



Enhancing nursing students' preoperative care competence and problem-solving skills through video-assisted case-based learning

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ABSTRACT

Background: Competent nursing care provided the preoperative period is crucial for ensuring patient safety, improving surgical outcomes, and preventing potential complications. Traditional teaching methods in nursing programs may be insufficient for developing this competence. This study aimed to evaluate the effect of video-assisted CBL on nursing students' perceived preoperative care competence and problem-solving skills.

Methods: A quasi-experimental, two-group, pretest–posttest design was used in this study. Seventy-seven nursing students were assigned either to the CBL group ($n = 38$) or to the lecture-based learning (LBL) group ($n = 39$). Outcomes pertaining to perceived preoperative nursing care competence and problem-solving ability were assessed in both groups using the Perceived Preoperative Nursing Care Competence Scale for Nursing Students (PPreCCNS) and the Problem Solving Inventory (PSI).

Results: In the CBL group, the post-intervention total and subscale scores of the PPreCCNS showed significant improvements compared with baseline. The CBL group demonstrated higher mean scores than the LBL group on all PPreCCNS sub-dimensions except for the communication. Regarding the PSI, no significant change in the total score was observed in the CBL group when compared with either the pre-intervention assessment or the LBL group; however, significant difference emerged only in the approach–avoidance style subscale.

Conclusions: To enhance students' perceived competence in preoperative nursing care, active learning approaches such as CBL may be integrated into undergraduate nursing curricula. Further studies are needed to examine the effectiveness of longer-term CBL using diverse scenarios, as well as other active learning strategies, to better support the development of problem-solving skills.

1. Introduction

The preoperative period, which begins when the surgical decision is made and ends with the patient's transfer to the operating room, encompasses nursing activities such as patient assessment, identification of potential or existing health problems, planning individualized care based on patient needs, and providing preoperative education.¹ Preoperative nursing care plays a critical role in ensuring patient safety, reducing anxiety, and promoting postoperative recovery.² Due to the highly technical, complex, and fast-paced nature of preoperative healthcare settings, nurses working in these environments must possess specialized theoretical knowledge, advanced clinical skills, and a high

level of professional competence.³ Although undergraduate nursing education aims to prepare students to work in various clinical settings, preoperative nursing care is often taught using traditional instructional methods, in which students acquire knowledge passively. To ensure that students attain the level required to fulfill the roles and responsibilities of a preoperative nurse, active learning methods that strengthen their knowledge and facilitate the transfer of theoretical understanding into clinical skills should be employed.⁴

Problem-based learning (PBL), case-based learning, role-playing, and simulation are among the active learning methods utilized in nursing education.⁵ CBL represents a constructivist learning paradigm in which students select and transform information, organize ideas, and

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make decisions based on their existing or prior knowledge.⁶ In CBL, students are presented with a structured clinical scenario containing biopsychosocial data aligned with specific learning objectives. They assume a decision-making role, analyze and reflect on the case, and discuss their findings with peers under the guidance of a facilitator.^{7,8} Focusing on a real patient or clinical scenario through CBL enables students to understand, retain, and apply knowledge, while also bridging the gap between theory and practice, thereby facilitating the development of relevant clinical skills.⁹

Studies have shown that CBL increases students' confidence in clinical decision-making and reduces their anxiety,¹⁰ improves their knowledge level and nursing care planning skills,¹¹ enhances their self-directed learning abilities,¹² and boosts their learning motivation and engagement with courses.^{13,14} Implementing CBL across different subjects or courses is also effective in enhancing nursing students' problem-solving skills.^{6,15,16} Although there are relatively few studies in the literature that directly examine the relationship between CBL and students' competence levels,¹⁷ since the concept of competence encompasses knowledge, understanding, judgment, cognitive, psychomotor, and interpersonal skills, as well as personal qualities and attitudes,¹⁸ studies specifically focusing on these domains have demonstrated its effectiveness.^{5,12,19}

The preoperative period represents one of the most critical stages of the surgical process, and the quality of nursing care provided during this time is directly associated with patient outcomes. As newly graduated perioperative nurses are expected to be competent in their duties, function effectively as integral members of the team without requiring continuous guidance, students should be trained to become professional nurses capable of delivering preoperative care effectively.²⁰ In this context, active learning methods such as CBL should be employed to integrate theoretical knowledge of preoperative care with practice by using clinical case-based scenarios and providing students with opportunities to experience various clinical situations. Empowering nursing students in preoperative care will contribute to enhancing their capacities for clinical decision-making, care planning, and anticipating potential complications. The literature indicates that nursing students generally possess adequate preoperative care knowledge, that the clinical learning environment is associated with students' clinical competencies, and that simulation-based education positively influences perioperative knowledge, self-efficacy, and clinical decision-making.^{21–23} However, no study has specifically evaluated preoperative care while examining the effects of CBL, which can be implemented in classroom settings without requiring high-technology resources.

Therefore, this study aimed to evaluate the effect of video-assisted CBL on nursing students' perceived preoperative care competence and problem-solving skills. It was hypothesized that video-assisted CBL would (1) improve nursing students' perceived preoperative care competence and (2) enhance their problem-solving skills compared to traditional LBL.

2. Method

2.1. Study design

This study employed a quasi-experimental, two-group, pretest–posttest design, including within-group comparisons. The manuscript was drafted in accordance with the SQUIRE 2.0 (Standards for Quality Improvement Reporting Excellence) reporting guideline.²⁴

2.2. Setting and participants

This study was conducted in 2024 spring semester at the Nursing Department of a university located in Istanbul. The university has a 4-year nursing program with 50–60 students in each academic year. Students take foundational medical science courses such as anatomy,

physiology, and microbiology during the first semester, and from the second semester onward through graduation, they complete all major nursing courses, beginning with the fundamentals of nursing. The final semester of the fourth year is conducted as an internship. Nursing courses are predominantly delivered face-to-face through traditional lecture-based methods, with laboratory components held at the university and clinical practice carried out in hospital settings. In Türkiye, the undergraduate nursing curriculum offers medical–surgical nursing as two separate courses: internal medicine nursing and surgical nursing. At the university where the study was conducted, the topic of preoperative care is taught as part of the surgical nursing course in the spring semester of the second year, within a 1-hour session.

Being a junior or senior nursing student and volunteering to participate in the study were the inclusion criteria. The exclusion criteria were students who failed the surgical nursing course. There were 37 junior students and 60 senior students. The sample size was calculated using the sample size calculator Raosoft (2004).²⁵ The significance level was ($\alpha = 0.05$), the large effect size ($d = 0.80$) and power were 80 %. The power calculation indicated that the required sample size was 78 students (39 per group). Students were randomly assigned to either the CBL or the LBL group using a computer-generated random number list. One student from the CBL group was excluded due to incomplete data. The analyses were done with 38 students in the CBL group and 39 students in the LBL group (Fig. 1).

2.3. Intervention

2.3.1. Development of CBL

First, a case scenario on preoperative nursing care was developed based on a literature review conducted by the researchers; subsequently, the case was video-recorded, and finally, an instructional guide was prepared.

Stage 1 – Development and scripting of the case: A total knee arthroplasty case was selected because it encompasses various aspects of preoperative care. In writing the case, the physical, psychological, legal, and patient-education components of the preoperative care process—from the decision for surgery to the transfer of the patient to the operating room—were addressed.

Common clinical problems and errors related to the patient, nurse, surgical team members, and hospital system were also integrated into the case. Evidence-based practices, including preoperative fasting and measures for preventing surgical site infections, as well as skill checklists for preoperative patient education, were utilized. The case and the developed scenario were sent to five field experts for review, and their recommendations regarding clinical accuracy and appropriateness were obtained. The experts suggested incorporating a situation in which the patient's relative asks the nurse an additional question, assigning an extra role to the student nurse before the patient's transfer to the operating room, and including a commonly missed step during patient handover. The case was finalized in accordance with these recommendations.

Stage 2 – Video production of the case: The case was recorded on video to allow students to better visualize the procedures/skill steps and emotional expressions involved. The video, which included the roles of the patient, patient's relative, clinical nurse, student nurse, surgeon, and operating room nurse, was filmed in the university's simulation laboratory. Each role was performed by a different student nurse. Learning objectives and discussion questions related to the case were added to the video, and voice-over edits were made. The total duration of the video was 30 min.

Stage 3 – Development of the instructional guide: It was prepared by a researcher with expertise in the field who had prior experience using the CBL method. The guide provided to the CBL group included

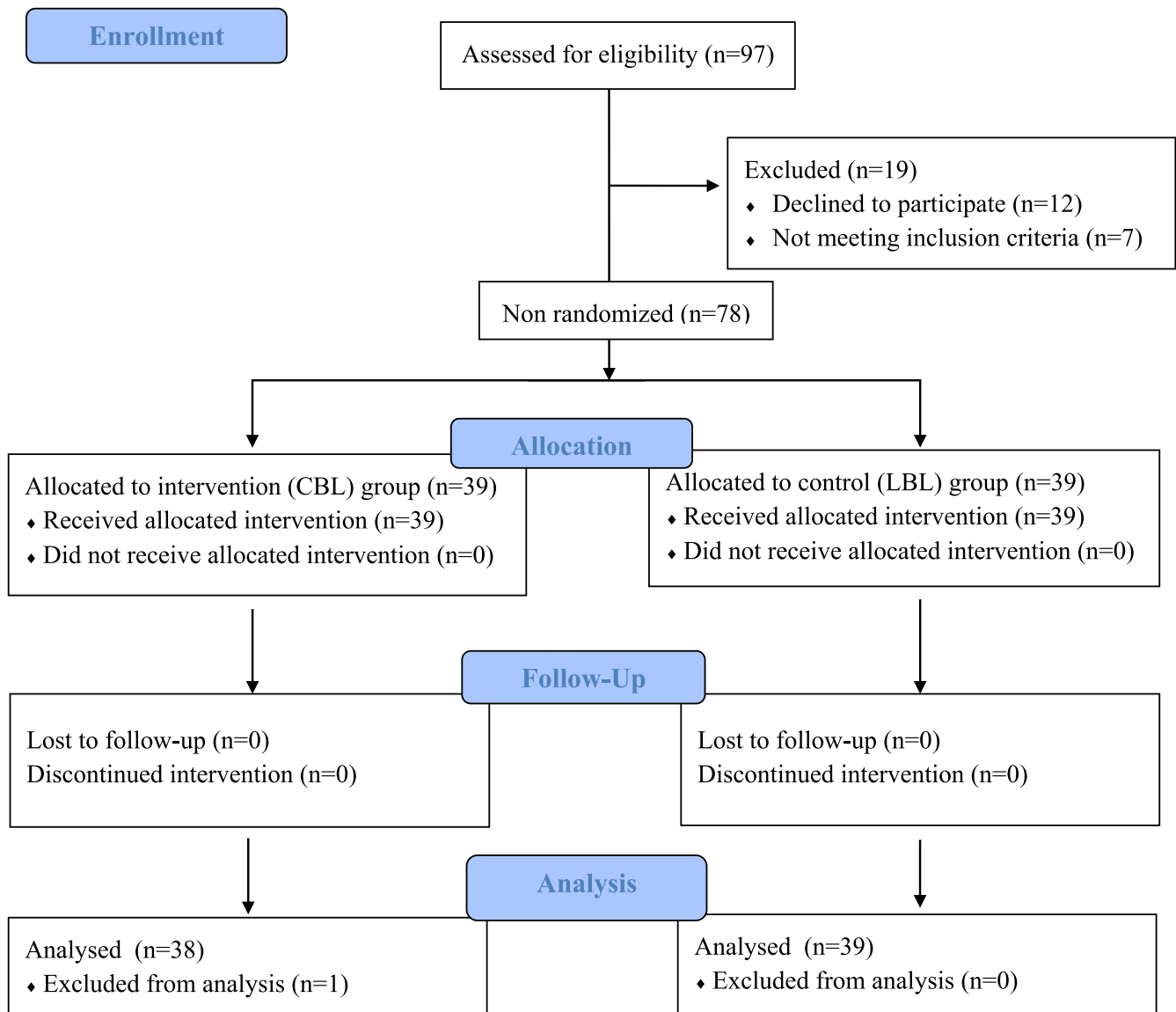


Fig. 1. Flow chart showing enrollment of students.

learning objectives, expected outcomes, the case scenario, and references related to the topic. It was shared with students one week prior to the case sessions. Additionally, the facilitator's guide contained questions to be used during case discussions, such as: 'What is the problem in this scenario?', 'What would you do as a nurse in the next step?', 'What data would you collect from the patient at this stage?', 'What did the nurse omit in the scenario?', and 'Based on these data, which nursing diagnoses did you formulate?'

2.3.2. Application of CBL

Students in the CBL group were divided into four groups of 9–10 participants each. The case was implemented in a classroom setting facilitated by a researcher in two sessions on the same day: the first session covered the decision for surgery and the day before surgery, while the second session addressed the morning of surgery and the patient's transfer to the operating room. The students were briefed on how the case sessions would be conducted and the associated rules, after which the video was played. At points in the video where embedded questions appeared, playback was paused, and the group collaboratively sought answers under the facilitator's guidance. Differences between theoretical knowledge and clinical practice (e.g., preoperative fasting,

informed consent process) were discussed. At the end of each session, the facilitator provided a summary. Each session lasted 45 min, resulting in a total educational time of 90 min.

2.3.3. LBL for control group

For the control group, the topic of preoperative nursing care was delivered face-to-face in a classroom setting by the researcher who serves as the instructor for the surgical nursing course. A PowerPoint presentation was used. The physical, psychological, and legal aspects of the preoperative care process were explained theoretically, and clinical examples were provided. During patient education, the instructor demonstrated preoperative breathing and leg exercises. At the end of the session, students' questions were answered. The duration of the instruction was 60 min.

2.4. Study outcomes

The primary outcomes of the study were nursing students' perceived preoperative care competence and problem-solving skills, measured using validated self-report scales. The main exposure was participation in video-assisted CBL, while traditional LBL constituted the comparison

condition. Based on the literature, academic level (junior/senior), age, high school attended, and prior clinical experience were considered potential confounders, as these variables may influence students' perceived competence and problem-solving skills independently of the educational intervention. Academic level was also considered a potential effect modifier; however, effect modification was not formally tested due to the limited sample size. To address potential confounding, participants were randomly assigned to the CBL and LBL groups. Following randomization, baseline characteristics were compared between groups, and no statistically significant differences were observed. Therefore, no additional statistical adjustment was performed.

2.5. Data collection tools

Data were collected using a demographic questionnaire, which included questions on students' age, gender, overall grade point average, high school attended, and prior experience observing or providing preoperative care, as well as the Perceived Preoperative Nursing Care Competence Scale for Nursing Students (PPreCCNS) and the Problem Solving Inventory (PSI).

After obtaining informed consent from all students participating in the study, they were asked to complete the demographic questionnaire. Students in the CBL group completed the PPreCCNS and PSI twice, once before (pre-test) and once after (post-test) the case sessions, whereas students in the LBL group completed these instruments only once as a post-test. A pre-test was not administered to the LBL group because the session consisted solely of a review of the same material presented to the CBL group in the surgical nursing course. The post-tests for the CBL group were conducted four weeks after the completion of the case sessions.

Perceived Preoperative Nursing Care Competence Scale for Nursing Students: The scale was developed by Şimşek et al.¹⁸ and its validity was established with nursing students in Türkiye. The scale comprises 22 items grouped into five sub-dimensions: ability to fulfil legal responsibilities and adherence to ethical principles (5 items), evaluation and follow-up of the patient (5 items), preoperative patient preparation (4 items), communication (4 items), and research and professional development (4 items). Responses to each item are rated on a 5-point Likert scale (1=strongly agree, to 5=strongly disagree), with a maximum possible score of 110 and a minimum score of 22. Higher scores on the scale indicate greater perceived competence of nursing students in providing preoperative nursing care. The original scale demonstrated a Cronbach's alpha of 0.94. In the current study, the Cronbach's alpha of the scale was 0.94.

Problem Solving Inventory: The scale, developed by Heppner and Petersen in 1982,²⁶ was adapted into Turkish by Şahin et al. (1993).²⁷ It is a 35-item, 6-point Likert-type scale comprising three factors. The first of these factors is problem-solving confidence (11 items), the second one is approach-avoidance style (16 items), and the third one is personal control (15 items). In scoring the scale, three items (9, 22, and 29) are not rated, resulting in a possible total score range of 32 to 192. Lower total scores indicate that an individual perceives themselves as more competent in problem-solving skills. The Cronbach alpha of the developed scale was 0.88 and the Cronbach's alpha for this study was 0.80.

2.6. Ethical considerations

The institutional permission (E-72,357,089–299–134,936) and ethical approval (Decision no: 2024/31) was obtained from the institution where the study was conducted before the study. Written and verbal consent was obtained from all students.

2.7. Data analysis

Collected data were processed and analyzed with the SPSS (Statistical Package for the Social Sciences) version 26 (IBM Corp., Armonk,

NY, USA). The Mann-Whitney U test, the Fisher-Freeman-Halton Exact test and Fisher's Exact Chi-Square Test were used for comparison between groups. To verify the efficacy of the intervention in CBL group, the Wilcoxon signed-rank test and paired sample t-test were applied. A Mann-Whitney U test and the independent-sample t-test were run to determine if there were differences in preoperative nursing care competency and problem-solving ability scores between the CBL and LBL groups. No sensitivity analyses were conducted, as baseline equivalence between groups was achieved through randomization, and all participants completed the study protocol without missing data. The significance level for all statistical measures was set at $p < 0.05$.

3. Results

Characteristics of the 77 students are shown in Table 1. The average age was 21.8 years and most students were female (89.6 %). Among the students, 72.7 % were seniors, and the most common clinical placement for students was the operating room, accounting for 51.6 % of internships. Nearly all students (96.1 %) had observed preoperative care, and 70 % had provided preoperative care; however, 76.8 % of those who provided care did not perceive themselves as competent. Baseline characteristics considered as potential confounding variables, including age, academic level, and prior clinical experience, were compared

Table 1
Characteristics and homogeneity of the students (N = 77).

Characteristics	Total (n = 77)	CBL group (n = 38)	LBL group (n = 39)	p
	Mean ±SD	Mean±SD	Mean ±SD	
Age (years)	21.78 ±0.837	21.87 ±0.906	21.69 ±0.766	0.592 ^a
Last academic year GPA	3.005 ±0.349	2.99±0.390	3.01 ±0.310	0.881 ^a
Gender		n (%)	n (%)	
Female	69 (89.6)	34 (89.5)	35 (89.7)	1.000 ^b
Male	8 (10.4)	4 (10.5)	4 (10.3)	
Last graduated school				
Anatolian high school	63 (81.8)	29 (76.3)	34 (87.2)	0.250 ^b
Vocational high school of health	6 (7.8)	4 (10.5)	2 (5.1)	
Other	8 (10.4)	5 (13.2)	3 (7.7)	
Academic level				
Junior	21 (27.3)	12 (14.1)	9 (10.5)	0.409 ^b
Senior	56 (72.7)	26 (30.6)	30 (34.9)	
Internship clinics*				
Operating room	64 (51.6)	32 (37.6)	32 (37.2)	1.000 ^c
General surgery	39 (31.5)	18 (21.2)	21 (24.4)	0.651 ^c
Orthopedics	35 (28.2)	17 (20)	18 (20.9)	1.000 ^c
Thoracic surgery	31 (25)	17 (20)	14 (16.3)	0.490 ^c
Urology	30 (24.2)	15 (17.6)	15 (17.4)	1.000 ^c
Plastic surgery	24 (19.4)	13 (15.3)	11 (12.8)	0.628 ^c
Neurosurgery	25 (20.2)	12 (14.1)	13 (15.1)	1.000 ^c
Observation of preoperative care in internship				
Yes	74 (96.1)	36 (94.7)	38 (97.4)	0.615 ^b
No	3 (3.9)	2 (5.3)	1 (2.6)	
Providing preoperative care				
Yes	54 (70.1)	26 (68.4)	28 (71.8)	0.807 ^b
No	23 (29.9)	12 (31.6)	11 (28.2)	
Perceived self-efficacy in preoperative care				
Yes	13 (23.2)	3 (7.9)	8 (20.5)	0.209 ^b
No	43 (76.8)	23 (60.5)	20 (51.3)	

SD: Standard deviation.

* indicates that more than one option was picked, $p > 0.05$.

^a : Mann-Whitney U test,.

^b : Fisher's exact test.

^c : Fisher-Freeman-Halton test.

between the groups. The CBL and LBL groups were confirmed to be homogeneously distributed in terms of demographic characteristics and experiences observing and providing preoperative care with no statistically significant differences between groups (Table 1).

The mean total PPreCCNS score of students in the CBL group before the case sessions was 95.45 ± 9.99 , and the mean total PSI score was 82.58 ± 20.67 . After the case sessions, statistically significant improvements were observed in the total PPreCCNS score and all of its sub-dimensions. In the PSI, a significant change was found only in the approach-avoidance style subscale ($p < 0.05$) (Table 2).

After the case sessions, the mean total PPreCCNS score in the CBL group was 104.18 ± 5.36 , whereas in the LBL group it was 97.36 ± 11.31 . Compared to the LBL group, the CBL group demonstrated statistically significant differences in the total PPreCCNS score ($t = -6.671$, $p < 0.001$) and in all sub-dimensions except for the communication sub-dimension. PSI scores were 76.97 ± 20.84 in the CBL group and 87.00 ± 25.95 in the LBL group. A significant difference between the CBL and LBL groups was observed only in the approach-avoidance style subscale of the PSI ($t = -2.087$, $p < 0.05$) (Table 3).

4. Discussion

Perioperative nurses must be competent in their roles, responsibilities, and functions including both technical and non-technical skills, to ensure patient safety and achieve optimal standards of care. This necessitates providing a learning environment that prepares nursing students for acute clinical situations and multidisciplinary teamwork.²⁸ The literature includes few studies examining the effectiveness of different pedagogical approaches in enhancing nursing students' perioperative care knowledge and competencies.^{21,22} In the present study, video-assisted CBL was found to be more effective than LBL in improving nursing students' perceived competence in preoperative care and in the approach-avoidance style dimension of problem-solving skills.

In the study, students' perceived competence in preoperative nursing care increased from a total score of 95.45 ± 9.99 before the CBL sessions to 104.18 ± 5.36 after the sessions, with this improvement being statistically significant in the total score as well as across all sub-dimensions. No experimental studies on this specific topic were found. In a descriptive study reported in the literature, the perceived preoperative competence of nursing and midwifery students was 99.09 ± 10.81 ,²⁹ which is higher than the baseline score observed in our study. The total score of 93.38 ± 14.25 reported in another study conducted in Türkiye was lower than the result of the present study.³⁰ This difference may be attributable to the researcher including a mixed student group

Table 3

Comparison of the mean PPreCCNS and PSI scores between two groups.

Scales	CBL group (n = 38) Mean ±SD	LBL group (n = 39) Mean ±SD	t	p
PPreCCNS				
Ability to fulfil legal responsibilities and adherence to ethical principles	24.34 ±1.32	23.10 ±2.76	-2.479 ^a	0.013 *
Evaluation and follow-up of the patient	22.76 ±2.25	20.82 ±3.83	-2.043 ^a	0.041 *
Preoperative patient preparation	19.39 ±1.12	18.23 ±2.12	-2.631 ^a	0.009 *
Communication	19.18 ±1.15	18.13 ±2.21	-1.629 ^a	0.103
Research and professional development	18.50 ±1.73	17.08 ±2.46	-2.601 ^a	0.009 *
Total	104.18 ±5.36	97.36 ±11.31	-2.428 ^a	0.015 *
PSI				
Problem-solving confidence	26.34 ±10.09	29.03 ±12.73	-1.023 ^b	0.310
Approach-avoidance style	35.68 ±11.02	41.21 ±12.15	-2.087 ^b	0.040 *
Personal control	14.95 ±3.47	17.10 ±10.50	-1.202 ^b	0.233
Total	76.97 ±20.84	87.00 ±25.95	-1.928 ^b	0.058

PPreCCNS: Perceived Preoperative Nursing Care Competence Scale for Nursing Students, PSI: Problem Solving Inventory, SD: Standard deviation.

* $p < 0.05$.

^a : Mann-Whitney U test.

^b : The independent-sample *t*-test.

from the second to fourth year in the sample. In both of the aforementioned studies, the highest mean scores were observed in the 'ability to fulfil legal responsibilities and adherence to ethical principles' sub-dimension, while the lowest mean scores were in the 'research and professional development' sub-dimension, which supports the findings of the current study. The consistently low scores in the 'research and professional development' sub-dimension suggest that students perceive themselves as less competent in research-based thinking in preoperative care, adopting evidence-based practices, and participating in continuous professional development compared to other areas. This indicates that this domain should be reinforced through active learning methods.

This study demonstrated that CBL was more effective than LBL in enhancing students' perceived competence in preoperative care.

Table 2

The pre- and post- intervention PPreCCNS and PSI scores of the CBL group (n = 38).

Scales	Before	Difference	CI 95 %		t	p
	Mean±SD	Mean±SD	Lower	Upper		
PPreCCNS						
Ability to fulfil legal responsibilities and adherence to ethical principles	23.47±1.83	−0.86±1.63	−1.404	−0.332	−3.284 ^a	0.002 [*]
Evaluation and follow-up of the patient	19.92±3.42	−2.84±3.85	−4.108	−1.575	−4.548 ^a	<0.001 ^{**}
Preoperative patient preparation	18.18±2.04	−1.21±1.74	−1.783	−0.637	−4.283 ^a	<0.001 ^{**}
Communication	17.42±2.79	−1.76±2.54	−2.598	−0.928	−4.278 ^a	<0.001 ^{**}
Research and professional development	16.45±3.03	−2.05±3.23	−3.116	−0.988	−3.908 ^a	<0.001 ^{**}
Total	95.45±9.99	−8.73±8.07	−5.934	−2.690	−6.671 ^a	<0.001 ^{**}
PSI						
Problem-solving confidence	28.32±8.94	1.97±9.98	−1.309	5.257	1.218 ^b	0.150
Approach-avoidance style	39.08±10.77	3.39±12.15	−0.599	7.389	1.722 ^b	0.047 [*]
Personal control	15.18±3.95	0.23±4.05	−1.094	1.568	0.360 ^b	0.829
Total	82.58±20.67	5.60±21.36	−1.416	12.626	1.618 ^b	0.062

PPreCCNS: Perceived Preoperative Nursing Care Competence Scale for Nursing Students, PSI: Problem Solving Inventory, SD: Standard deviation.

* $p < 0.05$.

** $p < 0.001$.

^a : Paired sample *t*-test.

^b : Wilcoxon signed-rank test.

Although no directly comparable study exists in preoperative care, the findings of Wang et al.,³¹ showing that CBL in pediatric surgery improved students' professional skills and work competence in both the short and long term, are consistent with the results of the present study. Other studies have also reported that the CBL method positively influences students' clinical reasoning and competence regarding patient safety¹⁷ and clinical decision-making and professional competence in public health nursing.³² In a study by Aydın, CBL was implemented in the surgical nursing course, resulting in significantly higher care behaviors and self-efficacy in the CBL group compared to the control group.³³ These findings indicate that integrating theoretical knowledge with real clinical scenarios enhances students' ability to translate knowledge into practice and suggest that CBL can be employed as a learning strategy to improve students' competence in preoperative nursing care.

The impact of problem-based learning (PBL), which -like CBL- focuses on specific situations/problems and real-life scenarios, on nursing students' competence has also been examined in previous studies. Ma et al. found that PBL in surgical nursing improved students' core competencies, satisfaction, and self-confidence.³⁴ Additionally, a systematic review and meta-analysis reported that PBL was more effective than LBL in enhancing students' clinical competence in surgical education.³⁵ Based on these findings, it can be argued that, unlike the passive learning experience in LBL, methods such as CBL and PBL promote active student engagement and deep learning, thereby strengthening students' perceived professional competence in surgical care. A recent systematic review and meta-analysis examining randomized controlled trials reported that active learning strategies, particularly simulation, support the development of competence in nursing students.³⁶ However, in contrast, Kulakaç et al. found no significant effect of simulation on nursing students' competence in the perioperative process.²²

In this study, CBL did not have a significant effect on students' overall problem-solving ability in preoperative nursing care; however, improvements were observed in the approach-avoidance style subscale both compared to the pre-test scores and to the LBL group. This subscale reflects the student's tendency to actively seek solutions when faced with a problem. The positive change in this subscale through CBL is considered important, as it suggests that nursing students may approach clinical problems encountered in the preoperative period more proactively and solution-oriented. Similarly, Rezaee et al. found that CBL in a nutrition course led to improvements across all subscales, including the approach-avoidance style.³⁷

Although no studies specifically on preoperative care are available for comparison, findings from numerous studies in the literature indicate that CBL is an effective method for improving nursing students' overall problem-solving skills, which differs from the results of the present study.^{6,15,38} Yoo and Park reported that, compared to traditional education, CBL significantly improved problem-solving skills in nursing students.⁶ Although subscale mean scores were not provided, the total scores before and after CBL in their study were substantially higher than those observed in the current study. While no significant change was detected in the total score in the present study, it can be inferred that students' problem-solving skills in preoperative care were at an acceptable level. Similarly, in a study comparing PBL and LBL, assessed using a different scale, no significant change in students' problem-solving ability was observed, consistent with the current findings.³⁹ This lack of change may be explained, as the authors of the aforementioned study noted, by the relatively short duration of the CBL intervention.

5. Limitations

To our knowledge, this study is the first of its kind in the literature; however, several limitations should be acknowledged. The generalizability of the findings is limited due to the single-institution design and inclusion of only junior and senior students. Outcomes were assessed

using self-report instruments, which may have introduced response bias, as perceived competence may not fully reflect actual clinical performance. Although random assignment was used and standardized instructional materials were delivered by the same instructor, performance bias cannot be entirely excluded, as blinding was not feasible and students in the intervention group may have been more motivated by exposure to a novel teaching method. In addition, post-test assessments were conducted shortly after the intervention, precluding evaluation of long-term effects. Future research should include larger and more diverse samples, incorporate objective assessment methods such as simulation or OSCE, and employ longitudinal designs to assess the sustainability of learning outcomes.

6. Conclusion

This study demonstrated that video-assisted CBL is a useful and effective educational approach for enhancing nursing students' perceived competence in preoperative care, although it did not lead to a significant improvement in overall problem-solving skills. Given its effectiveness and feasibility, video-assisted CBL can be sustainably integrated into undergraduate nursing curricula using existing educational resources. The approach also has strong potential for implementation in other nursing programs and educational contexts. Incorporating video-assisted CBL more widely and systematically into preoperative care education may contribute to improved professional readiness among nursing students. To further strengthen problem-solving skills, future educational initiatives and research should explore longer-duration CBL interventions that include a wider range of clinical scenarios and are integrated with simulation-based learning activities.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication

Not applicable.

Ethics approval

This study was conducted in full compliance with the ethical principles set out in the Code of Ethics of the World Medical Association (Declaration of Helsinki) for research on human subjects. The research protocol was reviewed and approved by the Bezmialem University Non-invasive Clinical Researches Ethics Board on 02 February 2024 with reference number 2024-31.

Provenance and peer review

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CRediT authorship contribution statement

Betül Güven: Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **Beyza Şahin:** Writing – review & editing, Methodology, Investigation, Data curation, Conceptualization. **Melike Karapınar:** Writing – review & editing, Methodology, Investigation, Data curation. **Merve Baş:** Writing – review & editing, Methodology, Data curation, Conceptualization. **Özlem Gürkan:** Writing – review & editing, Methodology, Investigation, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- Berman A, Snyder S, Frandsen G. *Perioperative nursing. Koziar's & Erb's Fundamentals of Nursing, Concepts, Process, and Practice*. 11th ed. Singapore: Pearson; 2022: 957–960.
- Turunen E, Miettinen M, Setälä L, Vehviläinen-Julkunen K. An integrative review of a preoperative nursing care structure. *J Clin Nurs*. 2017;26(7–8):915–930. <https://doi.org/10.1111/jocn.13448>.
- Arakelian E, Swenne CL, Lindberg S, Rudolfsen G, von Vogelsang AC. The meaning of person-centred care in the perioperative nursing context from the patient's perspective -an integrative review. *J Clin Nurs*. 2017;26(17–18):2527–2544. <https://doi.org/10.1111/jocn.13639>.
- Kalu F, Wolsey C, Enghiad P. Undergraduate nursing students' perceptions of active learning strategies: a focus group study. *Nurse Educ Today*. 2023;131, 105986. <https://doi.org/10.1016/j.nedt.2023.105986>.
- Raurell-Torredà M, Olivet-Pujol J, Romero-Collado À, MC Malagon-Aguilera, Patiño-Masó J, Baltasar-Bagué A. Case-based learning and simulation: useful tools to enhance nurses' education? Nonrandomized controlled trial. *J Nurs Sch*. 2015;47(1): 34–42. <https://doi.org/10.1111/jnu.12113>.
- Yoo MS, Park HR. Effects of case-based learning on communication skills, problem-solving ability, and learning motivation in nursing students. *Nurs Health Sci*. 2015;17(2):166–172. <https://doi.org/10.1111/nhs.12151>.
- Kantar LD, Massouh A. Case-based learning: what traditional curricula fail to teach. *Nurse Educ Today*. 2015;35(8):e8–14. <https://doi.org/10.1016/j.nedt.2015.03.010>.
- Thistlethwaite JE, Davies D, Ekeocha S, Kidd JM, MacDougall C, Matthews P, Purkis J, Clay D. The effectiveness of case-based learning in health professional education. A BEME systematic review: BEME Guide No. 23. *Med Teach*. 2012;34(6): e421–e444. <https://doi.org/10.3109/0142159X.2012.680939>.
- Li S, Ye X, Chen W. Practice and effectiveness of "nursing case-based learning" course on nursing student's critical thinking ability: a comparative study. *Nurse Educ Pr*. 2019;36:91–96. <https://doi.org/10.1016/j.nepr.2019.03.007>.
- Demir Acar M, Çevik Güner Ü, Vural B. The effect of case-based learning methods on self-confidence and anxiety of pediatric nursing students in clinical decision making process. *CBU-SBED*. 2022;9(4):501–508. <https://doi.org/10.34087/cbusbed.1052241>.
- Boonkong D, Junsevg K, Sangsaikaew A, Utaisan A. The effects of case study-based learning on nursing care plan ability in nursing process of nursing students. *Malays J Med Health Sci*. 2022;18(2):71–75.
- Liu L, Li M, Zheng Q, Jiang H. The effects of case-based teaching in nursing skill education: cases do matter. *Inquiry*. 2020;57, 46958020964421. <https://doi.org/10.1177/0046958020964421>.
- Burucu R, Arslan S. Nursing students' views and suggestions about case-based learning integrated into the nursing process: a qualitative study. *Florence Nightingale J Nurs*. 2021;29(3):371–378. <https://doi.org/10.5152/FNJJN.2021.20180>.
- Shohani M, Bastami M, Gheshlaghi LA, Nasrollahi A. Nursing student's satisfaction with two methods of CBL and lecture-based learning. *BMC Med Educ*. 2023;23(48): 2–5. <https://doi.org/10.1186/s12909-023-04028-3>.
- Gholami M, Changae F, Karami K, Shahsavaripour Z, Veiskaramian A, Birjandi M. Effects of multiepisode case-based learning (CBL) on problem-solving ability and learning motivation of nursing students in an emergency care course. *J Prof Nurs*. 2021;37(3):612–619. <https://doi.org/10.1016/j.profnurs.2021.02.010>.
- Liu YH, Zhang L, Zhang JJ, et al. Enhancing clinical problem-solving skills in cardiology nursing interns: a randomized controlled study of case-based learning and task-driven learning. *Nurse Educ Pr*. 2025;87, 104449. <https://doi.org/10.1016/j.nepr.2025.104449>.
- Moon S, Chang SJ. Comparing the effects of patient safety education using design thinking and case based learning on nursing students' competence and professional socialization: a quasi-experimental design. *Heliyon*. 2024;10(9), e29942. <https://doi.org/10.1016/j.heliyon.2024.e29942>.
- Şimşek P, Özmen GÇ, Kemer AS, Aydın RK, Bulut E, Çilingir D. Development and psychometric testing of perceived preoperative nursing care competence scale for nursing students (PPreCC-NS). *Nurse Educ Today*. 2023;120, 105632. <https://doi.org/10.1016/j.nedt.2022.105632>.
- Seshan V, Matua GA, Raghavan D, Arulappan J, Al Hashmi I, Roach EJ, Sunderraj SE, Prince EJ. Case study analysis as an effective teaching strategy: perceptions of undergraduate nursing students from a middle eastern country. *SAGE Open Nurs*. 2021;7. <https://doi.org/10.1177/23779608211059265>, 23779608211059265.
- Kaldheim HKA, Munday J, Haddeland K, Fossum M. Newly graduated perioperative nurses' experiences of transitioning to clinical practice: a qualitative explorative secondary analysis. *J Adv Nurs*. 2025;81(6):3252–3267. <https://doi.org/10.1111/jan.16537>.
- Bwanali RK, Msiska G, Urstad KH, Bø B, Chimwaza A. Effect of simulation-based perioperative education on the acquisition of self-competence and knowledge among undergraduate student nurses: a randomised controlled study. *BMC Nurs*. 2025;24(1):1090. <https://doi.org/10.1186/s12912-025-03751-0>.
- Kulakaç N, Koçan S, Aktuğ C. The impact of video-based simulation training on perioperative process in nursing students: a randomized controlled study. *Teach Learn Nurs*. 2024;19(1):e46–e51. <https://doi.org/10.1016/j.teln.2023.08.018>.
- Nasiri-Formi E, Ranjbar-Moghaddam M, Alizadeh A. Correlation between clinical competence and clinical education environment among perioperative nursing students: a cross-sectional survey. *Perioper Care Oper Room Manag*. 2025, 100498. <https://doi.org/10.1016/j.pcorn.2025.100498>.
- Ogrinc G, Davies L, Goodman D, Batalden P, Davidoff F, Stevens D. The SQUIRE reporting checklist. editors. In: Harwood J, Albury C, J de Beyer, Schlüssel M, Collins G, eds. *The EQUATOR Network Reporting Guideline Platform [Internet]*. The UK EQUATOR Centre; 2025. Available from <https://resources.equator-network.org/reporting-guidelines/squire/squire-checklist.docx>.
- Raosoft, 2004. Sample size calculator. Cited at. http://www.raosoft.com/sample_size.html.
- Heppner PP, Petersen CH. The development and implications of a personal problem solving inventory. *J Couns Psychol*. 1982;29(1):66–75.
- Şahin N, Sahin NH, Heppner PP. Psychometric properties of the problem solving inventory in a group of Turkish university students. *Cogn Ther Res*. 1993;17(4): 379–396. <https://doi.org/10.1007/BF01177661>.
- Antonsen KN, Hofstad JK. Simulating preoperative preparations with focus on non-technical skills in an OR nursing education program in Norway. In: Akselbo I, Aune I, eds. *How Can we Use Simulation to Improve Competencies in Nursing?* Springer; 2023:37–52.
- Alnajat R, Etom M. Factors affecting nursing and midwifery students knowledge regarding preoperative nursing care. *Adv Med Educ Pr*. 2024;15:161–171. <https://doi.org/10.2147/AMEP.S441145>.
- Baydoğan GM. Investigation of nursing students' perceived competencies regarding preoperative nursing care: descriptive research. *Turk Klin J Nurs Sci*. 2025;17(3): 702–709.
- Wang M, Chen X, Yang Y, Wang H, Yan Y, Huang X, Bi Y, Cao W, Deng G. Effect evaluation of case-based learning with situated cognition theory on competence training for student nurses in pediatric surgery. *Heliyon*. 2023;9(2), e13427. <https://doi.org/10.1016/j.heliyon.2023.e13427>.
- Sümen A, Adibelli D. The effect of case-based teaching method on professional competence and clinical decision-making levels of public health nursing students: a sequential explanatory mixed-methods study. *Public Health Nurs*. 2024;41(3): 446–457. <https://doi.org/10.1111/phn.13301>.
- Aydın A. A structured educational model to improve the education of nurses: case-based learning. *Perioper Care Oper Room Manag*. 2025;40, 100504. <https://doi.org/10.1016/j.pcorn.2025.100504>.
- Ma L, Yan R, Wang X, Gao X, Fan N, Liu L, Kang H. Enhancing surgical nursing student performance: comparative study of simulation-based learning and problem-based learning. *J Multidiscip Heal*. 2024;17:991–1005. <https://doi.org/10.2147/JMDH.S440333>.
- Zheng QM, Li YY, Yin Q, Zhang N, Wang YP, Li GX, Sun ZG. The effectiveness of problem-based learning compared with lecture-based learning in surgical education: a systematic review and meta-analysis. *BMC Med Educ*. 2023;23(1):546. <https://doi.org/10.1186/s12909-023-04531-7>.
- Ropponen P, Tomietto M, Pramila-Savukoski S, Kuivila H, Koskenranta M, Liaw SY, Mikkonen K. Impacts of VR simulation on nursing students' competence, confidence, and satisfaction: a systematic review and meta-analysis of randomised controlled trials. *Nurse Educ Today*. 2025;152, 106756. <https://doi.org/10.1016/j.nedt.2025.106756>.
- Rezaee R, Haveschi F, Barati-Boldaji R, Mehrabi M. The effect of case-based e-learning on academic performance and problem-solving ability in nursing students: a pre- and post-test study. *J Educ Health Promot*. 2022;11:302. https://doi.org/10.4103/jehp.jehp_1613_21. Sep 28.
- Evgin D, Sümen A. Effect of online case-based teaching method on professional development of nursing students. *Clin Exp Health Sci*. 2023;13(1):9–17. <https://doi.org/10.33808/clinexphealthsci.942370>.
- Choi E, Lindquist R, Song Y. Effects of problem-based learning vs. traditional lecture on Korean nursing students' critical thinking, problem-solving, and self-directed learning. *Nurse Educ Today*. 2014;34(1):52–56. <https://doi.org/10.1016/j.nedt.2013.02.012>.