- **Economic evaluation:** Conduct cost-benefit/cost-utility analyses comparing UCS formats (text, video, simulation) with other pedagogies to inform scale-up decisions.
- **Interprofessional education (IPE):** Develop and share reusable UCS scenario libraries adapted for IPE, with common data elements to facilitate replication and benchmarking.
- **Implementation reporting:** Consistently report dose (number of episodes), modality, fidelity, facilitation quality, and learner level to explain heterogeneity and guide adoption in varied contexts, including resource-limited settings.

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Authors' Contribution

Dr. Al-Kalaldeh, Miss. Kassabry, and Dr. Ayed equally contributed to the conception and design of the research; Dr. Al-Kalaldeh, Miss. Kassabry contributed to the design of the research; Dr. Al-Kalaldeh, Miss. Kassabry, and Dr. Ayed contributed to the acquisition and analysis of the data; Dr. Al-Kalaldeh, Miss. Kassabry, Dr. Ayed, and Dr. Abu-Shosha contributed to the interpretation of the data; and Dr. Al-Kalaldeh, Miss. Kassabry, Dr. Ayed, and Dr. Abu-Shosha drafted the manuscript. All authors critically revised the manuscript, agree to be fully accountable for ensuring the integrity and accuracy of the work, and read and approved the final manuscript. All authors are in agreement with the manuscript and declare that the content has not been published elsewhere.

Conflict of interest

The authors declare no conflicts of interest.

Declaration on the use of AI

The authors declare that no AI tools were used in the preparation of this manuscript.

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