

1. Introduction

Newly graduated nurses are expected to have acquired the knowledge and skills necessary to be safe and accountable practitioners (Mårtensson and Löfmark, 2013). Hence, nursing students should not only develop cognitive knowledge about the what and how of nursing skills, but also about using evidence-based nursing practice. Bergen and Santo (2018, p. 362) defines action competence as having self-awareness and “deeming oneself qualified and capable of working through a problem to obtain a solution”. Action competence naturally starts with critical thinking, but focuses on actions and may be defined as the perceived capability to select and perform actions. When action competence is acquired, students can approach a clinical situation by seeking information, analyzing data, evaluating and reflecting with peers and deciding on appropriate actions to solve a specific problem. However, newly graduated nurses report that they lack the necessary skills to feel confident in their work (Chesser-Smyth and Long, 2013; Milton-Willey et al., 2014; Ortiz, 2016) and that the transition from student to registered nurse can be experienced as a shock (Duchscher, 2009; Murray et al., 2019). In this article, we will describe how simulations based on the concept of wilderness medicine can be used to enhance students’ development of action competence. We will also reflect on the possibilities to use similar teaching-learning strategies in other outdoor contexts than those traditionally associated with wilderness medicine.

2. Background

To develop action competencies in nursing students, different strategies have been used, such as problem-based learning, (Gholami et al., 2016; Ling-Na et al., 2014) and instructor-led simulations (Berro and Knoesel, 2016; Myler and Seuryneck, 2016), as well as a combination of these (Roh et al., 2014). Simulation allows students to practice procedures and decision making and develop reflective skills using role play, videos and different equipment in simulation rooms in a university.

Simulation has a long history in nursing education (Sanko, 2017), but only in recent decades has it been used systematically and found beneficial for enhancing nursing students' performance, self-confidence, and preparedness for clinical work (McCaughey and Traynor, 2010; Tosterud et al., 2013). Different approaches to simulation have been suggested both as an educational activity to enhance clinical skills before clinical placements (Hansen and Bratt, 2015), and as a means to address a shortage of such placements (Baxter et al., 2009).

In-situ simulations, which take place in real life, have been suggested as an effective strategy in the training of nursing students (Kaplan et al., 2017). However, the vast majority of studies describe the use of in-situ simulations in relation to continuing education and staff training in various traditional clinical contexts (Dowson et al., 2013; Lavelle et al.,

2017; Villemure et al., 2016). Among health care professionals, in-situ simulations are considered more realistic than off-site simulations (Kosanam et al., 2019; Sørensen et al., 2015). It is reasonable to assume that nursing students will also benefit from in-situ simulations, as they take training out of the safe environment of the university into more realistic settings.

3. Context

Nurses are expected to act professionally in complex situations. Accidents and injuries as well as acute illness might occur far away from acute care settings, e.g. hospitals. In such contexts, which are common in Norway, the time from an emergency call to assistance from paramedics will often be longer than in densely populated areas. Thus it is necessary for nursing students to develop action competence to prepare for such situations. Therefore, nursing students at UiT The Arctic University of Norway are offered a course in wilderness medicine, which has been defined as the practice of medicine where definitive care is more than one hour away, resources are limited and care must be continued for an extended period (Duff and Gormly, 2007). The course at UiT is based on Advanced Wilderness Life Support (AWLS), which was originally developed by the University of Utah School of Medicine (Simon, 2012). AWLS is designed for qualified physicians, nurses and paramedics. At UiT, the content and methodology have been adjusted to the needs of nursing students, and to local challenges such as a cold climate. Students were also prepared

by lectures about the effects of cold and instructed to dress accordingly. However, the basic idea of wilderness medicine is not to be able to care for people in the outback, but to act competently when encountering people in need of acute care outside institutions. The four-week full-time course is elective during the last year of a three-year program, after completion of all theoretical courses in medicine, nursing and pharmacology. The learning outcomes are described in Table 1. Students need to have acquired theoretical knowledge as well as practical skills related to emergency nursing. On the wilderness medicine course they are expected to apply these in a new, unfamiliar context.

[Please insert Table 1 here]

The instructors are nurses, physicians, paramedics and physiotherapists. Learning activities are “speed lectures” on topics such as acute injuries, drowning, avalanches and hypothermia. These lectures are followed by “creative cafés”, 21 skill training sessions and five simulations in situ. The “creative cafés” involve case studies where students actively participate in an exchange of ideas. On these occasions, cases with multiple alternative solutions are presented in order to encourage students to develop reflective skills and express their understanding of a situation and possible nursing interventions. In the skill training sessions, the focus could be, for example, on caring for a person with hypothermia in addition to a neck injury, with limited resources. Students are encouraged to be creative, for example they might need to transport a person in rough terrain, using a tarpaulin and rope (burrito

wrap), or on a stretcher composed of skis. Traditionally, in-situ simulations take place in familiar clinical settings. In the course in wilderness medicine they are held in outdoor locations; these are not restricted to the outback, but could be other places where medical equipment as well as immediate assistance from other professionals is unavailable. Simulations take place outdoors, and the location varies between the university campus, urban areas and mountainous snow-covered areas. The temperature normally ranges from -10°C to $+15^{\circ}\text{C}$. Students work in groups, some act as patients, but mannequins are also used. The instructors circulate between the groups, but they remain passive during the simulations, unless the students decide to take a time-out and ask for feedback. Following the simulation, the instructor is responsible for a debriefing session.

4. Purpose

As far as we know, there is no previous research focusing on experiences of a wilderness medicine course in nursing education, even though it has been concluded that this is important knowledge for nurses (Wislawski, 2013). This does not mean that all nurses need to be prepared for nursing outdoors in a cold climate, but that they need the knowledge and skills to provide nursing care in unexpected situations and unfamiliar contexts. This is vital in relation to action competencies and the ability to act appropriately when encountering ill or traumatized people in acute situations far from health care facilities. Hence, the aim of this study was to describe nursing students' experiences of participating in a course in wilderness medicine

and how such a course could provide action competence.

5. Methods

5.1. Participants and setting

The study had a qualitative inductive design. All 28 students on one course were invited to participate in the study by e-mail when the course started, and asked to respond to researcher 1. Six participants volunteered (two males and four females, aged 23-50). All of them had previous experience of simulation-based training in simulation rooms. As this was in line with Brinkmann and Kvale's (2014) recommendations of 5-25 participants in this type of study, and as we wanted to avoid students feeling pressure to participate, we did not repeat the invitation.

5.2. Data generation

In line with Brinkmann and Kvale (2014), we argue that data are co-created between researchers and participants rather than collected. Hence it was important to provide an interview situation that enabled participants to feel confident about narrating their experiences. Interviewers 1 and 2 conducted semi-structured interviews in pairs. Both interviewers knew the participants but were not involved in their grades. This enabled the participants to narrate their experiences to people they were familiar with but not dependent on. All interviews started with an open question that encouraged participants to narrate their experiences of taking the wilderness medicine course, focusing on their learning from the simulations. Follow-up questions like "Can you give me an

example?” and “How was that for you?” were used to support the narration. The interviews lasted between 60 and 110 minutes, and were digitally recorded and transcribed verbatim.

5.3. *Data analysis*

The transcribed interviews (146 pages, single spaced, in total) were subject to qualitative content analysis (Graneheim & Lundman 2004). The analysis (illustrated in Table 1) was performed jointly by all four researchers. First the transcribed interviews were read through several times to gain an initial sense of the whole. Meaning units were identified and condensed into descriptions close to the text, and abstracted into codes. By comparing similarities and differences between the codes, six sub-categories and two categories were constructed. Finally, a theme expressing a thread of meaning through the findings was created.

[Please insert Table 2 here]

5.4. *Ethical considerations*

The study followed the ethical principles of the World Medical Association (1964/2013). The researchers gave the invited students written information about the aim of the study and the procedures, and told them that participation was voluntary and that neither participating nor declining to participate would affect their grades. The students also received information about confidentiality and the fact that the

researchers would use the data for any other purpose than the study. The regional ethics board approved the study (No. 50904).

6. Findings

As illustrated in Table 2, students' experiences were described in two categories, "to be challenged by the unfamiliar", and "to develop professional autonomy". We present these categories and the six sub-categories (written in *italics*) below, followed by a description of the overall theme, "balancing between challenges and trust", which expresses the synthesized meaning of the interviews, based on our interpretation.

[Please insert Table 3 here]

6.1. To be challenged by the unfamiliar

In contrast to the familiar settings of the university, simulation in situ meant that students needed to practice different skills with limited access to medical equipment in an unfamiliar environment. To be challenged by the unfamiliar during the simulations contributed to the development of general skills associated with action competence as well as confidence in one's own ability to manage unexpected situations. From this perspective, *learning outside the safe environment* was not only challenging, but also realistic in a way that went beyond previous experiences from the simulation room. One participant shared the following:

You need to use your imagination, and to reflect. In the simulation

room, we know we have lots of things there. This wasn't possible outside. Now we have learnt how to find out different possibilities.

In contrast to their previous experiences where patient cases were assigned to them prior to simulations in training rooms, the in-situ simulations were based on encounters with unfamiliar cases and situations. This called for an ability *to think outside the box* and find creative solutions. One participant stated:

What you can make use of so you can get the patient down from the mountain. Making that burrito wrap. It was very good to make such unusual things (...) to use skis to make a stretcher (...) Simply to improvise, and just make use of what you have.

The presence of the unforeseen not only challenged students' knowledge and skills but also caused stress. The novel situations and non-clinical environment could also be uncomfortable and noisy, making it hard to perform certain tasks and to communicate in the familiar way. In addition, issues related to their own safety, for example in cold weather, also highlighted the importance of *being able to manage stress*. One participant commented:

It is about experiencing it in your body. A stressful situation. And being able to manage it. That got better, so you're prepared the next time.

However stressful, the experience of being able to deal with these challenges also provided a sense of mastery.

Another participant said:

You feel more and more confident (...) And I think that as your confidence in doing something increases, you don't focus so much on it

(...) Then you move on and you can concentrate more on choosing tasks that you're not so confident about.

6.2. *To develop professional autonomy*

The second category focuses on experiences of developing professional autonomy. As one of the participants narrated, this could partly be described as *having an inner guide to follow*, enabling professional judgement.

You have a recipe to follow when you come (to the patient). You follow it, step by step, and it reminds you what to do. I feel I've got a totally different understanding about what I should do in an acute situation.

The development of professional autonomy also included experiences of *being able to trust one's own nursing judgement*. This meant having the confidence to trust one's knowledge and skills in complex situations. One participant said:

Shall I do this or that, or will the ambulance come soon? Those are assessments you need to make. And then you sit there, thinking about what should be done. Shall we let the patient lie where he is, or shall we move him? What's the advice from the EMCC (Emergency Medical Communication Center)?

But they haven't been here. Are we capable enough to make a decision? Yes, we are! And then we just have to take that decision.

This required the students to use previously learned skills, and trust their

own judgement as a basis for action. Autonomy was also related to participants *daring to take professional responsibility* and arguing for their judgements. One participant shared the following:

Now I feel that I can argue for what I do. Stand up for my decisions. Maybe it sounds pretentious What I have learned until now makes me sure that somebody will listen to me, and follow my instructions if I arrive at an accident (...) I'll dare to do more as I have much more knowledge now.

Hence, participants learned to rely on their own judgement while they developed skills in communication, co-operation and leadership. This also enhanced their autonomy and feeling of being confident about their professional competencies.

6.3. *Balancing between challenges and trust*

When synthesized, the categories comprise a theme formulated as “balancing between challenges and trust”, illuminating the process of developing action competence.

During in-situ simulations, participants found unfamiliar and stressful situations to be challenging. The experience of being able to apply previously acquired knowledge as well as finding new, creative solutions developed a sense of trust in one's own ability to manage and take responsibility in challenging situations.

7. Discussion

To develop action competence is a matter of learning to master professional knowledge and skills, to strengthen one's ability to make decisions based on professional judgement and to have legitimacy to perform certain tasks that belong to the profession (Bergen and Santo, 2018). It also involves accountability for one's decisions and actions (Krautscheid, 2014). To develop such competencies can indeed be a challenge for nursing students (Porteous and Machin, 2018). According to Johns (2009), such competencies require reflective practice, which people can learn by reflecting on their lived experiences. We would claim that in relation to complex and acute situations, in-situ simulations are as close to reality as possible without jeopardizing patient safety. The students perceived the in-situ simulations in the wilderness medicine course as realistic as well as challenging, as the simulations required them to use knowledge and skills in situations where they needed to think and act outside the box. In line with Benner's (1984) claim that competence development requires engagement, we conclude that the specific challenges associated with the simulation, as well as the perceived realism, engaged the students in a way that contributed to progression and mastery that differed from traditional campus tuition. Many nurses in rural and urban areas will find themselves in situations without any other healthcare personnel to support them. They will need to implement creative interventions before the paramedics arrive. The Wilderness Medicine course prepares nurses to provide care in a variety of rural and urban environments. We therefore argue that outdoor simulations might be a

valuable complement to simulations in an institutional setting.

As a nurse, it is impossible to be prepared for everything; nursing students therefore need to be ready to deal with the unexpected, which can occur outdoors, but also in home care services, in the hospital restaurant or any other situation where immediate action is needed. The in-situ simulations were thus not merely a learning occasion where students needed to make assessments, prioritize, communicate and cooperate with others, and act based on their decisions. Reflecting on these experiences also enabled students to integrate knowledge, and develop self-awareness and an understanding of themselves as capable of working through unexpected situations and finding solutions. This meant developing action competence as defined by Bergen and Santo (2018).

In relation to the literature, the theme “balancing between challenges and trust” can be understood on two levels. On a manifest level it enhances understanding of students’ experiences of the in-situ simulations in wilderness medicine. Participants described how the simulations were challenging in a way that went beyond the safety of the simulation room, and required all their knowledge as well as their creativity and ability to improvise to master the situation without standard equipment and under stress. Such realism leads to meaningful learning (Rystedt and Sjöblom, 2012) and tasks solved in practical settings will be more likely to generate suitable outcomes than solutions in written assignments or in an educational environment (Lave, 1988). As an example, it might be difficult to learn how to take a pulse in cold

weather, or to examine a neck injury when the patient is lying on rough ground. In another outdoor context, it might be more realistic to replace the rough ground with a staircase in a crowded shopping center. The point is that students gain hands-on experience and become prepared to be unprepared (Freer, 2006).

Experiences of mastery lead to a new sense of trust in one's own competence and capability to manage the more ordinary clinical situations. This is particularly interesting. Even though common sense might suggest that such experiences enhance one's self-confidence, the action competencies demonstrated by the students contrast with Benner's (1984) claim that the ability to improvise is associated more with expert competencies than with what could be expected from a novice.

The other aspect of balancing between challenge and trust is more implicit. Previous research on simulations emphasizes informing students about the scenario in advance in order to prepare, feel secure and get the most out of the simulation (Motola et al., 2013). Our findings indicate that students have a greater need to stretch beyond the familiar to develop and build trust in their competencies. Yet students still need to feel secure during simulations. As we interpret our findings, this sense of security does not depend on detailed information about the scenario, but on a safe learning environment where students feel that the instructors care about and listen to them. Hence, this study indicates that action competencies related to assessments, decisions and actions in simulated acute situations are developed in dialogue with other students. It is

through co-operation and discussion that they receive confirmation as to whether their clinical reasoning and actions are appropriate, and whether they possess the knowledge and skills they are expected to have as nurses.

Hence, such learning processes are not only related to a realistic environment and challenging situations, but also to social interplay and co-operation, where the joint dialogue and interactions contribute to students' identity (Kumpulainen and Rajala, 2017). Students need to jointly reflect and make decisions on issues like "Shall we let the patient stay where he is, or shall we move him?" In these reflections, students have to engage and make their assessments explicit, and to argue for the relevance of their own conclusions as if it was a real situation, and to take relevant action in time. Hence, they challenge each other to share their point of view and the basis for their conclusions.

Reflections in situ, in combination with the creative café, also increased the students' awareness that previous knowledge is not always applicable in a particular situation, as the usual resources are not available. Hence, the students needed to use their imagination and trust each other's knowledge and experience to find solutions. The students' different opinions created tensions and confrontations, which led to shared knowledge and understanding through dialogue (Bachtin et al., 1981). These discussions focused on nursing assessments and interventions and arguing for one's own viewpoint as a nurse. In addition to building action competencies for acute situations, this might

also have prepared the students for inter-professional teamwork, as they were able to develop the skills necessary to make the nursing perspective visible. In a university where students study for various professions, it might be valuable to include students from other disciplines in simulations and subsequent reflections.

8. Methodological considerations

In qualitative content analysis the terms credibility, dependability and transferability are used to describe the trustworthiness of a study (Graneheim and Lundman, 2004). It is important to reflect on these three aspects in relation to data generation and analysis. *Credibility* deals with the quality and representativeness of data. In this study credibility is evidenced by the inclusion of participants who completed the entire course and by prolonged engagement with each participant. All participants contributed rich descriptions of their experiences, which indicates that the quality of the data was sufficient to cover significant variations. Credibility also concerns the researchers' ability to choose relevant meaning units (Graneheim and Lundman 2004) and to demonstrate how the codes, categories and themes relate to each other (Graneheim et al., 2017), as shown in Table 2 and 3.

As qualitative data are not independent facts, but dependent on the interaction between researchers and participants, *dependability* is related to the researchers' pre-understandings as this might affect their responses to participants in interviews as well as the subsequent analysis (Graneheim et al., 2017).

In this study the interviewers (researchers 1 and 2) were also involved as instructors during the simulations, which might have affected the kinds of issues the participants chose to reflect on in the interviews. By interviewing participants after the course, we could benefit from the fact that the interviewers and the participants could reflect on a shared experience.

In order to balance the interviewers' pre-understandings, the other two researchers were not involved in the course. This enabled a dialogue between the researchers about how pre-understandings might have affected the interview situation, the analysis and emerging findings. Different possible interpretations were discussed until the researchers reached a consensus on the analysis. Thus, having two researchers involved in the interviews and all members of the research team creating the codes, categories and themes addressed the challenge of dependability.

Finally, *transferability* refers to the possibility of transferring the knowledge generated in this study to other settings (Graneheim & Lundman, 2004). To support transferability, we have not only described the overall context and provided direct quotes from participants, but also given some examples of relevant situations that are transferable to other contexts. This provided an audit trail with enough details to support future similar studies.

Study limitations

Twenty-eight students were invited. Six accepted and were included. Even though this is within the range of 5-25 participants suggested by Brinkmann and Kvale (2014), it called for reflection on representativeness. One could argue that the participants were students who were particularly confident in reflecting on their experiences and sharing their thoughts with others. However, the findings are well in line with the results of other course evaluations where all students participate. Furthermore, following Brinkmann and Kvale (2014) and Sandelowski (1995), credibility depends more on the richness of the data and the researchers' analytical ability than on the amount of data.

9. Conclusions

Today's nurses need to be able to make nursing assessments, have flexible competencies, and express their basis for action (Benner et al., 2010). This is especially important in community care where resources and support from other professions might be limited (Bing-Jonsson et al., 2016; Hounsgaard et al., 2013). We conclude that studies in wilderness medicine and outdoor simulations that include challenges associated with in-situ simulations in realistic contexts with limited resources can enhance students' ability to co-operate with others and to improvise when necessary. This enhances nursing students' confidence in their own capabilities and their action competence in relation to their future profession. It is therefore worth considering whether such a course should

be mandatory instead of elective. Even though the outdoor context in Northern Norway is extreme, we believe that the underlying idea of wilderness medicine and the in-situ simulations are transferable to other contexts and nursing courses. Further research on outdoor simulations, for example in urban areas, would therefore be valuable.

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