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Review Article

Simulation-Based Training Promotes Higher Levels of Cognitive Control in Acute and Unforeseen Situations

Ingunn Pedersen, MSN, RN[a,*], Anne Lee Solevåg, MD, PhD[b], Marianne Trygg Solberg, RN, MSN, PhD[c]

[a]*Intensive Care Unit, Helse Nord- Trøndelag HF, Sykehuset Namsos, Namsos, Norway*
[b]*Department of Pediatric and Adolescent Medicine, Akershus University Hospital, Lørenskog, Norway and Lovisenberg Diaconal University College, Oslo, Norway*
[c]*Lovisenberg Diaconal University College, Oslo, Norway*

KEYWORDS
simulation-based team training;
learning;
intensive care unit;
ICU;
patient safety

Abstract
Background: Simulation-based training has been recommended to improve patient safety. This study summarizes intensive care nurses' perceptions of what facilitates learning during simulation-based team training in preparation for acute and unforeseen situations.
Methods: This study is a literature review with thematic analysis.
Results: Seven qualitative articles were included. Synthesis with a cognitive perspective revealed six key factors for intensive care nurses' learning: (a) relational coordination, (b) analytical cognition in task management, (c) situational awareness, (d) self-awareness, (e) cognitive control, and (f) high-quality communication within the team.
Conclusions: The main factor that contributes to learning in simulation-based training is that nurses have cognitive control when time allows the use of analytical thinking.

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Intensive care for the most severely ill patients has a high risk of error and adverse events, and intensive care units (ICUs) have multifaceted systems to manage complex situations that require a high level of knowledge, skills, and competence (Guidet, 2016). One of the main threats to patient safety is health care professionals' lack of knowledge and skills (White, 2012), and the goal of patient safety initiatives is to reduce the risk of errors (Guidet, 2016). Norwegian health care legislation states that nurses are responsible for performing their duties in a safe and competent manner (The Health Personnel Act, 1999). In addition, the

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* Corresponding author: ingunn.pedersen@helse-nordtrondelag.no (I. Pedersen).

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employer is responsible for providing opportunities for training and education (The Health Personnel Act, 1999). The World Health Organization (WHO, 2000) recommended simulation-based training, and the Norwegian patient safety program (The Patient Safety Program ''I Trygge hender'', the Norwegian Ministry of Health and Care Services) included simulation-based training. The program challenged health professionals to develop patient safety initiatives adapted to new technology and advanced patient treatment (Struksnes, Hofmann, & Ødegården, 2015). Despite international data indicating that approximately 50% of patient injuries can be avoided, the national patient safety program did not succeed in reducing the incidence of serious harm to patients from 2013 to 2016 (The Patient Safety Program, 2017). About 9% of all in-patients in Norway experienced serious harm that was sometimes fatal (The Patient Safety Program, 2017).

Key Points

- Intensive care units have multifaceted systems to manage complex situations and require a high level of knowledge, skill, and competence.
- Simulation-based team training is a good learning method to increase the level of knowledge, skill, and competency in health care professionals.
- The main factor that contributes to learning in simulation-based training is that nurses have cognitive control by using time and analytical thinking.

Changes in infrastructure, processes and culture, implementation of bundles and multifaceted programs, and education and training of staff have proven to be effective in reducing the incidence of errors associated with ICU activities (Guidet, 2016). In addition, simulation-based skill and team training has been increasingly used in clinical practice (Shekelle et al., 2013; Weaver et al., 2013). Because some medical emergencies occur infrequently, it is particularly important that intensive care personnel can increase their exposure and train in simulated settings (Dhawan, Kapoor, & Choudhury, 2016). Learning arenas other than clinical experience, including simulation-based training, are therefore needed to acquire and maintain competencies to handle many acute and unforeseen situations (Guidet, 2016).

The U.S. Air Force has used a learning method called crew resource management since the mid-1980s (Struksnes et al., 2015). Simulation-based team training (SBTT) derives from crew resource management and is now an established method to increase health care professionals' level of knowledge, skills, and competency (Barry Issenberg, McGaghie, Petrusa, Lee Gordon, & Scalese, 2005; The Health an Care Ministry, 2012). SBTT mimics a clinical situation with a manikin or a simulator to allow personnel to practice simple or more advanced collaborative skills (Brinchmann-Hansen, Wisborg, & Brattebö, 2004). SBTT also allows participants to practice communication and necessary skills in a safe and controlled environment (Fanning & Gaba, 2007). SBTT traditionally has four phases prepared and led by a facilitator: (a) the preparatory phase, in which the topic and relevant theories are presented, (b) the briefing phase, in which participants are introduced to the location, scenario, and learning goals, (c) the accomplishment phase, in which they act the scenario, and (d) the debriefing phase, in which participants systematically reflect on what happened during the scenario (Breivik, Johnsgaard, & Reime, 2016; Fanning & Gaba, 2007).

Studies performed in ICUs showed improvements in teamwork and team behaviour after SBTT (Shekelle et al., 2013) and found that SBTT increased self-efficacy (Faust, 2017). SBTT has been used to educate resuscitation teams and, increasingly, in anaesthesia and surgical training (Shekelle et al., 2013), but few studies have examined factors contributing to ICU nurses' learning. It is important that the SBTT facilitator has knowledge about factors that may facilitate learning. That way, SBTT can be optimized. Thus, the aim of this review was to summarize and provide insights into research surrounding factors that contribute to ICU nurses' learning during SBTT in acute and unforeseen situations. The following research question was developed: What does the research tell us about intensive care nurses' perception of facilitating factors for learning during SBTT?

Theoretical Framework

The aim of SBTT for intensive care nurses is to increase their level of knowledge and skills in managing acute and unforeseen situations. In this review, the theoretical perspective of Hammond's cognitive continuum theory (CCT) was chosen as inspiration for the analysis because it highlights the process of informed decision-making and illustrates how different judgement tasks are suited to different processes being taught (Hammond, 1996). In addition, Gittell's theory about relational coordination was used in the analysis to describe how team members can learn from each other during coordination and communication (Gittell, 2009).

Cognitive Continuum Theory

Hammond (1996) defines judgement as a process in which people apply their knowledge. The concepts ''modes of cognition'' and ''task properties'' are essential in CCT. In ''modes of cognition,'' dimensions include degrees of analytical and intuitive cognition in task management, and ''task properties'' varies from ill structured to well structured (Cader, Campbell, & Watson, 2005). Analytical cognition is a process that is slow, conscious, and

consistent. It is associated with cognitive control, slow data processing, conscious awareness, a task-specific organizing principle, and confidence. A well-structured task (i.e., the task property) induces analytical cognition in task management (Cader et al., 2005). Conversely, an ill-structured task often induces intuitive cognition with a rapid and unconscious form of data processing that involves less cognitive control, less conscious awareness and averaging organizing principle, and low confidence in its method (Cader et al., 2005). Consequently, wrong decisions can result from a high degree of intuitive cognition. The time available affects the degree of analytical cognition used in a situation (Hammond, 1996).

Theory of Relational Coordination

Relational coordination describes how the tasks are managed between professionals, the relationship between roles, and how communication works (Gittell, 2009). Relational coordination has three relational dimensions: shared goals, shared knowledge, and mutual respect (Gittell, 2009). Shared goals are important in establishing ties between professionals and agreement in decision-making (Gittell, 2009). In sharing knowledge, it is important to clarify who needs to know what and to emphasize the degree of urgency. Mutual respect is important to acknowledge the expertise of others (Gittell, 2009). Relational coordination also encompasses four dimensions of high-quality communication: problem-solving, and frequent, timely, and accurate communication (Hoffer, Dana, Susan, & Christine, 2008). The relational dimensions of the theory are reinforced by the communicational dimensions (Spreitzer, Cameron, & Gittell, 2011). Frequent communication results in knowledge creation through repeated interactions. Timely communication is important because delayed communication may lead to errors. Accurate communication is important for effective decision-making (Spreitzer et al., 2011).

Methods

We performed a literature review, which is a systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed work produced by researchers (Fink, 2014). Systematic searches were conducted in January through March 2018 in the Ovid Medline, CINAHL, and PsycINFO databases. To identify other relevant articles, we screened reference lists, searched the name of key authors, and used the snowball method. The search used a population, exposure, and outcome format (Bettany-Saltikov, 2012), and the keywords used in the different databases are described in Table 1.

Study Selection

The search results were reviewed, and relevant studies were chosen by title, abstract, and predetermined inclusion criteria. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram was used to structure the process of systematic article retrieval (Moher, Liberati, Tetzlaff, & Altman, 2009). After screening, 24 articles remained (see Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow chart, Figure). The following inclusion criteria were used: qualitative design, interviews, intensive/critical

Table 1 Search Terms Presented in Population, Exposure, and Outcome Format

Database	Population	Exposure	Outcome
CINAHL mesh headings	Intensive Care Units, Critical Care, Critical Care Nursing, Specialties Nursing, Education, Nursing, Clinical Competence	Patient simulation	Learning
Textword	Intensive care unit*, icu, critical care, critical care nursing, nursing specialties, intensive care nurs*, critical care nurs*, intensive care ward, education nursing, clinical competence, education nurs*	Simulation training, high fidelity simulation, in situ simulation, simulation based team training, simulation	Learning, learn*
Medline/PsycINFO	Intensive care units, critical care, specialties nursing, critical care nursing, education nursing, clinical competence, specialties nursing	Simulation Training, Patient Simulation	Learning
Textword	Intensive care nurs*.tw, critical care nurs*.tw, icu.tw, intensive care unit*.tw, intensive care ward*.tw, nursing specialities.tw, critical care.tw, intensive care.tw, education nurs*.tw	simulation.tw	Learn*.tw

* Truncation seeks the trunk of a word to include both singular and plural forms and various variations of the word (Søk & Skriv, 2019).

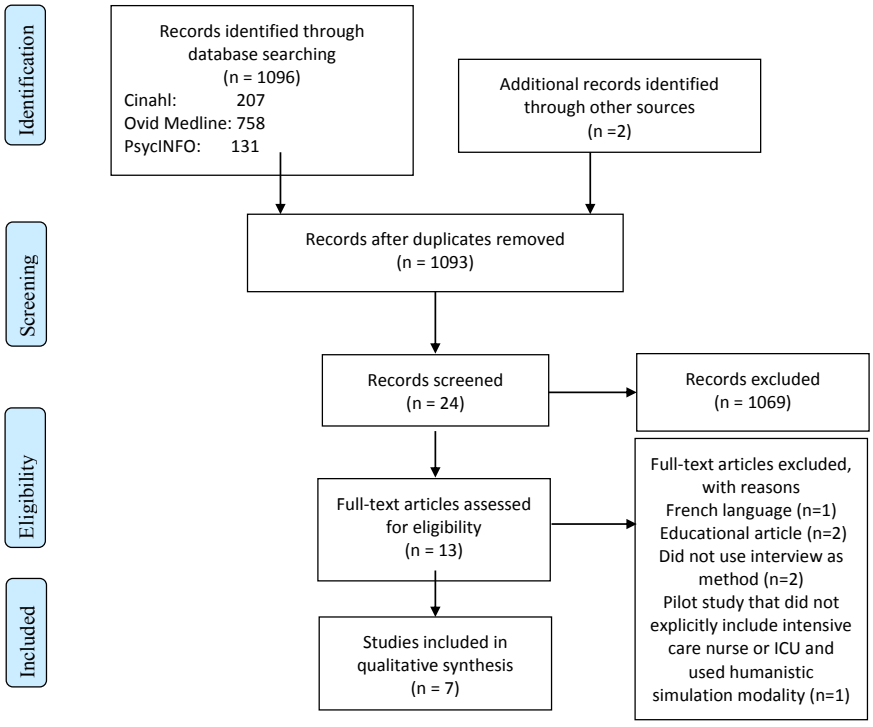

Figure Study selection.

care nurses or nurses in an intensive/critical care unit, SBTT, and research articles published in Norwegian, Swedish, Danish, German, or English. The search was limited to articles published between 2010 and 2018 (current) to include the most recent publications. Articles studying medical residents and baccalaureate nursing students were excluded.

Quality Appraisal

The quality of the included articles was evaluated using a checklist for evaluating qualitative research available from the Norwegian Institute of Public Health (Norwegian Institute of Public Health, 2014). The checklist includes nine questions to assess the quality of the articles based on the following: (a) how the aim of the study is formulated, (b) if the method is appropriate to get answers to the problem, (c) the trustworthiness of the results, analytical method, background conditions, substantiated findings, and ethical considerations, (d) what the results are, and (e) useful findings. Each question is categorized as ''yes,'' ''no,'' or ''unclear,'' and the total score classifies the article as high, medium, or low quality (Norwegian Institute of Public Health, 2018). The quality assessment of the included articles is presented in the literature matrix (Table 2).

Data Analysis and Abstraction

The seven articles that met the inclusion criteria are presented in Table 2.

To determine what research tells us about factors that intensive care nurses perceive as contributing to their learning during SBTT, the articles presented in Table 2 were used for further thematic analysis. This approach to the synthesis of findings of qualitative research is often used in systematic reviews that address questions about people's perspectives and experiences (Booth, Sutton, & Papaioannou, 2016). The thematic analysis was divided into three stages: (a) coding text, (b) developing descriptive themes, and (c) generating analytical themes (Booth et al., 2016; Gough, Oliver, & Thomas, 2017; Thomas & Harden, 2008). In the first stage of this analysis, the relevant data were extracted from the abstract, results, and conclusion of each study before the text was coded to capture the features and content, see Table 2. Second, findings that corresponded to the research question were divided into descriptive themes. In the third stage, the elements were grouped into four main themes. These themes summarize the findings from the seven included studies (see example in Table 3).

Results

We identified six key factors through thematic analysis of the seven included articles: (a) Learning by relational coordination, (b) learning by using analytical cognition in task management, (c) learning through situational awareness, (d) learning by creating self-awareness, (e) learning by having cognitive control, and (f) learning by using high-

Table 2 Characteristics of the Studies Included in the Analysis

Authors/Year	Design, Interview, and Analyses	Participants	Aim of Study	Key Findings About What Contributes to Learning	Quality
Ballangrud, Hall-Lord, Persenius, & Hedelin, 2014	Qualitative, descriptive. Individual interview Elo and Kyngås Inductive content analysis	Nurses from seven intensive care units (n = 18)	To describe intensive care nurses' perceptions of the role of simulation-based team training in intensive care	• Use of realistic scenarios • Debriefing with open discussion and reflection • Use of different roles in scenarios, including the observer role • Repetition and regular SBTT • Awareness of own reactions • Awareness of communication skills	High
Flatgård & Berg. 2016	Qualitative, descriptive, exploratory. Individual interview Graneheim and Lundheim's Content analysis	Nurses in medical and surgical intensive care units (n = 10)	To describe nurses' experiences with the debriefing phase in full-scale simulation training conducted at their workplace	• Sharing different experiences during debriefing • Having interdisciplinary discussions in the debriefing, to clarify situations and questions • Listening to more experienced colleagues • Exchanging knowledge • Learning the importance of facilitator skills • Using the debriefing to reflect and discuss what happened in the scenario • Using a positive and direct debriefing • Focusing on roles and cooperation	High
Kaddoura, 2010	Exploratory qualitative descriptive design Individual semistructured interviews Content analysis	Nurses from the intensive care unit (n = 10)	To explore new graduate nurses' perceptions of what factors promoted their critical thinking, learning, and confidence throughout their critical care nursing training	• Use of realistic scenarios • Use of different roles in scenarios, including observer. • Learning by experience acquired in the scenarios • Using scenarios to contribute to transfer of cognitive knowledge into practical experience • Raising awareness of communication skills, cooperation, and leadership • Use of feedback in the debriefing • Use of video recording • Reflecting on learning in the debriefing • Learning from mistakes. • Sharing knowledge and experiences. • Learning in a safe environment	High
Karlsen, Gabrielsen, Falch, & Stubberud, 2017	Exploratory qualitative descriptive design Focus group interview Braun and Clark's thematic analysis	Intensive care nursing students (n = 14)	To explore intensive care nursing students' experiences with confirming communication skills training in a simulation-based environment.	• Raising awareness of confirming communication • Evaluating the use of video recording • Becoming aware of communication skills by observing oneself and others • Providing feedback in the debriefing on good performance and what could be improved	High

(*continued on next page*)

Table 2 (*continued*)

Authors/Year	Design, Interview, and Analyses	Participants	Aim of Study	Key Findings About What Contributes to Learning	Quality
O'Leary, et al., 2015	Quasiexperimental study. Individual semistructured interviews Braun and Clark's thematic analysis	Paediatric critical care nurses (n = 10)	To investigate the effects of high-fidelity patient simulation on nurses' self-efficacy in and knowledge about recognizing and managing paediatric deterioration. In addition, participants' perceptions of the learning experiences specific to the identification and management of a deteriorating child were explored	• Use of scenarios contributes to coping with stress • Use of scenarios contributes to learning by doing • Use of realistic scenarios contributes to transfer of knowledge into clinical practice • Cooperation, talking, and sharing ideas in scenarios facilitate learning • Conducting training in a safe environment	High
Rød, et al., 2017	Qualitative, inductive, and descriptive design Individual semistructured interviews Graneheim and Lundmann's content analysis	Nurses from paediatric intensive care units and intensive care units (n = 10)	To describe how nurse specialists experience participation in SBTT and to describe how their training experience may influence patient treatment in an emergency situation	• Realistic scenarios with interdisciplinary teams • Use of different roles • Regular training • Awareness of communication and communication skills • Realistic scenarios with regards to time and stress • Reflection • Theoretical instructions before practical training • Facilitator important in the debriefing • Feedback in the debriefing • Familiar and safe environment	High
Sandahl, et al., 2012	Case study approach Individual semistructured interviews	8 nurses and physicians 5 group leaders	To describe implementation of simulator-based medical team training and the effect of this program on interprofessionals working in an intensive care unit	• Use of realistic scenarios • Raising awareness in one's communication skills and interdisciplinary communication and cooperation • Use of interdisciplinary teams, including doctors • Use of challenging scenarios, but not too medically advanced • Use of video recording • Creating a familiar and safe environment • Emphasizing that well-planned programs, learning goals must be explained	High

Note. SBTT = simulation-based team training.

Table 3 Analysis Example

Meaning Unit	Condensed Meaning Unit	Subtheme	Key Factors
Simulation taught me how to deal effectively with stressful situations in the ICU without panicking.	SBTT contributes to raising awareness of own feelings and stress management in stressful situations	Learning through getting to know oneself	Learning by creating self-awareness
The participants pointed out that the advantage of SBTT was that it provided a safe arena for training that facilitated learning without affecting a highly critically ill patient	Learning in a safe environment without being afraid of harming a critically ill patient	Learning without affecting a highly critically ill patient	Learning by having cognitive control

Note. ICU = intensive care unit; SBTT = simulation-based team training.

quality communication. The results are presented according to what nurses perceived as contributing to their learning during SBTT.

Learning by Relational Coordination

We found that learning by relational coordination was one key factor contributing to learning. Relational coordination included two subthemes: ''learning through understanding others'' roles and perspectives and ''learning through creating awareness and understanding about teamwork'' (Ballangrud et al., 2014; Flåtgårrd & Berg, 2016; Kaddoura, 2010; Karlsen et al., 2017; O'Leary, Nash, & Lewis, 2016; Röd, Moeb, & Struksnes, 2017; Sandahl et al., 2013). Intensive care nurses described how SBTT creates awareness of own and others' roles through role-play, interaction, and collaboration, and in the debriefing session where they exchange perceptions and experiences within the interdisciplinary team. They learned how to interact and collaborate and about own and others' tasks. Observing and listening to other professionals and more experienced colleagues also generated knowledge.

Learning by Using Analytical Cognition in Task Management

Another key factor was that analytical cognition in task management was a vital learning tool. This factor includes two subthemes: ''learning by analytic reflection'' and ''learning through actively applying professional knowledge and re-evaluating'' (Ballangrud et al., 2014; Flåtgårrd & Berg, 2016; Kaddoura, 2010; Karlsen et al., 2017; O'Leary et al., 2016; Rød et al., 2017). SBTT facilitated a cognitive process during which the nurses applied their previous knowledge and the knowledge gained during simulations and reflected analytically on the process. Nurses described learning by creating new ways of thinking and gaining new perspectives in acute care after learning from shared experiences, views, and knowledge within and between professions. This was achieved both during the scenarios and in the debriefing sessions. Interdisciplinary cooperation increased nurses' understanding of different roles and promoted critical thinking and learning. SBTT takes participants out of their daily routine and encourages them to think and reflect about how to apply their knowledge. Realistic scenarios made it easier to use their knowledge and create this thinking process. The more immersive the simulation was, the more analytical the thinking and use of knowledge. Regular training promotes learning through repetition.

Learning Through Situational Awareness

The analysis also identified the key factor learning through situational awareness, which includes learning ''through recognizing and understanding,'' and ''through gathering information and anticipating'' (Ballangrud et al., 2014; Kaddoura, 2010; O'Leary et al., 2016). Nurses felt that realism in the scenarios, using real interdisciplinary teams and high-fidelity simulation equipment, helped them to more easily immerse themselves in the simulation. This helped them recognize situations and act accordingly using their knowledge. SBTT created experiences and new perspectives and allowed for reflection about what went well and what could be improved.

Learning by Creating Self-Awareness

Nurses learned ''by getting to know themselves,'' ''by reflecting on their own actions,'' and ''learning at their own level of knowledge'' (Ballangrud et al., 2014; Kaddoura, 2010; O'Leary et al., 2016). They felt that SBTT contributed to raising awareness about own feelings and stress in difficult situations, and they learned how to manage these feelings by getting to know themselves. The nurses learned

by reflecting on own skills and actions in the debriefing phase. They also noted that SBTT created awareness of what they did and did not know and enabled them to seek new knowledge.

Learning by Having Cognitive Control

Learning by having cognitive control is a key factor with one subtheme: ''learning without affecting a highly critically ill patient'' (Ballangrud et al., 2014; Kaddoura, 2010; O'Leary et al., 2016). This theme reflects learning by allowing the nurses to focus on technical and nontechnical skills, without the fear of harming a patient. Nurses learned when time allowed the use of analytical thinking and knowledge rather than stressful situations where they had to rely on intuition.

Learning by Using High-Quality Communication

Finally, nurses learned by using high-quality communication, which comprised two subthemes: ''learning by creating awareness about own communication style'' and ''learning by using timely and accurate communication to solve problems'' (Ballangrud et al., 2014; Sandahl et al., 2013). Nurses stated that they learned because SBTT created awareness of the importance of communication and how to communicate collaboratively with the other participants. They described learning by observing themselves and others and that they gained new knowledge and awareness about own communication during SBTT.

Discussion

Debriefing and realistic scenarios are considered success factors for learning in SBTT (Barry Issenberg et al., 2005; Fanning & Gaba, 2007). However, one prominent finding of this review was the importance of learning by using the analytical mode of cognition in task management. This theme was identified in six of the included articles (Ballangrud et al., 2014; Flåtgårrd & Berg, 2016; Kaddoura, 2010; Karlsen et al., 2017; O'Leary et al., 2016; Struksnes et al., 2015). In line with CCT (Hammond, 1996), it is important to promote analytical cognition in SBTT to manage acute situations in clinical practice when there is little time available. The urgency of acute situations negatively affects judgement and the use of analytical thinking. Judgement is a process whereby individuals apply their knowledge (Hammond, 1996); in this process, different degrees of analytical and intuitive cognition are used to handle a situation. This finding is relevant to understanding the importance of practicing analytical thinking skills to prevent misjudgement in acute situations. Research on nurses' clinical decision-making in situations that require rapid responses found intuitive decision-making to be predominant (Croskerry & Norman, 2008). Consequently, repeated practice in analytical thinking skills in acute situations during SBTT limits the gap between the use of analytical and intuitive thinking. Intuition develops after repeated analytical reasoning (Ker, Mole, & Bradley, 2003; Lauri et al., 2001).

Learning through situational awareness was a key factor identified in three articles (Ballangrud et al., 2014; Kaddoura, 2010; O'Leary et al., 2016). Realism in scenarios using actual interdisciplinary teams and high-fidelity simulation equipment allows participants to immerse themselves in the simulations. Observing vital parameters is necessary to balance risk and select options, which makes it easier to use one's knowledge and act accordingly. This finding is supported by Ker and Bradley (2003), who found that recreating working environments in which interdisciplinary teams interact provides a powerful learning experience. In addition, Stubbings, Chaboyer and McMurray (2012) support this understanding of multidisciplinary team training and development of situational awareness. The more realistic the environment is during SBTT, the higher the psychological effect is on the participants (Maran & Glavin, 2003). Increased awareness of vital technical and nontechnical skills and the environment are essential in decision-making, in addition to situational awareness. Non-technical skills are associated with situational awareness and influence clinical outcomes (Savoldelli, Naik, Hamstra, & Morgan, 2005).

Nurses perceived that cognitive control contributed to learning (Ballangrud et al., 2014; Kaddoura, 2010; O'Leary et al., 2016), which is essential in understanding that training without fear of compromising a patient contributes to cognitive control and analytical thinking. Nurses perceived less stress during SBTT because the training did not affect highly critically ill patients. Savoldelli et al. (2005), Fanning and Gaba (2007), and Barry Issenberg et al. (2005) support learning in a safe and controlled environment so that participants can focus on learning without compromising patients. CCT describes intuitive cognition as having low cognitive control, rapid data, and unconscious data processing (Hammond, 1996); consequently, judgements are made without logical thinking. Research on clinical decision-making in situations that require rapid responses found that intuitive decision-making was predominant and that analytical decision-making characterized nurses working in long-term care (Croskerry & Norman, 2008).

Learning by using relational coordination featured in all included articles (Ballangrud et al., 2014; Flåtgårrd & Berg, 2016; Kaddoura, 2010; Karlsen et al., 2017; O'Leary et al., 2016; Röd et al., 2017; Sandahl et al., 2013). Learning by relational coordination is not essential to understanding how we learn, but it is important for nurses to learn through understanding the roles and perspectives of others. It also creates awareness of the importance of understanding teamwork. Relational coordination is important because it develops the awareness that SBTT encourages nurses to

share knowledge to clarify who needs to know what, emphasize urgent tasks, work toward common goals, and understand decisions. This knowledge is useful to improve cooperation, coordination, and understanding, and thus less error (Bjurling-Sjoberg, Wadensten, Poder, Jansson, & Nordgren, 2017; Cato & Murray, 2010; Manser, 2009). Relational coordination is affected by another relevant finding: high-quality communication (Ballangrud et al., 2014; Sandahl et al., 2013). Communication may improve collaboration (Solberg, 2014). Therefore, interdisciplinary teams and teams with both experienced and less-experienced participants should be used. They allow professionals to share knowledge, reflect, discuss, and learn from each other and their different perspectives. This finding mirrors research on interprofessional collaboration, which claims that quality of care improves through developing high-quality communication, establishing plans together, and improving coordination (Solberg, 2014).

Learning by creating self-awareness describes how simulation can create a learning process by encouraging reflection on own knowledge and actions and how one reacts and manages feelings in stressful situations. This theme appeared in three articles (Ballangrud et al., 2014; Kaddoura, 2010; O'Leary et al., 2016). Learning by creating self-awareness allows individuals to become familiar with themselves. In comparison, Hammond's CCT (1996) describes a high level of conscious awareness as a quality of analytical cognition. Being self-aware in acute situations is important for making the right decisions, being confident, and managing situations while using analytical thinking. Using intuition with hasty actions is discouraged because of stress, rapid data processing, and low cognitive control (Hammond, 1996).

Limitations

The included articles were chosen only by the first author, which could create a risk of bias.

Another limitation is that one of the included articles (Flåtgårrd & Berg, 2016) is about the debriefing phase only, not all the phases of SBTT. However, we chose to include this article because of its relevance to our research question.

Ethical Consideration

Ethical approval was not sought for this study.

Conclusion

Findings from this literature review provided new insights into factors that intensive care nurses perceive as contributing to learning during SBTT to handle acute and unforeseen situations. This study shows that foundations of learning through SBTT include having cognitive control, time, and using analytical thinking, as well as awareness of the situation and self. In addition, an important factor for learning through SBTT is understanding coordination and communication. These new insights may be relevant to understanding the importance of practicing analytical thinking skills to prevent misjudgement in acute and unforeseen situations.

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