






ORIGINAL ARTICLE

Professional competence development through interprofessional simulation-based learning assists perioperative nurses in postgraduation acute clinical practice situations: A qualitative study

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Abstract

Aims and objectives: To explore recently graduated perioperative nurses' experiences of interprofessional simulation-based learning during postgraduate education and investigate whether and how this learning approach contributed to the development of their professional competence in meeting acute clinical situations.

Background: Perioperative nursing requires specialised education that offers professional development to ensure high-quality nursing care and patient safety in acute situations. Interprofessional simulation-based learning exposes students to acute situations in a safe environment without the risk of harming the patient, and it prepares postgraduate nursing students for clinical practice. Despite extensive research regarding simulation-based learning, there is a lack of knowledge on what impact such training has on perioperative nursing students after graduation.

Design: An explorative qualitative design was used, and this study is reported in accordance with the COREQ guidelines.

Method: Between March 2019–November 2020, 16 perioperative nurses participated in semi-structured individual interviews three to five months after their graduation from five different educational institutions. During their postgraduate education, they had participated in interprofessional simulation-based learning that included acute clinical situations. A phenomenological hermeneutical analysis was applied to the data involving three steps: naïve reading, structural analysis and comprehensive understanding.

Results: During the naïve reading, three themes emerged: competence in handling acute situations, competence in interprofessional teamwork and professional identity development.

Conclusion: Interprofessional simulation-based learning in perioperative nursing education developed relevant and important competence, including professional identity

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development, among perioperative nursing students. As recent graduates, their professional competence was transferred to clinical practice and developed further.

Relevance to clinical practice: Findings indicate that interprofessional simulation-based learning is an important educational approach in perioperative nursing education. It is essential to use effective learning approaches to develop competencies that are transferable to clinical practice and improve perioperative nurses' performance as recent graduates. Therefore, interprofessional simulation-based learning should be implemented into perioperative nursing education.

KEYWORDS

acute situations, interprofessional simulation-based learning, perioperative nursing, phenomenological hermeneutical method, postgraduate education, professional development, professional identity, recent graduates, student, transfer to practice

1 | INTRODUCTION

Perioperative nurses work closely with other professionals and provide advanced care for patients in acute situations, so they are required to possess highly developed knowledge and skills (Smith, 2019). This requires professional development education (Chernikova et al., 2020) to prepare them for interprofessional teamwork and to ensure high-quality perioperative nursing care and patient safety in acute situations (Beitz, 2019). Preparation for professional practice requires the acquisition of important knowledge and skills and the development of professional identity, including intrinsic dispositions that define the profession and its members (Cruss et al., 2014).

Professional development involves structured professional learning that results in improving perioperative nursing students' learning outcomes and a change in their practices as recent graduates, and it includes development of professional competence. Professional competence has been defined as 'the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served' (Epstein & Hundert, 2002, p. 226). Professional development includes building a professional identity, described as 'how we perceive ourselves as professionals based on our attributes, beliefs, values, motives, and experiences in relation to our profession' (Rees & Monrouxe, 2018, p. 202).

In Norway, perioperative nurses have two primary roles: a sterile executive and a circulating role. The executive role requires an in-depth knowledge of all the steps of surgical procedures, while the circulating role requires that nurses take responsibility for the assessment, planning, coordination, and implementation of an appropriate plan for care for the perioperative patient. In this study, perioperative nursing is defined as a speciality that focuses on care for patients with life-threatening crises, illnesses or injuries undergoing planned or acute surgery, treatment or examination. Perioperative nurses are registered nurses (RNs) who have undertaken dedicated

What does this paper contribute to the wider global community?

- Competencies developed from interprofessional simulation-based learning during education are transferable to the future clinical practice of recently graduated perioperative nurses and may improve performance.
- Transferable competencies including prioritising, coping with stress, contingency planning, communicating and collaborating in an interprofessional team were identified.
- Interprofessional simulation-based learning used in education can support recently graduated perioperative nurses' incipient professional identity and strengthen their courage to speak up when working in interprofessional teams.

perioperative nursing education; they are also known as theatre nurses, scrub nurses, circulation nurses and operating room nurses.

2 | BACKGROUND

Preparing perioperative nursing students for acute clinical practice situations requires a learning environment that includes exposure to practice in the professional field and authentic learning experiences (Kaldheim, Fossum, Munday, Johnsen, & Slettebø, 2021). Acute situations are characterised by unexpected events that must be responded to rapidly and where appropriate prioritisation is needed without delay (Gabrielsen, Lindström, & Näden, 2009). Simulation-based learning (SBL) is a learning process in which participants interact with people, simulators, computers and/or task trainers to accomplish learning goals that represent the learners' real-world responsibilities (Lioce et al., 2020). SBL involves three

stages, commencing with information provided by the facilitator about the simulation scenario and learning objectives. Participants then undertake active roles in the scenario (Tyerman, Luctkar-Flude, Graham, Coffey, & Olsen-Lynch, 2019). Finally, debriefing facilitates formative feedback and supports participants in reflecting critically, developing clinical reasoning and linking theory to practice (Hall & Tori, 2017).

SBL is an often-used educational approach widely explored in nursing programmes. Systematic reviews communicate that SBL is a useful educational approach to develop knowledge, critical thinking and confidence (Cant & Cooper, 2017; Jeppesen, Christiansen, & Frederiksen, 2017), and it can also improve patient safety by reducing errors (Lamé & Dixon-Woods, 2020).

The World Health Organization (WHO) recommends professional collaboration as an educational approach to enable effective practice and improve patient safety (World Health Organisation, 2010). In this study, the focus is on interprofessional simulation-based learning (ISBL), as it can enhance interprofessional communication, collaboration and appreciation for other professions and promote the contributions of one profession to an entire team (Kaldheim, Fossum, Munday, Johnsen, & Slettebø, 2021). Upon entering professional clinical practice, the capability to successfully collaborate with other disciplines is vital to assure superior patient outcomes (Lamparyk, Williams, Robiner, Brusshwein, & Ward, 2022).

However, there is a need for studies about perioperative nursing students' development of professional competence and to investigate the perceived effectiveness of ISBL (Kaldheim et al., 2019). Furthermore, there is scarce evidence regarding students' transfer of professional competence to clinical practice after graduation and how ISBL influences future practice (Seaton et al., 2019).

3 | THEORETICAL FRAMEWORK

Activity theory was applied as a theoretical framework in this study to understand the development of professional competencies generated through participation and activities during ISBL. Activity theory can help us understand complex systems, such as ISBL (Byerly, Floren, Yukawa, & O'Brien, 2021). This theory is built on Vygotsky's (1978) and other sociocultural theories of learning which view the learning of knowledge and skills as socially constructed through dialogue and interactions and regard individual learning as a product of participation in activities with others (Mylrea, 2018).

It is essential to design and develop learning environments within higher education that support the transfer of students' professional development from education to clinical practice. The word 'transfer' focuses on the progressive re-mediation of object-oriented activity and is grounded in activity theory. Here, 'collective activity' refers to individuals working together towards a common goal. Our experiences are formed 'by the ways that we aim to act in coordination with other people' (Danish, Saleh, Gomoll, Sigley, & Hmelo-Silver, 2021, p. 129).

4 | METHOD

4.1 | Aim and research question

The aim of the research was to explore recently graduated perioperative nurses' experiences of interprofessional simulation-based learning during postgraduate education and investigate whether and how this learning approach contributed to the development of their professional competence in meeting acute clinical situations. Thus, the research question addressed was the following: Do perioperative nurses perceive that ISBL during their education contributed to the development of their professional competence in meeting acute situations in their clinical practice after their recent graduation, and if so, how?

4.2 | Design

The study applied an inductive and qualitative research design, using semi-structured individual interviews to capture lived experiences. A phenomenological hermeneutical method inspired by Ricoeur's (1973) theory was used to interpret the transcribed text from the interviews. While phenomenology centres on how all-important meaning appears through lived experiences, hermeneutics focuses on the necessary conditions for text interpretation (Lindseth & Norberg, 2004, 2021). Ricoeur articulated that interpretation of a text means perceiving something new within that which is already taken as established (Ricoeur, 1973). This method allowed us to gain a deeper understanding of ISBL as a complex phenomenon. The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist was used for reporting (Tong, Sainsbury, & Craig, 2007; See Appendix S1).

4.3 | Participants

Heads of Departments from five higher educational institutions in Norway agreed to the conduct of the study, and perioperative nursing students received study information from their teachers and provided written informed consent. They enrolled in a postgraduate programme (of 18 months duration) or a master's degree programme (of 2 years duration). In Norway, students taking a postgraduate programme in perioperative nursing follow the same curriculum as those taking a master's degree programme, as regulated by the government. However, students can choose to terminate this programme after 18 months and write a final thesis instead of a master's thesis. Before enrolling in perioperative education in Norway, students must be RNs.

Between February 2019–May 2019, 31 perioperative nursing students signed written consent forms to participate in this study. Some recruited perioperative nursing students did not graduate before June 2020 and so could not be interviewed as newly graduated perioperative nurses before autumn 2020 as their personal

situations may have changed during this period. Thus, the number of participants was reduced by six. A further five participants did not respond to the second contact attempt made by the researchers. One interview was not conducted because the participant did not work as a perioperative nurse following graduation. Between March 2019–November 2020, therefore, 19 individual interviews were conducted with recently graduated nurses. Of these, however, three were excluded because of the participants' work situation (their work as newly graduated perioperative nurses did not involve acute situations). As a result, a total of 16 individual interviews with recently graduated perioperative nurses were conducted and transcribed (Table 1).

Based on recommendations (Malterud, Siersma, & Guassora, 2016), this sample size was sufficient to provide rich data. For inclusion, participants needed to have participated in ISBL during their postgraduate education together with students from other specialisations, such as anaesthetic, critical care and paediatric nursing. The simulation context needed to include acute situations, such as an acute caesarean section or a trauma, and include a focus on the development of interprofessional collaboration and communication. The individual interviews were conducted within three to 5 months after graduation.

In this study, 16 of the participants had taken part in an acute caesarean section, four in an acute appendix operation, eight in a trauma, one in a burn injury, 10 in an advanced cardiopulmonary resuscitation and two in a tonsil bleeding scenario. Five of the participants had also taken part in SBL/ISBL after their perioperative nursing education.

4.4 | Data collection

The first author conducted semi-structured interviews asking open questions and follow-up questions. The main topic was the individuals' experiences with ISBL during education and how this had assisted in their professional development in acute clinical practice situations recently after graduation. One question, for example, asked, 'Would you please tell me how you have experienced your involvement in acute situations in clinical practice since your recent graduation?'. The follow-up question to this was 'Can you further

elaborate on what experiences you have had for which you were prepared? Please provide an example, if possible' (See Appendix S2).

The design of this study was explorative. This consideration guided our interviews questions, which were semi-structured questions encouraging the participants to tell us about their experiences within different areas in the ISBL context. All interviews were conducted away from the subjects' workplaces, in an undisturbed location, but four were conducted as video meetings using Skype for Business, because of the geographically remote locations of participants ($n = 2$) or because of the COVID-19 situation ($n = 2$). All interviews were audio-recorded and transcribed by the first author. They were between 43–86 minutes in duration (mean 61 min). Recruitment ended when no new data emerged in the interviews, and data saturation was attained.

4.5 | Ethical consideration

Prior institutional ethical approval was obtained, and the study was approved by the Norwegian Centre for Research Data (NSD, ref. 2019/363692). The study followed the ethical principles governed by the World Medical Association Declaration of Helsinki (World Medical Association, 2013). It was emphasised that participation was voluntary and that participants had the right to withdraw at any time.

4.6 | Data analysis

A phenomenological hermeneutical analysis inspired by Ricoeur's theory of interpretation was performed to disclose the underlying meaning of the text. This approach is well-suited for taking life experiences into account when analysing texts, and it has the advantage of moving dialectically between comprehension and explanation. It includes three steps: naïve reading, structural analysis, and critical analysis and discussion (Lindseth & Norberg, 2004, 2021). All authors participated in the analysis.

First, a naïve reading of the interview transcript was conducted with an open mind 'to grasp its meaning as a whole' (Lindseth & Norberg, 2004, p. 149). In this stage, the researchers adopted a

Gender	Female	Male		
	14 (87%)	2 (13%)		
Age	Mean	Min	Max	SD
	36.1	27	52	7.3
Times	Number of times participation in SBL before entering postgraduate nursing education			
Mean	5.6			
Min	0			
Max	15			
SD	4.6			

TABLE 1 Participant's demographic characteristics

phenomenological attitude, one which involved opening up to the phenomenon described in the text by setting aside any prior assumptions about it—a technique well known as bracketing—to articulate the participants' understanding of the text in a phenomenological context (Lindseth & Norberg, 2004, 2021).

During the naïve reading, the first author read all the transcribed interviews several times, and the second and last authors read three of the interviews several times and discussed them with an open mind to understand the full meaning of each. Then, in the structural analysis, the first author used NVivo¹² when dividing the text into meaning units. This stage included reading the text several times to generate condensed descriptions that revealed its meaning (Table 2). In this stage of the analysis process, all researchers discussed the units of meaning and identified subthemes and themes. The naïve reading established a verification of these themes. To achieve final comprehension, the text was read as a whole, and the naïve understanding and the themes were reflected on, discussed and interpreted in light of the theory and relevant literature (Lindseth & Norberg, 2004, 2021).

5 | RESULTS

During the naïve reading, three themes emerged: competence in handling acute situations, competence in interprofessional teamwork and professional identity development. The themes with entailed subthemes (Figure 1) are presented individually to explore each theme in depth.

5.1 | Competence in handling acute situations

Participants felt they had developed their competence in handling acute clinical practice situations as recent graduates as a result of experiencing ISBL during their postgraduate education. They identified expanded knowledge and work-related skills in their general competence development. Also, they noted increased competence in prioritising, better-developed coping strategies for tolerating stress, and better competence in contingency planning.

5.1.1 | Development of general competence

Participants highlighted that they developed relevant knowledge and skills (general competence) through ISBL, which allowed them to face acute situations with understanding and preparedness as recent graduates.

P4: If you know the basics and have a good experience [through ISBL], you manage it [basic perioperative nursing tasks]. You manage to handle it a little better and faster then. Because then you do not have to start thinking about the basic things. Then you can

concentrate and think in a way about what is a little extraordinary.

They felt that combining theory and practice and linking this through reflection prepared them for clinical practice in a constructive way.

As well, participants identified that ISBL contributed to self-insight into identifying what expertise they further required.

P17: I think that was very good... Even though it was experienced as chaotic, and you may not have had control when you were in the simulation situations. Then, in practice, will it be these [simulation situations] that you look back on in order to improve, or to reflect on how you could improve.

Participants expressed that they gained knowledge and skills as a basis for continuing learning when entering clinical practice. As newly qualified perioperative nurses, they felt that they further developed their competence every time they faced an acute situation.

P11: You may not be able to simulate everything, all situations, but you build experience as small stones that, in a way, grow into a large wall. And all this is important!

Participants also said they felt safer when encountering acute situations similar to those they had experienced in ISBL as opposed to those that they had not experienced in ISBL. They also reported that they reflected on their ISBL experience, called upon the knowledge and skills they had gained and applied them in clinical practice as recent graduates.

P1: The first time I participated in an acute operation as a recent graduate, I thought of the time we simulated a caesarean section... I used this [knowledge] a bit then. In a way, I went into a mode where I watched and didn't say anything to save time, and things had to happen a little faster then. So, I went into this mode where I filtered out some other thoughts to become more attuned to the situation.

5.1.2 | Competence in prioritising

The participants said that ISBL helped them to develop skills in prioritisation in acute situations, providing greater understanding and developing competency in prioritisation as recently graduated perioperative nurses.

P17: Because you stand there too [in the ISBL], you learn and gradually prioritise what can wait and what cannot. With a caesarean section, you learn that

TABLE 2 Examples of the structural analysis

Meaning units	Condensed meaning	Subthemes	Theme
P10: Going through simulation [participating in it] so that you are prepared in a way. Because you have to practice CPR, as you cannot start practising in real life, you learn to know what to do when it happens. You learn every time you practice. Then you gain a foundation of what you learned then. At least then you have it in the back of your mind.	Going through it to be prepared. You have to practice and cannot start in real life. Then you know what to do, at least you have it in the back of your head. You learn every time you practice and build a foundation.	Development of general competence	Competence in handling acute situations
P16: In the simulation, you got good guidance and explanation of why you do things in a special order and what's important to prioritise. The most important things were explained to us also, like that it's not so important to have a tidy table when it's about saving the life of a small baby.	In simulation you get guidance, and explanation why you do things in a special order, and what is important to prioritise. It is not so important to have a tidy table, it's about saving a small baby.	Competence in prioritising	Competence in handling acute situations
P14: Because there's a lot of equipment and many things that you can read about, it is [the feeling] to have it in your hands and see how it really works, which is important, and you know that people are waiting for you to do the right thing.	There's a lot of equipment, and you can read about it, but it's [the feeling] to have it in your hands and see how it works, it's important and people are waiting.	Competence in working in stressful situations	Competence in handling acute situations
P1: You have to think of a worst-case scenario. You have to be prepared that if it <i>can</i> happen, it <i>will</i> happen, and you must be able to do this and that. It's a constructive attitude, in a way. Yes. Hm. In any case, you should not rule out that if there is a potential chance of something happening, you must be able to deal with it then.	You have to think of a worst-case scenario, to be prepared that if it happens, you are able to do this and that. It's a constructive attitude. If there is a potential chance of something happening, you must deal with it.	Contingency-planning competence	Competence in handling acute situations
P5: Yes, I think I saw very clearly for the first time that here we have to talk together. And that communication in the team is important, and all parts of the team depend on having good communication. How far have we come? And how far have you come? When can I start washing? When is the time to cover? So, all the time. That the whole team must work together to reach the goal then, because, before the simulation, I think you are so focused on your own role, you are so focused on the one task you have, and do you think that it's the task that determines whether you have an operation or who will be in control. So, when you simulate, you see that here, there are several people who have to work together and communicate for the surgery to happen.	I saw clearly that here we have to talk together, and that communication in the team is important, that the team depends on good communication all the time, and we work together to reach the goal. Before the simulation, you are focused on your own role and task, and when you simulate, you see that there are several people who work together, and the teamwork and communication.	Interprofessional communication competence	Competence in interprofessional teamwork

TABLE 2 (Continued)

Meaning units	Condensed meaning	Subthemes	Theme
P17: Because there is something that I like very much about an operations department, we have very different roles but mesh very well together. Practicing it when you are a student to understand the different roles is very useful too. Now I know that not everyone goes to a hospital where the perioperative nurses and anaesthesia nurses work well together. Still, I experience that where I work, it works very, very well. Better than a lot of places in the country. I kind of feel that it was something where we got the basics of it from the simulation. You see that was what they do, and you have a little understanding of what the other professional students were struggling with. They saw what I was struggling with. That together we could solve the tasks, and that were really okay.	I really like it that we have different roles but mesh very well together. When you are a student, practising to understand the different roles is useful. Not everyone goes to a hospital where everyone works well together. I experienced that it was something that you get the basics of by simulation. There was a little understanding of what the students in the other professions were struggling with and what I was struggling with, and together we solved the tasks, and we were okay.	Interprofessional collaboration competence	Competence in interprofessional teamwork
P4: In a way it gives you a little security. That yes, okay, I handled it, actually in a usable way. It wasn't perfect, but I handled it. So, in a way it's security to take with you. Then I think in a way that's what's important with the simulation, that you get to practice under safe conditions, and in a way you can get things in your hands a little, so you feel that you'll actually be a bit prepared when you encounter situations in real life.	It gives you security. I handled it. It wasn't perfect. In a way it's security to take with you. It's important to practice under safe conditions, and you can get things in your hands, so you feel prepared to encounter situations in real life.	Development of self-confidence	Professional identity development
P11: The very roles that people have, and that there is a leader, a surgeon, an orthopaedist, and a bioengineer, so I have got them with me. That all participants in the trauma team must have their place. Everyone is important. Furthermore, I am part of the team, and it has made me very proud that perioperative nursing is a part of this.	The roles that people have, and that I have them with me. That all participants have their place, and everyone is important. I am a part of the team and proud that perioperative nursing is a part of this.	Belonging to a profession in an interprofessional team	Professional identity development

something can wait for a period of time to prioritise having a knife [scalpel] and getting the baby out.

should be fine, but you should save lives and do it as safely and quickly as possible then. Yes, she [the supervisor from the hospital] had a great focus on that.

The participants viewed it as essential that the knowledge-generation occurred simultaneously with the experience in ISBL and that this was guided by competent people within their own profession, thus providing them with relevant knowledge about prioritising in an acute situation.

The relevant knowledge gave the participants an explanation and thus a greater understanding of what and how one should prioritise in an acute situation and then anchored the experience and the knowledge behind it.

P16: I remember having the supervisor [an experienced perioperative nurse] involved from the hospital; she was very good at commenting on what was important to focus on in an acute situation. Often, it's about saving lives. It's not about having the cleanest [table] possible or that it should look the best, or that the instruments

P16: In the simulation, you got good guidance and explanation of why you do things in a special order and what's important to prioritise. The most important things were explained to us also, like that it's not so important to have a tidy table when it's about saving the life of a small baby.

Additionally, they expressed that observing others prioritise in an acute situation prompted self-reflection concerning what it was wise to prioritise and how. By seeing others determine their priorities, observing participants could reflect on what was best to prioritise in an acute situation.

Some participants expressed that they did not have enough ISBL experience and theoretical knowledge to gain competence in prioritising when they entered clinical practice as recent graduates.

P18: It's not easy in the beginning, and we didn't simulate enough, I think. Prioritising was and is difficult. It's really difficult to prioritise.

5.1.3 | Competence in working in stressful situations

Participants expressed that it was preferable to experience their own reactions under controlled situations, as in ISBL when facing acute situations.

P4: It's nice to experience [things] in controlled ways because when you get into a similar situation, you recognise yourself and your reactions. So, you can calm down a bit so that you can see what's happening and get an overview.

They expanded their knowledge regarding how they experienced stress and what coping strategies they could use.

P4: Actually, a bit like that in general, that in a way what I learned the most from the simulation, was what I said in the beginning, that you have to feel a little of your own adrenaline, a little about how you reacted, a little of it to learn... to try to calm myself down a bit then. If you have a lot of adrenaline in your body, then you become very clumsy. Then you are all thumbs.

Participants expressed that stress was perceived differently in an ISBL as opposed to a real acute situation.

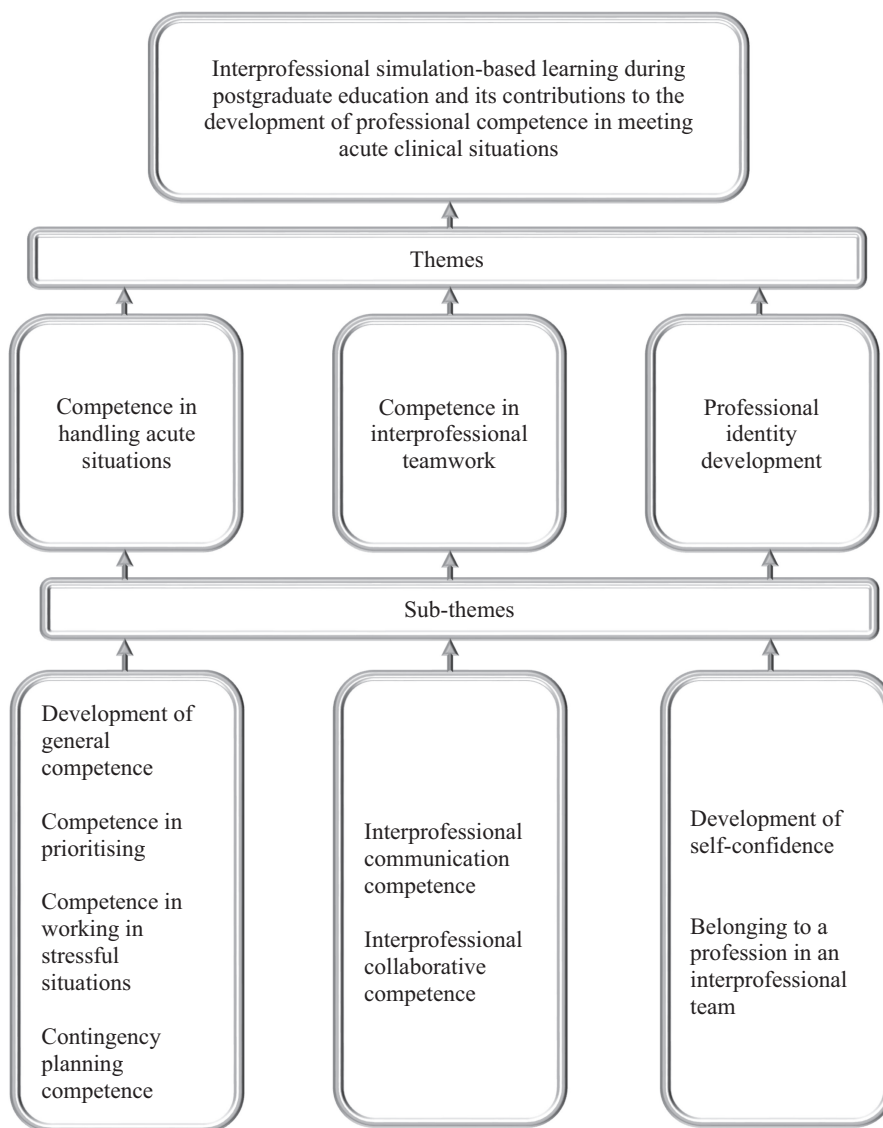


FIGURE 1 Overview of themes and subthemes

P18: Yes, the things that occur in real situations [are] more challenging than they would have been in a simulation. Suddenly, a slightly different mindset requires concentration, and there is another form of stress that makes you almost panic. So, it is different in real situations. But it is still good to know how it should be.

Participants also reported that when in an actual stressful situation, such as an acute situation in clinical practice, they experienced having more time to handle it than during ISBL in education. The participants reflected upon the realism of ISBL and the time things take in an ISBL compared to an acute situation in clinical practice.

P17: You felt that you had more time when we had a simulation because things take longer in reality than when you simulate. Things go very fast because [even] if you just put a central cannula in a doll, for example, now I have to put in a central cannula... it takes ten seconds instead of one minute. I kind of experience that you have a bit more time. Then, there's something about being in a stressful situation before knowing how one reacts. Because, as I said earlier, when you're in a simulation, it becomes real, and you get carried away, at least I do. I stay in that moment and immerse myself in it as if it was real. It's like that for the most part, but of course, it's a bit different with real patients, but it means that you're a little prepared for how you react, and you get to breathe and think about it.

The participants expressed that having experienced working in a stressful situation was important and that this was impossible to read up. Furthermore, it meant a lot to have that experience and competence when facing an acute situation in clinical practice as a new graduate.

P14: Because there's a lot of equipment and many things that you can read about, it is [the feeling] to have it in your hands and see how it really works, which is important, and you know that people are waiting for you to do the right thing.

Although they experienced different kind of stress in ISBL compared to real acute practice situations, their participation in ISBL had still provided useful experience and knowledge about working in stressful acute situations.

5.1.4 | Contingency-planning competence

Through ISBL, participants stated that they gained increased understanding that, as perioperative nurses, they had to expect the

unexpected and develop competence in contingency planning. They stated that things usually went as planned, but that they had to manage to rapidly adapt and act as the situation dictates.

P1: We had a simulation where we had a patient in the prone position, where we suddenly had to turn the patient over again due to ventilation problems. And it's just like that, such a fantastic, it was actually a fantastic example, because I have experienced it so many times now since I have started working, and anything can happen here. You cannot expect things to go as planned.

As newly graduated perioperative nurses, they described that they continued working to prepare themselves mentally for the worst possible scenarios. They did this in different ways, such as going through the trauma equipment, reading procedures or working as if it was an emergency even when the surgery was planned. They found this to be meaningful because if something suddenly happened, they felt prepared to manage the acute situation.

P19: And what I actually learned [through ISBL], and it stayed with me, is to find and have the knives [scalpels] and compresses first. Everything else you can find afterward. And I've taken that with me.... So, I find the compresses and knives [scalpels] first, whether it is an acute or a planned [caesarean section]. Then, I find the others afterward. I do this consistently because, yes, because then there won't be any problem when an acute one happens. The compresses and knives [scalpels] are there. Yes.

Furthermore, participants reported that upon graduation they lacked the ability to foresee all the turns a situation could take, because they were not experienced enough and were unequipped to prepare themselves for all eventualities.

P17: The disadvantage that I experience is that you don't have all the scenarios in your head of what can happen as a recent graduate. You haven't experienced so much, so you invent things, and they run in your head.

They stated that the professional knowledge they had gained resulted in how they eventually acted in acute situations.

P17: But it's the professional knowledge that you have, that action competence, to be able to do something if something should happen. Oh, what you go through in your head, then the action competence [helps] you manage to handle things when something happens.

5.2 | Competence in interprofessional teamwork

Through ISBL during their postgraduate education, participants gained knowledge and practical experience that increased their competence in interprofessional teamwork as recently graduated perioperative nurses working in interprofessional teams. They discussed the development of communication and collaborative competence in interprofessional teamwork.

5.2.1 | Interprofessional communication competence

Participants reported that they gained knowledge and understanding of the importance of clear communication, repeated messages, and conciseness in acute situations. They had the opportunity to practise closed-loop communication and experience how useful this was.

P15: This here with communication. Clear and with repeating messages, and concise. Yes, that with practicing communication. I feel that I have a little of that inside of me and an increased awareness of its importance. Yes, in all situations, really, but especially in acute situations.

Practising communication through ISBL and then reflecting on this while debriefing expanded their knowledge regarding effective communication in acute situations. As recently graduated perioperative nurses, they found this knowledge and skills beneficial for daily communication in interprofessional teams in clinical practice. Also, they gained competence in communication as they reflected further during their clinical practice after graduation.

P10: I think that was part of it, communicating with each other when we had that simulation. Further on, you got to use it a little more in practice. Let's put it that way. Because then you had more time and room to think about how you're doing it. When a nurse is standing and receiving, when the trauma manager says 'Yes, blood pressure 140 over 70, yes, blood pressure 140,' you confirm it. Oh, that was a role we got to have when we stood there [in the ISBL]. Yes, when we had to be the nurse who was writing it down.

Additionally, the participants expressed that they, through ISBL, experienced and understood how important it was that the leader of a trauma team communicates clearly.

P16: Yes. In retrospect, I see that I wasn't clear enough myself, on things I was unsure of... Being in trauma reception, I saw the difference between having a clear

team leader and not having one. There's a huge difference. As a recent graduate, it's important for everyone, but it's essential to have a clear leader.

5.2.2 | Interprofessional collaborative competence

Participants reported that ISBL during their education had developed their competence in interprofessional collaboration. As members of teams in interprofessional contexts, they experienced and understood each other's professional roles and the importance of team cohesion. They also gained insights into their own professional roles and how that could relate it to other roles in the team.

P18: It's a little easier when you know what kind of people work together in such a situation.... What are these different people doing? What are their work tasks? A caesarean section situation is one thing, but also in a trauma situation where... there are many people and knowing in advance who they are and what they do.... I have thought afterwards that it has been valuable from the simulation. It improved my handling of acute situations... at least me, in a real situation.

The participants said that ISBL gave them insights into the specific tasks that the different professions performed in the team during an acute practice situation. They also gained insights into how dependent they were on each other as being of different professions, not only as a team but also as individuals, to work coherently together to ensure patient safety. Additionally, they perceived the amount of time needed for tasks undertaken by different professionals, such as patient intubation.

P17: Of course, we had a slightly different focus. The anaesthesia nursing students had their focus, while we had our own as the perioperative nurses. But there is something [beneficial] about seeing each other work, to see the time spent, for example, intubating a patient before starting to do something more with the patient.

Seeing the roles of each professional performed in this way, they deepened their appreciation and understanding of team dynamics.

The participants said they gained insights into their own professional roles and tasks in acute situations, which increased their knowledge of what to do in such a situation.

P11: Even though I am a recent graduate, I know what is going to happen. The simulation has given

me a greater understanding of these situations. Yes, absolutely, even though I am new, I am not completely unprepared. No, I am not quite that. Because I know the basics, but I cannot control what will happen according to what kind of patient is coming and what condition he is in. I can be unprepared of course. But I understand what is going to happen. I know about my role, and the tasks and what is expected of me. Of course, it [ISBL] helped me a lot. Very much.

Defined roles gave the participants a sense of security, but they could also practise outside of their own roles and help each other after learning how to work together with others in the team.

P10: Like in a trauma team, for example, then, there are an awful lot of different people in that team. You have bioengineers. You have emergency nurses. You have doctors, so many different roles. Then I feel that it is constructive that the roles are so clear as like when we simulated at school. We have practiced it. It is kind of like, you know, yeah. Everyone does their thing and knows who to talk to and who to ask. You know who the leader is. It kind of slides so easily. In a way.

Through ISBL, participants observed how personal competence affected interprofessional teamwork in acute situations. Calm, confident personalities created a positive atmosphere in interprofessional collaboration.

P14: I saw that teamwork depends on who you are during acute situations. How the rest of the team handles it. Because there can be a huge difference in the atmosphere when handling such situations, you feel it as soon as you enter, how the stress level is, and how their mood is. Then it could fast spread to the rest of the team. I think it is a bit person dependent. We are a team, so regardless of how I had handled it, one has experienced being affected by the rest then.

The opposite was also experienced, creating stress when people acted without clarity, leading to uncertainty and less security.

5.3 | Professional identity development

Participants described how ISBL may have influenced their self-confidence as recently graduated perioperative nurses. Furthermore, ISBL supported an incipient sense of professional identity when working as part of an interprofessional team, as they experienced increased clarity regarding roles.

5.3.1 | Development of self-confidence

While observing themselves on film and receiving professional feedback, participants reflected on the performances of themselves, the others and the team in the ISBL scenario. This enabled them to gain an incipient understanding regarding the professional demands on a perioperative nurse in acute situations. Gaining a sense of mastery in ISBL, they felt increased self-confidence by perceiving that they too could also handle and face acute situations in clinical practice, which was important as recent graduates in perioperative practice.

P12: But it [the simulation] has made me realise that [I am able to manage an acute situation] and has given me feelings that I have been able to manage [being in an acute situation]. Call it mastery then because I have managed [being in an acute situation]. I have also been involved in a trauma situation and then.... I managed. I have also been involved in an acute situation and have been up to not exactly maximum speed at the caesarean section.... So, on the whole, that one benefits from being in it [acute situation], absolutely!... I have experienced handling that [manage being in an acute situation].

Participants said that their experiences of increased competence and mastery led to a feeling of security and self-confidence. In ISBL, debriefings were highlighted as essential, as these gave rise to such experiences through reflection and constructive feedback. This promoted increased self-trust in having the required knowledge and skills to manage acute situations. However, ISBL could also result in experiences that led to decreased self-confidence. One participant mentioned an experience during ISBL as a feeling of complete failure, as they had gained no sense of mastery, resulting in a negative experience.

P2: I was a little put off by that simulation. Thought how should this go? Really. Interviewer: Was that the feeling you went home with at the end of the day? P2: Yes, I was a little stressed then. There was no feeling of mastery at all, and I showed that it was not representative of how I am. And how I usually do things and how I perform and function.

Participants found that the transition from leaving their roles as a student with few responsibilities to perioperative nurses with great responsibilities was difficult. They described gaining enough self-confidence to trust themselves as being challenging but possible. They brought forth experiences from being RNs and felt that this could give them a sense of security that increased self-confidence.

P1: But I know with myself that I have been in acute situations as a nurse and, so I lean a little on that. If it

does not necessarily help me there, it helps to think that I have some experience. I have some, I have solved some situations before, so maybe I'm relying on that too, true.

As recent graduates, the participants explained that they needed time and experience to become more self-confident and to build up enough self-confidence and assertiveness to raise their voices and become full-fledged participants in a team.

P8: It is more about having to dare to have 'pointed elbows' and taking my place [in the team] or space. That is perhaps more of what I have found challenging. To not dare to take space in the room if you understand. Yes. When cutting clothes, for example [trauma situation]. If you are a little too careful, then it is said [in the room] that you have to get rid of those clothes. Because there are so many people there, and you think that little me should stand in the corner.

5.3.2 | Belonging to a profession in an interprofessional team

Participants noted that through ISBL they had become more aware of their professional role in interprofessional teams. This gave them a sense of belonging to their future profession, and thus an emerging sense of identity.

P11: I was in a caesarean section team one day, and the other day I was in a trauma team. I have to say that I mostly draw on the simulation of trauma, because I recognised that situation again when I was in trauma, when I was a perioperative nurse on trauma.

Participants also pointed out that they became more aware of their professional roles through debriefing, during which the participants received expert feedback and reflected on their roles as perioperative nurses.

P1: We got to see afterwards and speak in a safe environment about the simulation situation. I think it was a little scary, as I said, in the beginning before we went through. But I benefited greatly from it. Because I think it was constructive feedback I got, and I felt mastering within things we did in the simulation. We got to see it again. I think that raising awareness of cooperation and prioritisation is very useful.

Also, participants said that it was essential that their profession was included in the ISBL to feel a sense of professional identity and pride.

P11: The very roles that people have, and that there is a leader, a surgeon, an orthopaedist, and a bioengineer, so I have got them with me. That all participants in the trauma team must have their place. Everyone is important. Furthermore, I am part of the team, and it has made me very proud that perioperative nursing is a part of this.

In their role as perioperative nurses during ISBL, the opposite occurred when they did not receive the same focus and attention as the other students in other professions. Then they felt like extras in the scenario. This gave rise to a sense of being a less important part of the interprofessional team, with reduced professional identity development.

P14: I remember we had a simulation about caesarean section. Then, I remember that there was a lot of focus on anaesthesia... Yes, so I felt that perioperative nursing came a bit in the background.

6 | DISCUSSION

This study has explored recently graduated perioperative nurses' experiences of interprofessional simulation-based learning during postgraduate education and investigated whether and how this learning approach contributed to the development of their professional competence in meeting acute clinical situations. Our results reveal that the recently graduated perioperative nurses did experience ISBL as having contributed to the development of their professional competence in meeting acute situations in their clinical practice. The benefits included competence in handling acute situations, competence in interprofessional teamwork and professional identity development.

The results of this study highlight the function of ISBL in facilitating the development of relevant knowledge and skills as a general competence, allowing recently graduated perioperative nurses to face acute situations with understanding and preparedness. This was developed through their experience of (simulated) acute situations followed by reflection, which connected clinical and theoretical knowledge for practice and thus contributed to an active and constructive learning process.

Learning through reflection is well known in the literature emphasising that reflection allows students to learn from their experience (Bulman & Schutz, 2013; Schön, 1987). Through reflection, students can gain valuable insights into their practice (Bolg, Dwyer, Doherty, Pignataro, & Renaud, 2020). The study by Barbagallo (2021) further supports this, asserting that reflection promotes the capacity to understand practical performance and substantiate with theory and generates effective professional learning since it is needed to achieve generalisation and application (Barbagallo, 2021).

Our study indicates that the general competence development gained through ISBL augments higher professional development for recent graduates in clinical practice, as participants expressed that

they developed their competence whenever they faced an acute situation. This aligns with a study by Sterner, Ramstrand, Palmér, and Hagiwara (2021) showing not only that experience is vital but also that the amount of experience of acute situations is an important factor in delivering safe care to patients (Sterner et al., 2021).

The participants in this study developed competence in prioritising in acute situations, which is vital for patient safety (Gabrielsen et al., 2009; Gawronski, 2019). Further, they developed competence for working in stressful situation, which seems essential for perioperative nurses as stress can distract attention and lower performance. Hence, it is important for perioperative nurses (and others) to experience working in stressful situations in ISBL so as to learn how to manage this and enhance their performance (Vincent et al., 2021). Additionally, the participants here learned to expect the unexpected through ISBL, which developed their contingency-planning abilities. This also is imperative for perioperative nurses, who work in situations where the patient's condition can change quickly. Unexpected situations occur during surgeries, and perioperative nurses need to be prepared to adjust their plans (Nyberg, Olofsson, Otten, Haney, & Fagerdahl, 2021).

The World Health Organisation (2010) recommends interprofessional collaborative practice to provide safe, high-quality care to patients in acute situations (Gregory, 2020). In our study, the perioperative students participated in ISBL along with students from other nursing specialisations, such as anaesthetic, critical care and paediatric nursing. From a sociocultural viewpoint, participating in ISBL creates valuable interaction between students, generating knowledge and skills (Mylrea, 2018). This study's results support this view by showing that through ISBL, participants gained an increased understanding of the importance of clear and concise communication in acute situations. Furthermore, they reported improved interprofessional collaboration, as they experienced themselves as members of interprofessional teams and perceived the roles of the others and the importance of team coherence.

Educating perioperative nurses to prepare for interprofessional teamwork is imperative for patient safety in acute situations (Beitz, 2019; Lamparyk et al., 2022). In this study, activity theory was applied to understand the development of professional competence using ISBL, and this theoretical framework expanded our understanding of the results (Byerly et al., 2021). According to activity theory, learning occurs when students participate in collective activities and interact with each other towards a common goal (Mylrea, 2018). This learning also occurred in our study as participants developed deeper understandings of the other professionals' roles in the interprofessional team.

ISBL also assisted participants in becoming professionals, as they increased their understanding of their roles and related these to the team's other professional roles, clarifying professional boundaries. Participants in the present study gained insights into how dependent they were on each other as professionals in an interdisciplinary team. This resulted in an increased understanding of each other's roles and work tasks, team dynamics and positive attitudes towards

other professions, which can support the development of more beneficial interactions in team processes (Gregory, 2020). Having a positive attitude regarding each member in the interprofessional team can lead to expanded psychological safety, also defined as how safe a team member feels it is to take interpersonal risks, though, for example, speaking up (Willassen, Jacobsen, & Tveiten, 2018).

The results of this study indicate that participants developed their professional identities through ISBL as they understood their professional roles and the associated demands in acute situations. Bagnasco et al. (2019) stated that building professional identity is an active process leading to an understanding of the context of a professional role, one's practice, and one's commitment to a profession (Bagnasco et al., 2019). Understanding professional identity development has to a large extent been addressed in sociocultural learning theories (Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2014). Johnson, Cowin, Wilson, and Young (2012) concluded that developing professional identity is essential to obtaining knowledge and skills during nursing education. Within a perioperative nursing context, perioperative nursing is described as caregiving in a hierarchical context, one in which speaking up for the patient can be challenging (Willassen et al., 2018). Developing a stronger professional identity and self-confidence can strengthen the courage to speak up in an interprofessional team to ensure patient safety. Rød, Kynø, and Solevåg (2021) supported this, finding that participants experienced this when they became confident through ISBL and found the courage to ask questions and express disagreement.

For our participants, having self-confidence as recent graduates was perceived as valuable, and they described gaining the required self-confidence as challenging but possible. Gaining mastery experiences through ISBL gave participants experiences of increased self-efficacy. This influenced their self-confidence, giving them the perception that they had enough knowledge and skills to manage acute situations in clinical practice as recent graduates.

In previous studies, it was found that ISBL can influence self-efficacy in acute situations (Kaldheim, Fossum, Munday, Creutzfeldt, & Slettebø, 2021), as well as self-confidence (Haddeland et al., 2021). ISBL can also decrease self-efficacy and self-confidence when the experience of failure dominates, as one participant in our study mentioned. Participating in an ISBL scenario, students report experiences of anxiety and stress (Al-Ghareeb, McKenna, & Cooper, 2019), and that these emotions can affect their learning process. Further, how instructors and participants look at poor performance may affect students' willingness to expose themselves and leave their comfort zone (Harland, 2020). Therefore, educators need to provide a psychologically safe ISBL environment, follow ISBL guidelines and devote time during debriefing to reflection and explanations to avoid students leaving ISBL with feelings of unresolved frustration and confusion (Madsgaard, Smith-Strøm, Hunskår, & Røykenes, 2022), and to develop self-efficacy and boost self-confidence.

Experienced-based education like ISBL promotes the development of appropriate self-beliefs in participants, giving rise to changes in self-perception, which can guide them in further training. The participants in this study expressed that their experience as RNs gave

them a sense of security that bolstered their self-confidence, and that they needed time to build up their self-confidence. It seems that building self-confidence and professional identity is a transformative process that begins when students enter education and continues throughout their work.

In the present study, participants stated that ISBL increased awareness of their professional role, resulting in a feeling of belonging to their profession. Being in a representative context, playing out their future role as a perioperative nurse and reflecting over their performance and future professional role, participants acquired a sense of professional identity. Furthermore, a condition for this was that they were included on the same terms as other professions during ISBL. This is supported by Mylrea (2018) who contend that each profession 'learns to function within a particular society or group by internalising values and norms' (Mylrea, 2018, p. 3). This active process involves transforming students into professionals who recognise their profession's values, attitudes and behaviours (Rees & Monrouxe, 2018).

Participants in our study highlighted the usefulness of previous experience. When facing an acute situation similar to one they had experienced in ISBL during postgraduate education, they called upon the knowledge and skills they had gained and applied them in clinical practice as recent graduates. This is in line with other studies where learners reported that they could transfer their gained learning outcomes from ISBL to clinical practice (Fisher & King, 2013; Marker, Mohr, & Ostergaard, 2019). Marker et al. (2019) found that SBL facilitated the transition from being a medical student to becoming a junior doctor. Transfer of competence from one context to another, in our study from education to clinical practice as recent graduates, is used as a metaphor, and it implies that something is 'moved' from one situation to another. According to activity theory, this does not mean that the effects of a prior task and knowledge remain intact; instead, it is a process where transfer involves active interpreting, modifying and reconstructing (Tuomi-Gröhn, Engeström, & Young, 2003).

6.1 | Study strengths and limitations

The first author conducted and transcribed the interviews to ensure correctly reproduced statements. It can improve the trustworthiness of data when the same person interviews, transcribes and verifies the content's meaning.

Four interviews were conducted using Skype for Business, which could have affected the interactions between the interviewer and the participants providing their answers. These interviews were nonetheless rich in text to analyse and interpret. All the authors were involved in the entire process of interpretation; they discussed the interpretations, which according to Sandelowski (1993) is important to ensure high quality in interpreting the transcribed text. Also, the researchers are of different backgrounds and came with different preunderstandings, giving rise to different views to consider and ensuring good internal consistency of the interpretation (Lindseth & Norberg, 2004, 2021).

Within a phenomenological hermeneutical interpretation, our focus is to reveal truths about a phenomenon. We cannot establish causality but reasonably interpret the possible meaning of lived experiences (Lindseth & Norberg, 2021). To provide transparency in the analysis process, quotes from the data material have been included in the descriptions of the results.

7 | CONCLUSION

During postgraduate education, through ISBL perioperative nurses developed professional competencies to deal with acute situations as recent graduates. ISBL is essential for practising acute situations, as it generates effective professional learning by integrating theoretical knowledge with practice and linking this through reflection. This has allowed recently graduated perioperative nurses to face acute situations with understanding and preparedness. As well, professional identity is developed, as through ISBL participants gain self-confidence and enhanced awareness of their professional role in an interprofessional team.

8 | RELEVANCE TO CLINICAL PRACTICE

Recently graduated perioperative nurses experience ISBL as having increased their self-efficacy and self-confidence, strengthened their belief in their own knowledge and skills in managing acute situations and developed their professional identities. This is essential for patient safety, as it improves competence and enables perioperative nurses to speak up when working in an interprofessional team. As newly graduated perioperative nurses, they transferred the competence development from the ISBL in postgraduate education into clinical practice and improved their performance. This finding is essential and supports the necessity of implementing ISBL into perioperative nursing education to prepare students for clinical practice.

AUTHOR CONTRIBUTIONS

All authors, Hege Kristin Aslaksen Kaldheim, Mariann Fossum, Judy Munday, Johan Creutzfeldt and Åshild Slettebø, fulfil the journal's authorship policy and have approved the final text. Hege Kristin Aslaksen Kaldheim involved in collection data and performed as transcriber. All authors Hege Kristin Aslaksen Kaldheim, Mariann Fossum, Judy Munday, Johan Creutzfeldt and Åshild Slettebø analysed and prepared manuscript.

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CONFLICT OF INTEREST

The authors declared no conflict of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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