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Learning activities in bachelor nursing education to learn pre- and postoperative nursing care—A scoping review

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ABSTRACT

The aim of this scoping review was to systematically map and summarise the existing literature on learning activities in pre- and postoperative nursing care for undergraduate nursing students. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses–Extension for Scoping Reviews (PRISMA-ScR) and the Johanna Briggs Institute guidelines were applied. Eleven articles were included in the scoping review. The learning activities involved simulation-based learning (including human patient simulation and virtual simulation), web-based learning and case studies. A range of pre- and postoperative content was applied in the learning activities. Students' knowledge, skills, clinical decision making, clinical reasoning, experiences and stress and anxiety were measured. The review highlights findings for nursing educators planning teaching methods for pre- and postoperative nursing care.

1. Introduction

Worldwide, an estimated 4664 surgical procedures occur per 100,000 people each year (Rose et al., 2015). Pre- and postoperative nursing competence is essential to ensure surgical patients' safety during hospital stays (Danko, 2019; Nilsson, Gruen, & Myles, 2020). The preoperative phase includes nursing patients who are to undergo a surgical procedure until they are fully monitored in surgery unit (Kaasa, 2019). In this phase, nurses carefully assess a patient's condition, physically and psychosocially prepare the patient for surgery and define the patient's risk components that could lead to complications during surgery (the intraoperative phase) or in the post-operative phase (Kaasa, 2019; Powell et al., 2016). The postoperative phase is the time immediately after the surgical procedure and the subsequent period (Kaasa, 2019). Postoperative nursing is concerned with re-establishing the patient's physiological equilibrium, providing pain relief, and preventing complications (Pache, Addor, & Hübner, 2020).

The acquisition of pre- and postoperative nursing competence for undergraduate nursing students is complex. It demands clinical decision making, knowledge and reasoning and psychomotor skills, all essential to safeguard high-quality patient care (Kaasa, 2019), but has been described as poorly integrated within nursing education (Danko, 2019; Yang et al., 2020). More efficient patient care and shorter hospital stays have impacted nursing students' learning conditions during surgical placement (Ljungqvist, Scott, & Fearon,

Abbreviations: Preferred Reporting Items for Systematic Reviews and Meta-Analyses – Extension for Scoping Reviews, (PRISMA-ScR); virtual reality, (VR).

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2017; Sibbern et al., 2017). In addition, the number of nursing students in education programmes is increasing (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). COVID-19 and the resulting cancellations of elective surgery (Collaborative CoVID-Surg, 2020) have created additional challenges for students' learning opportunities during placements (Morin, 2020; Ulenaers, Grosemans, Schrooten, & Bergs, 2021).

Nursing education should adjust curricula and teaching methods according to structural changes in surgical placements. When students are more prepared for clinical placements, they can better achieve the intended learning outcomes (Shin, Sok, Hyun, & Kim, 2015).

Learning activities provide opportunities to transfer knowledge to clinical situations through independent exercises and reflections (Gaberson, Oermann, & Shellenbarger, 2015). Eurostat (2016, p. 10) defines *learning activities* as 'any activities of an individual organised with the intention to improve his/her knowledge, skills and competences'. A learning activity has a predetermined purpose, where the intention of learning is formulated and organised with a facilitator and a method of instruction (Eurostat, 2016). A designed learning activity should build on existing knowledge and should be devised to fit the learning outcome (Biggs & Tang, 2011). The assessment should be facilitated to align with the learning activity and the learning outcome (Biggs & Tang, 2011).

Overall, there are several ways to use learning activities in nursing education, and the methods vary widely (Gaberson et al., 2015). Using a literature review, Crookes, Crookes, and Walsh (2013) investigated what teaching techniques are in use in general in nursing education to create meaningful and engaging teaching. These techniques include technology/online education, simulation, gaming, art, narrative, problem/context-based methods and reflection. Systematic reviews have summarised digital learning and simulation knowledge in nursing education (Männistö et al., 2020; Rouleau et al., 2019; Smith et al., 2018; Stoffels, Peerdeman, Daelmans, Ket, & Kusurkar, 2019), but to our knowledge no systematic reviews have summarised learning activities with pre- and postoperative nursing care content. Therefore, this study is needed to inform future research on pre- and postoperative nursing in bachelor nursing education.

This study aims to systematically map and summarise learning activities for undergraduate nursing students learning pre- and postoperative nursing care prior to clinical placement. The study addresses the following research questions:

1 What learning activities are developed for undergraduate nursing students to learn pre- and postoperative nursing care prior to clinical placement, and what characterises these learning activities?
2 How are pre- and postoperative nursing care content described in the sources?
3 What outcomes have been measured and reported regarding the learning activities?

2. Method

2.1. Design

A scoping review was chosen to explore the breadth of the literature of relevant learning activities to inform future research on pre- and postoperative nursing care in bachelor nursing education (Peters et al., 2020; Pollock et al., 2021). As the initial searches revealed few relevant studies, a meta-synthesis or meta-analysis was not possible. Therefore, we decided that a scoping review was appropriate for mapping and summarising the existing literature and for answering our three research questions.

This review was performed in accordance with the Joanna Briggs Institute guidelines (Peters et al., 2020; Pollock et al., 2021), which aligns with the PRISMA-ScR (Tricco et al., 2018) (Appendix A) and the updated PRISMA 2020 (Page et al., 2021).

2.2. Search methods

When preparing the searches, the population, the concept of interest and the context framework were used, as recommended by Peters et al. (2020).

2.2.1. Population

In this scoping review, undergraduate nursing students of any age, study year or demographic characteristics were considered for inclusion. Sources focusing on inter-professional collaboration were excluded as these were not of interest for this review. Sources focusing on other health-related education or further education were also excluded.

2.2.2. Concept of interest

The concept examined here is the planned and implemented learning activities arranged by educational nursing institutes that precede clinical placements. No uniform definition of learning activities was required for inclusion. Therefore, there were no limits regarding the frequency or duration of the learning activity.

2.2.3. Context

This review considered papers that reported on learning activities concerning pre- and postoperative nursing care. If only pre-operative or postoperative nursing occurred, the source was still included.

2.3. Information sources

The sources sought for inclusion were original research studies (qualitative, quantitative and mixed-methods designs), reviews,

original reports, unpublished evidence and grey literature. The sources had to be published in English. The search period spanned from January 2010 to October 2021. Table 1 shows the specific inclusion and exclusion criteria.

2.4. Search strategy and selection of studies

We used a three-step search strategy comprising (1) an initial search, (2) a main search and (3) a search for additional literature based on the reference lists of all included studies. The first step was initially limited to searches in Ovid MEDLINE and CINAHL Plus with full text (EBSCOhost), followed by an analysis of the words in the titles and abstracts and of the index terms used to describe the articles. A main search was conducted in June 2020 and updated in October 2021 using the four reference databases CINAHL, ERIC, Scopus and Ovid MEDLINE (Appendices B–E). All identified keywords and index terms used was performed in consultation with a health science librarian. The database searches comprised of a combination of search words with a method emphasised sensitivity over specificity in the search itself to not miss studies (Both, 2016). We did a manual screening afterwards and removed irrelevant studies through this manual screening. Appendices B–E show the search words used in the databases. All the identified articles were transferred to Endnote Reference Manager X9.3.3 to gather the articles and remove duplicates. They were then exported to Rayyan (Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016) to screen titles, abstracts, and keywords.

The search for grey literature were done with an additional search conducted in August 2020 and updated in October 2021. The grey literature was defined as reports (documents providing relevant information) or dissertations (Bonato, 2018), and the Nursing and Allied Health Database (ProQuest) were used as a search database.

After identifying articles, forward and backward citation tracking was conducted. The citation tracking was done in Google Scholar in November 2021. Fig. 1 presents the PRISMA 2020 flow diagram of the search results from the main search to the final inclusion of studies (Page et al., 2021).

2.4.1. Inclusion criteria

Articles were included if they reported learning activities for undergraduate nursing students with a content of pre- and/or postoperative nursing care.

2.5. Data collection process

The data collection process was performed based on the pre-specified inclusion and exclusion criteria described above. Both the reading and full-text screening of titles/abstracts/keywords were performed independently by two reviewers (EMA and AO). Full-text studies that did not meet the inclusion criteria were excluded. All disagreements between the reviewers at each stage were solved via discussion amongst all researchers.

2.6. Mapping and summarising data

Data were mapped and summarised based on the study aim and the research questions. The results are presented in the data extraction fields (Table 2) and are accompanied by a narrative summary of the information extracted. A descriptive summary of the evidence includes a map of the data extracted from the included papers in tabular form. For this review, a draft charting table was developed and piloted at the protocol stage. The critical information was further refined at the review stage, and the charting table was updated accordingly, as shown in Table 2. A data charting sheet was developed to organise the charted data. Each article was screened and charted according to (1) the author(s), year of publication and origin/country of study; (2) the aim of the article; (3) the design and sample; (4) the learning activities; (5) the pre- and postoperative nursing content; and (6) the measured and reported outcome(s). Data were extracted by one reviewer (EMA), and quality was ensured by the other two reviewers (AO and ÅS).

Table 1
Inclusion and exclusion criteria.

Criterion	Inclusion	Exclusion
Types of articles/ literature	Original reports, original research studies (qualitative, quantitative, and mixed-methods designs), reviews, unpublished evidence, and grey literature	Textbooks
Language	English	Other languages
Time period	From January 2010 until October 2021	Before 2010 and after October 2021
Types of participants	Undergraduate nursing students	Non-nursing education, further education, or interprofessional collaboration
Type of concept	Learning activities prior to clinical placements	Learning activities during clinical placement or connected to psychiatric/mental placement, community care, or primary health care placement
Type of context	General pre- and/or postoperative nursing care	Intraoperative* nursing care, which is not a focus in the Bachelor of Nursing curriculum. Specific pre- and postoperative nursing care to patients with a diagnosis that is not transferable to patients who undergo surgery in general

*The intraoperative phase extends from the time the patient is admitted to the operating room and until the patient is transported to the recovery room or postanaesthetic care unit (Cuming, 2019).

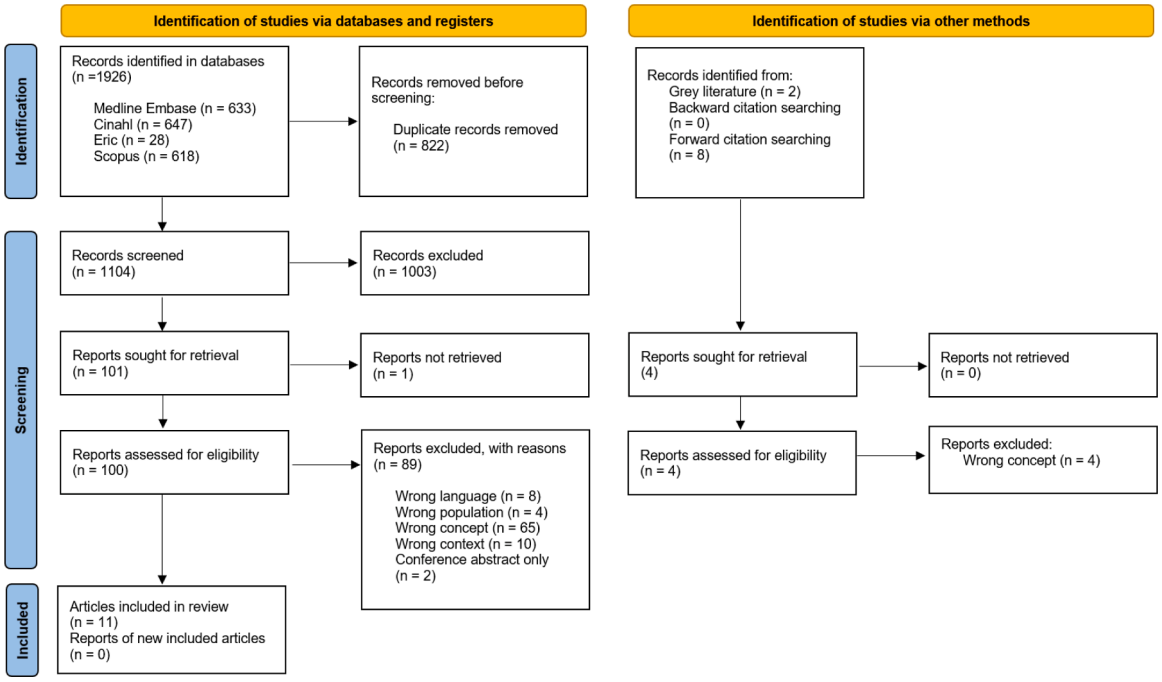

Fig. 1. PRISMA 2020 flow diagram summarising search and selection of articles.

3. Results

3.1. Study selection

After conducting database searches, 1926 records were identified, including 822 duplicates that were removed before screening. The titles and abstracts of the remaining 1104 records were screened, and 1003 records were excluded because they did not meet the inclusion criteria. In this stage one record was excluded because it was not retrieved. The remaining 100 reports were considered for detailed assessment of the full text, and 89 were ultimately excluded (see Appendix F for exclusion reasons). Eleven articles were included in the scoping review (Fig. 1).

3.2. Learning activity types

Six articles described the use of simulation-based learning (task trainers, manikin and standardised patient) (Brooks, Moriarty, & Welyczko, 2010; Burke, 2010; Durmaz, Dicle, Cakan, & Cakir, 2012; Evans & Mixon, 2015; Nakayama, Ejiri, Arakawa, & Makino, 2020; Parvis, Badowski, & Martin, 2021) and three articles described the use of virtual simulation (Kim, Lee, & Lee, 2021; Koivisto, Multisilta, Niemi, Katajisto, & Eriksson, 2016; Tjoflåt, Brandeggen, Strandberg, Dyrstad, & Husebø, 2018). Two articles described the use of web-based learning (Durmaz et al., 2012; Edeer, Vural, Damar, Yasak, & Damar, 2019) and one article described case studies (Byrne, Root, & Culbertson, 2016) (Table 2).

Different approaches were used for the simulation-based learning. Brooks et al. (2010) used academic staff as a standardised patient and a manikin when the students performed interventions. Burke (2010) used both task trainers at skill stations (low fidelity) and human patient simulators (medium fidelity). Evans and Mixon (2015), Nakayama et al. (2020) and Parvis et al. (2021) used high-fidelity simulations, which are life-sized manikins with correct anatomy, pathophysiological and pharmacological responses and sophisticated interactive capability. Durmaz et al. (2012) used a static manikin and had a final-year student act in the role of the patient.

The articles applying virtual simulation are explained in detail. Tjoflåt et al. (2018) used *vSim® for Nursing*, a web- based virtual simulation with the intention of allowing participants to learn planning and complexity and achieve learning outcomes in clinical nursing practice. Koivisto et al. (2016) used a 3D simulation game consisting of patient scenarios and related events. In the game, each participant acted as the nurse working in a hospital patient room. The patient in the game was a 3D character with authentic reactions. The game intended to be interactive; focused on the patients' concerns; and gave the player immediate and cumulative feedback in the form of points, patient responses and in-game facilitators' comments (Koivisto et al., 2016). Kim et al. (2021) used virtual reality (VR) with wearable devices with the intention to let the students experience how it is to walk in the shoes of a surgical patient through sights, hearing and touch. The VR simulation was a part of a blended learning programme (Kim et al., 2021).

Durmaz et al. (2012) and Edeer et al. (2019) used web-based education (referred to as e-learning) that included specific textual

Table 2
Extraction fields.

Learning activity type	Learning activities	Author(s) (year of publication), origin/country of study	Aim of article	Design and sample	Pre- and postoperative nursing content	Measured and reported outcome(s)
Simulation-based learning	Problem-based learning activities with simulation (manikin and academic staff acting as the patient)	Brooks et al. (2010), UK	Explore the development and implementation of a simulated practice learning exercise in the curriculum and expound on the advantages and disadvantages of the approach	Design: Not described in line with scientific requirements; data analysis not described Sample: Third-year preregistration nursing students	Preoperative patient assessment, postoperative care, care for an anxious patient, nursing documentation	No in-study information provided
Simulation-based learning	Task trainers and human patient simulation (low and medium fidelity); five areas: 1. Drill and practice 2. Advance organisers (in simulation) 3. Problem-solving activities 4. Case-based reasoning 5. Collaborative groups	Burke (2010), USA	How analysis, design, development, implementation and evaluation apply to developing a simulation programme	Design: Not described in line with scientific requirements; data analysis not described Sample: No in-study information provided	Provide patient safety, identification, postoperative assessments, assessing pain and medication record, administering pain medication, ensuring patient adheres to fasting, offering emotional support, documentation	No in-study information provided
Simulation-based learning	High-fidelity human patient simulation in postoperative pain management Scripted sequence of events, definitions of pain and pain assessment, measurement and management Structured briefing and debriefing	Evans and Mixon (2015), USA	Assess undergraduate nursing students' postoperative pain knowledge after participation in a postoperative pain simulation scenario	Design: A quantitative, descriptive study Sample: First-year (second semester) nursing students (N = 117)	Postoperative pain with fear of addiction	Students' pain knowledge
Simulation-based learning	High fidelity human patient simulation in postoperative patient management, personal and peer-led simulations Structured briefing and debriefing Organised in personal and peer simulations	Nakayama et al. (2020), Japan	To incorporate peer learning into simulation learning and to clarify the differences between stress and anxiety during personal and peer simulations	Design: An observational study Sample: Third grade undergraduate nursing students at two nursing universities (N = 109)	A postoperative patient with central venous catheter, oxygen masque, urethral catheter, wound dressing and indwelling abdominal drain Postoperative assessments through auscultation, inspection, and palpation	Stress and anxiety in nursing students between individual and peer simulations Stress and anxiety measured by heart rate variability
Simulation-based learning	High fidelity human patient simulation Prior to simulation-day activities: introduction to the simulation, learning objectives, a simulated patient's medical history and physical examination, a video recording of a sterile gowning and gloving demonstration, and reading assignments of a total hip arthroplasty and malignant hyperthermia crisis PowerPoint® presentation one week prior to the simulation Structured briefing and debriefing	Parvis et al. (2021), USA	To describe a simulated perioperative clinical day for prelicensure nursing students	Design: Not described in line with scientific requirements; data analysis not described Sample: Prelicensure Nursing students (N = 45)	Three separate simulations: preoperative, intraoperative, and postoperative phases (intraoperative not described due to the research question) Preoperative: patient interview, completion of a surgical checklist, administering medication, ensuring patient safety, patient education Postoperative: assessment to recover patient, responsibility of monitor's and patient recovery documents from anaesthesia, performs SBAR (Situation, Background, Assessment, Recommendation) hand-off to receiving nurse, evaluation of patient dischargement	Satisfaction, self-confidence, learning, collaboration simulation design through evaluation questionnaires

(*continued on next page*)

Table 2 (*continued*)

Learning activity type	Learning activities	Author(s) (year of publication), origin/country of study	Aim of article	Design and sample	Pre- and postoperative nursing content	Measured and reported outcome(s)
Virtual simulation	A virtual reality blended learning program of five weeks duration Four sessions: 1. Educational lectures 2. Problem-based learning I (individual activities) 3. Problem-based learning II (team activities) 4. Virtual reality simulation with wearable device	Kim et al. (2021), Korea	Nursing students learning experience and outcomes in a virtual experience of simulating a perioperative patient	Design: A phenomenological study, focus group interview Sample: Second-year nursing students (N = 21)	Preoperative: Intravenous injection, use the bathroom while connected to an intravenous pole, transfer to the operating room stage while lying on a stretcher, and expose and confirm the pre-marked breast surgery site Postoperative: catheterization procedure	Students' experience being a perioperative patient through virtual reality
Virtual simulation	Virtual 3D simulation game of 30–40 minutes' duration to increase the clinical reasoning process Single-player game, player took the role of nurse, patient was a 3D character in a 3D environment representing a hospital ward Interactive elements, feedback given, guidance given when playing	Koivisto et al. (2016), Finland	Investigate nursing students' experiences of learning clinical reasoning by playing a 3D simulation game	Design: A quantitative, descriptive cross-sectional study Sample: Nursing students from the first (13%), second (85%) and third (2%) year of a surgical nursing course (N = 166)	Postoperative patient scenarios in the ward (spinal surgery)	Students' clinical reasoning
Virtual simulation	Virtual reality web-based simulation of two hours duration Organised in terms of learning objectives, planning, complexity and cues Simulation instructions on e-mail to students one day in advance Structured briefing Students worked in pairs to allow discussions and interactive learning Interactive elements, feedback given	Tjoflåt et al. (2018), Norway	Evaluate nursing students' experiences with a virtual clinical simulation scenario in surgery using *vSim for Nursing*	Design: a quantitative and qualitative study, descriptive and convergent mixed method Sample: Second-year nursing students (N = 65)	Postoperative patient scenarios in the ward (ruptured appendix)	Students' experience
Web-based learning	Experimental group: Screen-based computer e-learning: textual information, pictures, flowcharts, tables, sample cases, videos, simulation Control group: Skill laboratories similar to clinical environments	Durmaz et al. (2012), Turkey	Examine the effect of screen-based computer simulation of knowledge, skills and clinical decision-making process in pre- and postoperative care vs. skill laboratories	Design: A randomised controlled study Sample: Second-year nursing students (N = 82): intervention group (n = 41), control group (n = 41)	Preoperative: Psychosocial and physical preparation, patient education about postoperative exercises Postoperative: Assessments and interventions aimed at preventing complications	Students' knowledge, skills, and clinical decision making
Web-based learning	Experimental group: Web-based education (e-learning): specific textual information, images, flowcharts, tables,	Edeer et al. (2019), Turkey	Explore the effect of web-based pre- and postoperative care	Design: A randomised controlled study (double blinded)	Preoperative: Nursing interventions, patient education, psychosocial and physiological assessments, pain management, patient preparation	Students' knowledge, skills and clinical decision making

(*continued on next page*)

Table 2 (*continued*)

Learning activity type	Learning activities	Author(s) (year of publication), origin/country of study	Aim of article	Design and sample	Pre- and postoperative nursing content	Measured and reported outcome(s)
	reminders, sample case studies, videos, and feedback section for participant questions Control group: PowerPoint presentations, case discussions,			Sample: Second-year nursing students (N = 305): intervention group (n = 155), control group (n = 150)	Postoperative: Potential intraoperative complications, pain assessment, interventions, observations for potential complications	
Case study	question- and-answer methods and presentations viewed in the classroom	Case study where clinical topics were highlighted, categorised by the concept they pertained to	Byrne et al. (2016), USA	Provide resources for nurse educators to create perioperative case studies	Design: Not described in line with scientific requirements; data analysis not described	Oxygenation (obstructive sleep apnoea and obesity), safety (screening, mobility, thermoregulation, time out, correct site surgery, transition of care venous thromboembolism prevention), posttraumatic stress disorder, pain, nutrition, patient education for home care, team communication training
Student learning outcomes identified, case study strategy developed and implemented for the learning outcomes	No in-study information provided	Sample: No in-study information provided				

information, images, flowcharts, tables, reminders, case studies, and videos. In addition, Edeer et al. (2019) included opportunities for students to ask questions during the learning activity. Byrne et al. (2016) used case studies.

3.3. Characteristics of identified sources

As summarised in Table 2, four articles originated from North America, three from Europe and four from Asia (Table 2). Seven papers were articles with qualitative, quantitative or mixed-methods designs. Of the papers with a quantitative approach, two were randomised controlled studies with pre- and post-tests (Durmaz et al., 2012; Edeer et al., 2019). Two used a descriptive design with questionnaires (Evans & Mixon, 2015; Koivisto et al., 2016), and one used a mixed-methods approach with qualitative and quantitative data (Tjoflåt et al., 2018). One article had an observational design (Nakayama et al., 2020) and one study had a phenomenological design (Kim et al., 2021). The remaining four articles included descriptions and evaluations of learning activities (Brooks et al., 2010; Burke, 2010; Byrne et al., 2016; Parvis et al., 2021) but did not include empirical evidence in accordance with scientific methods.

3.4. Considerations for designing learning activities in pre- and postoperative nursing care

The articles described various considerations and structural challenges when planning a learning activity (Table 2). Seven articles described the learning activity as part of a surgical nursing course (Brooks et al., 2010; Burke, 2010; Byrne et al., 2016; Edeer et al., 2019; Kim et al., 2021; Koivisto et al., 2016; Tjoflåt et al., 2018). One article described the learning activity as an alternative to traditional clinical learning (Parvis et al., 2021). Seven of the eleven articles suggested a sequence of theoretical considerations before the learning activity (Brooks et al., 2010; Burke, 2010; Durmaz et al., 2012; Evans & Mixon, 2015; Kim et al., 2021; Parvis et al., 2021; Tjoflåt et al., 2018). Briefing and debriefing were suggested as part of the pedagogy in the majority of the articles describing simulation-based learning as the learning activity (Brooks et al., 2010; Burke, 2010; Evans & Mixon, 2015; Nakayama et al., 2020; Parvis et al., 2021).

3.4. Pre- and postoperative nursing care content

Six articles contained both pre- and postoperative content (Brooks et al., 2010; Byrne et al., 2016; Durmaz et al., 2012; Edeer et al., 2019; Kim et al., 2021; Parvis et al., 2021), and five articles had only postoperative content (Burke, 2010; Evans & Mixon, 2015; Koivisto et al., 2016; Nakayama et al., 2020; Tjoflåt et al., 2018). Pre- and postoperative content was described in detail in four of the articles together with a clear explanation of the learning objectives (Burke, 2010; Byrne et al., 2016; Edeer et al., 2019; Parvis et al., 2021). Medication administration and/or assessment was the most phrased nursing content in the articles overall (Brooks et al., 2010; Burke, 2010; Byrne et al., 2016; Edeer et al., 2019; Evans & Mixon, 2015; Kim et al., 2021; Parvis et al., 2021), thereafter postoperative nursing assessment (Burke, 2010; Durmaz et al., 2012; Edeer et al., 2019; Kim et al., 2021; Parvis et al., 2021) and preoperative nursing assessment (Burke, 2010; Byrne et al., 2016; Edeer et al., 2019; Kim et al., 2021; Parvis et al., 2021). Care for emotional needs was a recurring theme in five articles (Brooks et al., 2010; Burke, 2010; Byrne et al., 2016; Durmaz et al., 2012; Edeer et al., 2019). Patient safety was mentioned in three articles (Burke, 2010; Byrne et al., 2016; Parvis et al., 2021) and team communication/-hand-off was mentioned twice (Byrne et al., 2016; Parvis et al., 2021).

3.5. Reported measurements and outcome(s)

As summarised in Table 2, six of the eleven articles reported outcomes. Only three articles (Durmaz et al., 2012; Edeer et al., 2019; Nakayama et al., 2020) assessed measurements other than self-reported data, specifically students' stress and anxiety in individual and peer simulations (Nakayama et al., 2020) and students' knowledge, skills and clinical decision making (Durmaz et al., 2012; Edeer et al., 2019). Various instruments were used to measure learning outcomes (Ferrell & McCaffery, 2012; Jenkins, 2001; Karayurt, Mert, & Beser, 2009).

Koivisto et al. (2016) investigated clinical reasoning using a questionnaire. The students in the study stated they learned how to collect information and act but were less successful in establishing goals for patient care or evaluating interventions. The students reported they learned the most about applying theoretical knowledge and the least about applying previous experiences when learning in a gaming context. Further, the students felt they could make mistakes when playing. The students' prior experience with non-digital or educational games was not significantly associated with learning the clinical reasoning process when playing. Finally, those students playing digital games daily or occasionally reported learning clinical reasoning better compared to those who did not play at all.

Tjoflåt et al. (2018) developed a questionnaire using quantitative and qualitative data from previous research on students' experiences with *vSim® for Nursing*. The majority of the students reported that working with the virtual simulation was good preparation for their clinical placements in surgical wards. The content was relevant to their roles as nurses, and most of the students recommended virtual simulation for future use. Overall, the qualitative data indicated that *vSim® for Nursing* was realistic and successful, with high student satisfaction in regard to learning. The students who did not recommend *vSim® for Nursing* reported difficulties with understanding how to navigate the programme and with the programme not being in their mother tongue.

Kim et al. (2021) examined students' experiences simulating as a surgical patient through VR. The students reported positive experiences of being in the patient's shoes. They gained understanding of the perioperative patient, developing nursing competencies and patient-centred care. The students expressed enhancement for a new and vivid teaching method.

4. Discussion

4.1. Considerations when designing future learning activities

The results of this scoping review indicated several factors that should be considered when designing learning activities to promote students' competence in pre- and postoperative nursing. Samples from the first, second and third study years were represented in the included sources. According to Shin et al. (2015), nursing students value early exposure to practice prior to entering placements. Burke (2010) stated that learning activities should depend on the curriculum content. If students have acquired relevant competence in advance of the learning activity, they will benefit more from the training (Biggs & Tang, 2011). The preparation and assessment of the surgical patient is a complex process (Danko, 2019; Kaasa, 2019; Nilsson et al., 2020). Timing should be considered, as it is important in terms of knowledge transfer and successful implementation of the learning activity.

Both Koivisto et al. (2016) and Tjoflåt et al. (2018), who used new technology in the simulation training, highlighted the possibility of repeated training. An integrative review of the education literature revealed that repetitive interventions rather than single interventions, were superior for learning outcomes (Bluestone et al., 2013). A limitation of initial training is the rapid loss of skills (Bang et al., 2016). Repeated practice can lead to the retention of healthcare-related skills (Kim, Park, & Shin, 2016), which is needed when providing care in the pre- and postoperative phase (Yang et al., 2020).

An interesting finding was the gradual improvement in fidelity in simulation-based training (Evans & Mixon, 2015; Kim et al., 2021; Koivisto et al., 2016; Tjoflåt et al., 2018). Badash, Burtt, Solorzano, and Carey (2016) indicated that the advancement of digital technology provides opportunities to create realism and complexity when designing surgery simulations. Advances in digital and virtual technology have resulted in a paradigm shift in health education, with the use of technology growing as a pedagogical approach. It demands fewer physical resources than traditional manikin-based simulations, making learning activities more flexible (Fogg, Kubin, Wilson, & Trinka, 2020).

4.2. Pre- and postoperative content

The pre- and postoperative content described and defined in this scoping review mostly comprised concrete preoperative preparations and pre- and postoperative assessments related to surgery. Some of the pre- and postoperative content could also be described as general nursing competence, such as thinking systematically about the safe delivery of patient care and medication assessment and administration (European Federation of Nurses Associations, 2015; Satu, Leena, Mikko, Riitta, & Helena, 2013). Still, both safety and medication assessment are particularly important when caring for surgery patients (Burke, 2010; Byrne et al., 2016; Parvis et al., 2021). The literature highlights medication patient safety as crucial during the pre- and postoperative parts of the surgical pathway (Storesund et al., 2020; Tobiano, Chaboyer, Teasdale, Raleigh, & Manias, 2019).

Students need both specific skills related to a surgical patient and general nursing skills. The results of this study and the literature support this (Cheng et al., 2020; Kaasa, 2019; McGarvey, Chambers, & Boore, 2000; Nilsson et al., 2020). By breaking down complex pre- and postoperative nursing skills into their component parts and describing them in detail, there is a danger that students' learning outcomes will be defined by and reduced to a score on a test related to a specific skill (Raaheim, 2011). The gap between theory and practice become even more visible in hospital settings where students get to test what they can do and experience the complexity of caring for patients.

The results from this review revealed a scarce of team communication training as it was only mentioned in two articles (Byrne et al., 2016; Parvis et al., 2021) (Table 2). The exchange of relevant clinical information from one provider to another is crucial for the surgical pathway as missing information and incorrect data transfer can lead to adverse patient outcomes (Nagpal et al., 2012). Poor communication amongst health care providers has been identified as the third leading root cause of sentinel incidents (The Joint Commission, 2016). Structured and precise communication is essential in clinical handover between healthcare providers to avoid necessary information get lost (Gardiner, Marshall, & Gillespie, 2015). With structured communication training nursing students can learn essential skills to promote patient safety.

4.3. Measurement methods

The measurement methods demonstrated an over-reliance on self-reported data. Although students' self-reported data can provide valuable information (Evans & Mixon, 2015; Kim et al., 2021; Koivisto et al., 2016; Tjoflåt et al., 2018), the evidence from these studies did not indicate whether the students achieved learning outcomes through the learning activities. Earlier research has suggested a poor correlation between students' self-reported assessment performance and objective measures (Liaw, Scherpbier, Rethans, & Klainin-Yobas, 2012; Ruzafa-Martinez, Leal-Costa, Garcia-Gonzalez, Sánchez-Torrano, & Ramos-Morcillo, 2021; Snibsøer et al., 2018). Self-reported assessment alone may not be a valid predictor of clinical performance (Liaw et al., 2012; Ruzafa-Martinez et al., 2021).

According to Maul, Irribarra, and Wilson (2016), there are difficulties when measuring certain aspects because to some extent they are defined by socially, culturally and historically situated perspectives and concerns. Even if one acknowledges that such elements can be shaped as quantities, they are resistant to standard techniques of (physical) empirical falsification. This arguably eliminates them as candidates for 'fundamental' measurement (Maul et al., 2016). The data for students' learning outcomes is contextual (Navas-Ferrer, Urcola-Pardo, Subirón-Valera and German-Bes, 2017; Ruzafa-Martinez et al., 2021). Therefore, it is problematic to compare cases and data in ways that meet the standards of pure science and controlled experiments. When measuring outcomes, the presentation, interpretation and generalisation of the outcome results should receive particular focus, as assessment depends on the context

(Navas-Ferrer et al., 2017).

4.4. Strengths and limitations

This study aimed to map and summarise learning activities for undergraduate nursing students learning pre- and postoperative nursing prior to clinical placement. One strength of this study is the broad and comprehensive search of electronic databases and the inclusion of all available articles from the last 11 years. Further, this study used an updated and recommended methodological framework method for the search strategy and data extraction. The articles included cover several methods and originate from three regions of the world.

The study has also some limitations. First, only articles published in English were included. Articles written in other languages could have provided additional information. Second, different terms were used to describe the pre- and postoperative nursing content in the curriculum and learning activities in nursing education. Therefore, additional terms were included in the search to identify relevant literature. However, it is possible that we inadvertently excluded studies with pre- and postoperative content and/or contexts in which learning activities were used in the curriculum. Third, due to the design (scoping review) no critical appraisal was made. Four of the articles describing learning activities are without a method section. The articles were considered valuable for inclusion because they had a comprehensive description of the learning activities. Finally, our study results may not be applicable to nursing students caring for patients undergoing specific surgeries that may be associated with concerns that differ from those about surgery in general.

5. Conclusion

This scoping review maps and summarises learning activities for undergraduate nursing students learning pre- and postoperative nursing prior to clinical placement. In particular, this work contributed new knowledge regarding the scope and features of existing learning activities in this specific area of nursing education. The results showed that simulation-based learning (task trainers, manikin and standardised patient), virtual simulation, web-based learning and case studies are used as learning activities. A range of pre- and postoperative content was applied in the learning activities. In the articles with outcome measures, students' knowledge, skills, clinical decision making, clinical reasoning, experiences and stress and anxiety were measured. It is likely that due to the COVID-19 pandemic which is resulting surgery cancellations and restrictions on clinical placements, the quantity and quality of research on learning activities to improve competence in pre- and postoperative nursing will increase. There is a need to develop more learning activities with pre- and postoperative nursing content to prepare nursing students for clinical placement. There is also a need for pre- and postoperative learning activities with structured communication training as this skill is needed for safe surgery patient care. The study results showed a trend towards using new technology such as 3D and VR, which can have implications for planning future curricula. Although developing virtual simulations is costly, these learning activities are advantageous because they can be used as self-practice without the expense of facilitators. Therefore, we anticipate that nursing education will gradually incorporate more of these interactive learning activities into the curriculum in the near future.

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Supplemental material

Appendix A. PRISMA-ScR Checklist.
Appendix B. Embase (Ovid) and MEDLINE (Ovid) (search conducted October 2021).
Appendix C. Cinahl Ebscohost (search conducted October 2021).
Appendix D. ERIC (search conducted October 2021).
Appendix E. Scopus (search conducted October 2021).
Appendix F. Full-text articles, excluding reason.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijer.2022.102033.

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