



## Simulation as a foundation for experiential learning among ambulance nursing students: A qualitative observation study<sup>☆</sup>

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### ABSTRACT

Simulation-based education is commonly used in undergraduate training but has gained increased utilization in postgraduate education. Ambulance nursing programs struggle to provide suitable simulations, as ambulance care can involve any possible situation. Simulation-based education in ambulance nursing programs commonly includes basic assessment and treatment of various conditions. However, there seems to be a lack of knowledge regarding students' experience of simulating pediatric emergency care in an ambulance care setting. Thus, the aim of this study was to explore specialist nursing students' experiences of simulating pediatric emergency care in an ambulance care setting. A qualitative design was deployed, utilizing field notes, individual and group interviews to capture the students' experiences. The results show that students immerse themselves in the simulations when the environment and facilitators support this. The simulation can elicit both emotional and physical responses among the students. Students gain insights into their knowledge deficit regarding certain topics, such as pediatric emergency care, as well as the rules and regulations governing what they are allowed to do for a child's safety and well-being. During simulation, students understand the importance of using adequate communication and recognize that there might be several aspects influencing this. Finally, the students gain insight into their emotional and behavioral responses when encountering patients and relatives in situations that conflict with their own views. In conclusion, simulation-based education can be a useful pedagogical tool if barriers to immersion are reduced. It can provide students with insights into their emotional and behavioral responses when encountering unexpected events. If properly discussed in debriefing sessions, these matters lead to increased learning that students can carry with them into their future careers. However, more research is needed on the feasibility of this kind of simulation in the ambulance nurse education setting.

## 1. Background

### 1.1. Ambulance care

The provision of ambulance care needs to be timely and accurate to maintain patient safety. Providing care in this context puts ambulance nurses' (AN) cognitive and physical abilities to the test, as they could encounter almost any scenario at any given time. In various environments, they encounter patients with all sorts of actual or perceived conditions, who are of all ages, genders, and from diverse socio-

economical and religious backgrounds (Wilson et al., 2015). With no predetermined work assignments and infrequent calls, preparing and maintaining updated knowledge for all possible encounters presents a challenge. Additionally, several studies have shown that learning clinical reasoning and assessing various situations in ambulance care comes primarily through field experience rather than just formal education (Andersson et al., 2022b). Subsequently, learning how to work in this context comes with some challenges, and the various educational programs need to account for this fluctuating context when preparing the future AN.

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## 1.2. Ambulance nurse education

Internationally, the standards for required educational levels for staffing ambulances vary widely, ranging from non-academic courses lasting a few weeks to academic education with either a Bachelor's or Master of Science degree, which could take two to four years (Bos et al., 2015). In Sweden, becoming a nurse specialist in prehospital care requires completing a one year Master's program, with a prerequisite of holding a Bachelor of Science degree and being licensed as a registered nurse (which typically involves a three-year academic education). Competence wise, the AN can be compared internationally to an 'advanced life support' provider, or as being able to utilize the 'stay and stabilize' approach (Rief et al., 2023). This means that the AN makes independent assessment and decisions regarding the most suitable care and treatment for the patients encountered, which could involve invasive approaches such as intravenous lines, fluid replacement and administration of controlled and potent medications. Additionally, ANs may, after stabilizing a patient's condition, make decisions regarding referrals to appropriate levels of care, direct admission to specialist care through bypassing the emergency department or, if further care is unwarranted, a non-conveyance (Andersson et al., 2019; Wilson et al., 2015).

Learning clinical reasoning is a challenge across various health care educational programs (Sudacka et al., 2021). However, it is recommended to progressively enhance this skill throughout the educational programs, adding complexity. Simulation-based education (SBE) is highlighted as a crucial pedagogical tool for learning clinical reasoning, as it integrates theoretical and practical knowledge, and there is a growing interest in SBE in various programs geared towards ambulance care.

## 1.3. Simulation-based education

Simulation in health care involves creating a situation or environment that allows participants to experience an event for the purpose of learning or practice (Lioce et al., 2020). Previously considered primarily for undergraduate education (Morse et al., 2019), SBE and simulation exercises have now become the most common teaching methods in postgraduate education in the health sciences (McInerney and Green-Thompson, 2020). In its various forms, simulation is now recognized as a fundamental component of creating competent and confident clinical practitioners (Wyatt, 2023). SBE also serves as a measure for professional education and is an accepted practice in hospital orientation and transitioning into practice (Morse et al., 2019). Utilizing SBE, compared to teaching methods without it, during nursing education enhances students' motivation, higher level thinking knowledge, critical thinking, self-efficacy, self-confidence, and clinical judgement (Hanshaw and Dickerson, 2020). The theoretical foundations of this educational transformation are often not thoroughly discussed or explicitly stated, suggesting that simulation is approached from a teaching rather than a learning paradigm. In nursing education, Kolb's experiential learning theory is most frequently cited (Lavoie et al., 2018). Kolb (1984) defines learning as the process of generating knowledge through the transformation of experiences. He describes learning as a cycle with four phases: concrete experience, reflective observation, abstract conceptualization, and active experimentation. The SBE community's interest in Kolb's theory likely stems from its relevance to simulation-based education, where simulation serves as a concrete experience, and the debriefing sessions foster reflective observation, abstract conceptualization, and active experimentation (Akselbo et al., 2019; Uppor et al., 2024).

SBE usages can be grouped into psychomotor skills training, procedural training to improve technical knowledge and proficiency, emergency response training focusing on confidence, and soft skills training that teaches empathy (Plotzky et al., 2021). Incorporation of exploration, training and assessment of ethical issues and dilemmas into SBE has

rapidly increased in recent years (Essex et al., 2022), and students have evaluated this positively (Basak and Cerit, 2019).

The broad scope of ambulance practice, in combination with infrequent assignments, makes simulation a necessary part of ambulance education (Bienstock et al., 2023). One well-known deficiency of the education has been students' access to children and young patients (Page et al., 2021); therefore, the use of SBE is one way to ensure students are exposed to different critical situations involving children and young patients (McKenna et al., 2015). SBE is another strategy used by preceptors to support ambulance students' learning during clinical practice (Wallin et al., 2022). An important skill reported in undergraduate paramedicine is confidence in communication and interpersonal communication skills, which could lead to increased empathy and decreased preconceived bias; opportunities to practice these skills could be provided by the use of SBE (Mangan et al., 2022). However, research has described that simulation at the university does not always provide the opportunity to engage in a sensitive and empathic manner (Hanna et al., 2021).

The incorporation of ethical dilemmas in SBE has been warranted (Sedgwick and Yanicki, 2020), and since simulation is considered the primary teaching modality today, there is a need for more research to ensure that AN-students gain valuable knowledge and skills (Wheeler and Dippenaar, 2020). Therefore, a qualitative study exploring AN students' experiences and experiential learning through SBE in paediatric emergencies could provide further insights into its impact and suitability in an educational program, making this study valuable.

## 2. AIM

The aim was to explore the experiences of specialist nursing students' in simulating pediatric emergency care in an ambulance care setting.

## 3. Method

### 3.1. Design

This study employed a qualitative descriptive design to capture the experiences of AN-students in simulating pediatric emergency care in an ambulance care setting during SBE.

### 3.2. Participants

Participants were recruited from the AN educational program at the University of Borås in Western Sweden. Applying the method of convenience sampling, all students ( $n = 30$ ) enrolled in the educational program and participating in the course that utilized the specific simulation sessions during the fall term of 2022 were eligible for participation. They received verbal information about the study on three different occasions throughout the program and on the day of simulation. Additionally, they were provided with written information that outlined the study's purpose, the voluntary nature of participation, and the option to withdraw without providing a reason. All who chose to participate then signed a written consent form.

The participating AN-students ( $n = 24$ ), were all registered nurses holding a Bachelor's degree in caring science. Prior to the simulation studied here, they had completed two courses in the AN educational program, which included three to five simulation sessions based on the Advanced Medical Life Support concept (AMLS) (National Association of Emergency Medical Technicians, 2024), which is an international educational concept for emergency care providers. Additionally, they had approximately two weeks of clinical training in the ambulance service. Therefore, the students were familiar with the simulation environment and the assessment structure. The AN students varied in their experience of clinical work; some had no prior experience in the ambulance service or emergency healthcare work, while others had several years of experience.

### 3.3. The simulation

The simulation sessions included a scenario involving a child in need of emergency care, with two different versions of the scenario. In both scenarios, a manikin represented the child in need of emergency care. Parents were present in each scenario: in one, the parent was very concerned about the child and interacted with the AN students; in the other, the parent was distant towards the child and the AN students. The scenarios were designed to encourage reflection during the debriefing session, particularly in relation to encountering vulnerable patients. Additionally, the students had specific goals to achieve during each simulation, including a primary assessment, identifying and addressing life-threatening conditions, gathering a focused anamnesis and assessment, providing appropriate treatment, and taking necessary actions. During the simulation, students either played active roles as ambulance clinicians or acted as observers. They alternated these roles between the two variations of the scenario. For more detailed information regarding the simulation scenarios and equipment used, please refer to Supplemental file 1.

### 3.4. Data collection

All participating AN students ( $n = 24$ ) took part in both scenarios, either as active care providers or as observers. Additionally, they all participated in the subsequent debriefing session, which was part of the simulation. Afterward, students attended either a group or an individual interview. Both formats were used for three reasons: 1) logistical constraints preventing researchers from attending specific simulation session, 2) AN student request, and 3) the researchers' assumption that different topics might emerge in group versus individual settings, as some students may feel more comfortable sharing in a group while others prefer one-on-one discussions.

### 3.5. Participant observation and field notes

Data was collected in December 2022 through various sources during the simulation. On the SBE day, one researcher collected data by documenting contextual information in the form of field notes ( $n = 12$ , totaling 112 A3-pages of text) (Phillippi and Lauderdale, 2018). These notes were taken during the scenario, detailing what happened, what was said and by who, body language and room placement during specific events. They also captured the debriefing session, including dialogue, participants, and observable expressions such as body language. These notes, which contained information on who, what, when, how, and why, were all handwritten and later transcribed using a computer-based word processor.

### 3.6. Group interviews

In addition to the observations and field notes, the same researcher conducted group interviews ( $n = 5$ ) with two to four participants in each group, totaling 16 participants. These interviews aimed to understand the participants' experience during the simulation sessions. The interviews lasted an average of 38 min (range: 26–56 min, total: 188.5 min) and were recorded and transcribed verbatim. All interviews utilized a semi-structured interview guide, posing the same questions but incorporating unique follow-up questions based on previous answers or discussions. Examples of questions and follow-up questions asked included: What did you feel in connection with the current simulation? Why do you think you felt that way? What decision or decisions did you find most difficult to make in these scenarios? Why? Did you perceive any ethical aspects to consider in the scenario? Which ones? Was any of these more important to consider? The recordings of these interviews were divided among the authors for verbatim transcription.

### 3.7. Individual interviews

Eight individual interviews ( $n = 8$ ) were conducted with participants from five of the simulation groups within a week of completing the simulation session. These interviews were conducted by one author using a web-based communication application (Zoom). The interviews followed the same semi-structured interview guide as the group interviews, including open-ended and follow-up questions. On average, the interviews lasted 17 min (range: 12–25 min, total: 136.5 min). The recordings of these interviews were divided among the authors for verbatim transcription.

### 3.8. Analysis

An inductive and manifest content analysis (Graneheim and Lundman, 2004), was performed using Atlas.ti 8 software for qualitative analysis. All transcripts from the conducted individual and group interviews, along with the transcribed field notes, were uploaded and analyzed. Two of the authors independently read and coded the transcripts, searching for various descriptions of the AN students' experiences in relation to the simulated scenarios. Examples of these codes were "wanting to help everybody in the situation", "feelings of frustration and anger", or "unfamiliarity with pediatric patients". When all documents had been coded, the codes were grouped based on their content similarity. These code groups were reviewed for content homogeneity between groups. If the groups only included codes describing the same aspects, a descriptive synthesis of their content was produced, creating sub-categories. Two or more sub-categories formed a category, and the categories formed a theme. The authors discussed the content and description of each sub-category, category and theme in relation to its meaning before presenting it to the other authors for further discussion. The author group then reached a consensus regarding the theme, categories, and sub-categories.

### 3.9. Ethical considerations

The study adhered to the ethical principles for research outlined in the Declaration of Helsinki (World Medical Association, 2013). Additionally, it was reviewed and approved by the ethical council at the University of Borås (Reference number: FO2022/183). Participants were provided with information about the study, given the opportunity to ask questions, and informed of their right to withdraw their participation without providing further explanation. The authors took great care to ensure that no researcher who conducted the interviews had any affiliation with the AN-program teachers. This precaution was taken to minimize the potential risk of students feeling indebted to their AN-program teachers.

## 4. Results

In total, 24 AN students participated in the study, and their demographics are presented in Table 1.

The results are presented as a theme, categories, and subcategories. The overarching theme was: 'The influence on one's professional role from one's own and societal norms and prejudice'. The two categories were: 'the simulation as a learning activity' and 'the encountered scenario'. The seven sub-categories were: 'the professional role'; 'the role as a student'; 'simulation prerequisites influence immersion'; 'children as patients require more than a one-track mind'; 'expectations of proper

**Table 1**  
Participant demographics.

Gender (Total $n = 24$ )	Male: 12 Female: 12
Age (years)	Mean: 33 (range 25–43)

communication'; 'who is included in the teamwork'; and 'the care environment having a more than desired influence' (Table 2).

#### 4.1. The influence on one's professional role from one's own and societal norms/prejudices

The results indicate that students harbor internal expectations regarding what is expected of them as ANs in their future profession. These expectations are influenced by the norms, prejudices, and preconceptions both of the students themselves and society at large. Additionally, the students' personal feelings exert a significant influence, more so than they may acknowledge or desire. These factors create conflicts between emotions, expectations, and their professional role, leading to uncertainty about how to act in various situations. However, this conflict also lays the groundwork for understanding the developmental needs of students as they shape their professional identity. Furthermore, the results shed light on the students' reflections on simulation as a learning activity. This encompasses their professional role, their role as students, and the factors that influence the simulation activity.

#### 4.2. The simulation as a learning activity

Students shared their experiences of simulation as a learning activity, which facilitated further reflection on various roles, as well as on the facilitators and any hindrances experienced during the simulation activity.

#### 4.3. The professional role

Simulation provides students with an experience where not everything goes according to plan. The situations they encounter in their professional role may turn out to be completely different from what they initially expected, leading to the need to reformulate their plans. Furthermore, students report gaining insight that, even in chaotic and unstructured situations, they can still manage to create some form of order. As one student stated:

*'Well yes, it was a little bit messy but somehow, in all of it, it kind of felt like organized chaos I would say. We got it done somehow. It did not happen in the correct order, but everything got managed. So even if it was really messy, it was an organized chaos.'* - Field notes debriefing, Day 2, morning

Students with prior experience from clinical work in ambulance care described how these experiences increased their confidence in the simulation scenario. They could draw on their previous experiences of structured assessment and creating order in chaotic situations, or when provided guidelines did not fit or were deemed unsupportive in the situation at hand. These students felt more comfortable with the notion

**Table 2**  
Overview of results.

Theme	Category	Sub-category
The influence on one's professional role from one's own and societal norms and prejudice	The simulation as a learning activity	- The professional role - The role as a student - Simulation prerequisites influence immersion
	The encountered scenario	- Children as patients requires more than a one-track mind - Expectations of proper communication - Who is included in the teamwork - The care environment having a more than desired influence

that there would be individual differences in choices regarding solutions or plans of action.

*'There are no guidelines for how to manage such a situation ... you would have done it this way, and we might have done it some other way. The third team would have found a completely different way ...'* - Group interview 4, student 2

#### 4.4. The role as a student

The students described feeling uncertain about what was expected of them in the scenario after completing the structured assessment. There was a sense that the facilitators wanted more from them, but as the scenario involved other aspects besides just medical interventions, the way forward became unclear. Additionally, students expressed that this sense of additional expectations came from themselves as well; they wanted to be able to do more in the situation than they felt capable of.

*'I felt as if I had done all the assessments and possible treatments and wanted to begin the transport to the hospital but couldn't because of the situation with the patient's parent. I was thinking: what is it they [the facilitators] want from me this time'* - Individual interview, Student A, Day 1

Furthermore, there was a feeling of being assessed during simulations. This feeling created an experience which led the students to frequently ask themselves if they had forgotten to do something. They also questioned: 'What is it that the facilitator wants me to do?'. This feeling seemed to be greater among students with prior experience in clinical ambulance care, especially in relation to the structured assessment.

*'It is an additional pressure, as we have been working in the ambulance services. It means that we should know this, right? Then it increases [pressure/stress] when you lose focus ...'* - Group interview 1, student 3

Being assessed caused the students to become tense and nervous as they aimed to perform well. However, the simulation environment did not allow them to rely on their 'clinical eye' or intuition to assess the patient, creating a perception that the situation was somewhat rigid. This was due to the need to assess a simulator rather than an actual human patient. Despite this, students also described feeling natural in the simulation environment and not being disrupted by their own thoughts of being assessed by facilitators and fellow students observing. This was related to their understanding that the facilitators were not assessing them on a detailed level but on an overall basis.

*'They [facilitators] do not pay an extreme amount of interest to the details, like "Have you missed this tiny little aspect", but you still feel that pressure on yourself. I do not want to miss anything, so naturally you reconsider and backtrack a few extra times during the scenario.'* - Group interview 1, student 1

#### 4.5. The simulation prerequisites influence immersion

The students became immersed in the simulated scenarios to the extent that they reacted emotionally and physically to what they experienced and recalled from the scenarios. Common emotional expressions included anger, frustration, and crying. Some physical manifestations of immersion included students describing their ability to see and smell the smoke from a fake cigarette. As observed in a field note:

*'I told you to put out that damn cigarette! [no one is smoking in the room, but the mother has a fake cigarette in her mouth].'* - Group interview 3, student 3

During the simulation session, there were aspects that both facilitated and hindered learning among the students. An embedded

facilitator playing the role of the patient's relative provided the students with increased simulation immersion. This was due to the experience of a more dynamic relationship and dialogue with the facilitator rather than a simulator. However, this dynamic required the facilitators to be engaged in their role. Something that students described as facilitating the simulation experience was the physical environment being representative of a real-world situation. This meant that the environment closely resembled an actual apartment rather than a remade classroom.

*'I believe that the simulation gains from having a real patient or relative to care for. And when they build it up with a home environment instead of a classroom with desks...it's also nice that we have equipment equivalent to what we use in clinical work.'* - Individual interview, student B, Day 4

The debriefing session was described as an important part of the simulation as it provided the opportunity to reflect and discuss experiences and specific aspects of the scenario. Students viewed these sessions as a chance to ventilate their experiences with colleagues or others, something they hoped to continue in their future work life. The simulated scenarios necessitated making a great number of decisions, and the debriefing provided an opportunity to analyze these in detail. Students were able to raise questions for further discussion and reflection.

*'Well ... you always do that ... you always have questions from the experience ... you can then broaden your perspective as we discussed it after the case, which allows for a broader perspective in the future.'* - Group interview 3, student 3

Students also described that they were not always clear on what the simulation session contributed to. The simulations did not feel like the 'real deal' but they still somehow still influenced and mentally prepared them for encountering similar situations.

*'It becomes some form of preparation if you have not encountered it before. I believe that it is good for you since if you heard it, you might recall it later and be more prepared.'* - Group interview 2, student 3

The sense of realism or immersion in the simulation was influenced by various issues, including technical malfunction with simulators, and faulty audio transferring. Additionally, aspects related to assessing a patient simulator affected the sense of realism. Students also noted that simulation increased communication with their colleagues compared to real clinical work. However, they described simulation as providing them with knowledge of alternative solutions to various problematic situations. It also made them aware of any knowledge deficits they might have regarding the specific case and its content.

*'I believe that the assessment, examination, and management of the patient are the simplest tasks in this case. The social aspects surrounding the case are the tougher ones to make decisions about.'* - Group interview 4, student 1

#### 4.6. The encountered scenario

The scenario encountered by the students prompted reflection and experiences related to various aspects of their professional role and expectations, whether internal or perceived societal expectations. This category includes four sub-categories: children as patients require more than a one-track mind; expectations for proper communication; who is included in teamwork; and the caring environment having a more than desired influence.

#### 4.7. Children as patients require more than a one-track mind

Caring for children was described as challenging and evoking a variety of emotions. The difficulties stemmed from a perceived knowledge deficit and lack of experience in providing care to children. Children as patients were seen as distinct from adults, requiring unique approaches to care. For instance, children are often fully undressed during

assessments, and underlying factors are given greater consideration during the taking of their medical histories. Additionally, students described children as more vulnerable and in need of protection from their environment, leading to a heightened sense of alertness as professionals. This awareness of children's vulnerability served as a reminder, making the students' lack of knowledge and experience more present, which contributed to increased stress in the situation.

*'...children are something more than just tiny adults... you need to think about so many other things than just to assess them, especially when they cannot speak to us themselves. I really wish that I had more knowledge of pediatric care...'* - Group interview 2 - student 3

When children become patients, there are always significant others in close proximity, primarily parents or guardians but may also include the children's siblings or other relatives. The family dynamic could be seen as a symbiotic relationship in relation to the child, with each member having various needs. In situations where children were considered vulnerable or exposed, students included siblings as well. They sought to protect the sibling (or both children) from a distanced significant other and a potentially harmful environment, even if there were no medical indications for it. Protecting an exposed or vulnerable child was described as both an obligation and a right, encompassing both individual and professional moral and ethical responsibilities.

*'We would have wanted to remove both of the children from this environment, based on the alcohol and that she [the mother] was smoking inside. It did not feel like a proper environment for a child.'* - Individual interview, student A, Day 2

#### 4.8. Expectations of proper communication

Students described that communication needs to involve several participants in the encountered situation, primarily with their colleague, the patient, and their significant others. There were expectations that communication with their colleague should be flawless, but that this was challenging when they were not accustomed to working together. Additionally, communication with colleagues was important during patient encounters, as well as afterwards to evaluate the situation and facilitate mutual reflection on development. Students expressed a desire for this type of reflective practice to not only be a part of simulation training but a permanent aspect of their future work life.

*'I think that these discussions after this case is really important for me... I mean, we talk to each other during the scenario but not in the same way as now... here we can twist and turn on different aspects. I really hope that I can do this with my future colleagues.'* - Group interview 1, student 3

Communicating with a small child was perceived as difficult. One cannot expect answers as one would from an adult; most often, a significant other is needed for communication or as a voice for the child.

The students also described being able to communicate with significant others as important. There was an expectation for them to create participation, mainly through communication. However, this was highly influenced by the initial response when encountering the significant other. Influences included when expectations of communication went unanswered or there was a reluctance to communicate. In these cases, prejudices or contempt for the significant other risked influencing the students' willingness to share information with them. This also jeopardized the physical treatment, primarily through physical touch and closeness, as well as invitations to participate in the child's treatment and decision making. The students shared that they were likely influenced by their prejudices based on the first impression of the initial encounter in the situations. They also noted that the simulated scenarios provided them with greater insights into why communication is influenced.

*'In these two scenarios, there is so much built into things that you would not do anything about if you didn't actively think about it. I mean, if we had not participated in these sessions, I would just have kept on ... not differentiating these aspects, without reflection. So, when I find myself in this kind of situation again, hopefully I will think twice regarding ... whether I should make an effort for closer contact or is it because I do not want to; which is it really about?'* - Individual interview, Day 1, student C

#### 4.9. Who is included in teamwork

There was a view of the team as a unit where everyone had their own assigned tasks and roles that complemented each other, allowing for the best possible outcome in the situation. Difficulties arose when the students in the team were not familiar with each other, i.e. did not know each other's strengths and weaknesses. The initial plan was often to divide the tasks upon arrival, with one student conducting a primary assessment and the second collecting information from the surroundings. Throughout the encounter, it was crucial for the team to check in and update each other on the progress and findings so that they both had the same perception of the situation. This facilitated mutual agreement in vital decision-making. Significant others could be viewed as a resource to the team as they often know and are a source of security for the child, enabling the students to perform their assessment and treatment. However, significant others could also be a hindrance to working practically with the patient. Nonetheless, the students described that they tried to involve significant others in patient care when feasible.

*'Well, she [the mother] was in such a crisis that the only thing she wanted was help. And at that moment, it is the only thing we can give her, to show her that we are taking care of her child. We inform her of what we are doing and then later when we got a little control of the situation, we involve her in the situation more and more...'* Individual interview, Day 3, student A

#### 4.10. The care environment having a more than desired influence

The environment where the patient was located, by definition, became a care environment and also formed the basis for how the students perceived the situation as a whole. A clean, tidy, and bright environment that aligned with societal norms for how a home should look did not create a need for further reflection regarding social welfare. However, when the home environment deviated from normative views, with a gloomy and dark atmosphere that included untidiness and visible hazards, it created a feeling of discomfort among the students.

*'We both felt that we did not want to be in here, we just wanted to leave. I did not feel good at all to be sitting there.'* - Individual interview, Day 2, student A

Having to force oneself into a home environment as a professional care giver was reflected upon as potentially laying the foundation for mistrust in authorities and also led to increased insecurity among the students. The students described instinctively reacting to the poorer environment, which prompted reflection regarding their own safety. During debriefing sessions, students learned that it could be vital to check for potential hazards, even in more acceptable environments. However, students also described that they sometimes were so focused on gaining access to the patient and understanding their condition that assessing the environment became secondary.

*'At first I only noticed the empty bottles, I was to focused on getting to assess the child to make sure that she was alright...but then...when I relaxed and started having a look around I noticed more and more things in the environment...cannulas, pills on the table and the mother smoking... it started to feel a bit uncomfortable and uncertain...'* Individual interview, Day 2, student B

Students acknowledged feeling more comfortable in an environment similar to the one they are accustomed to. Simultaneously, there were expectations of what constitutes a suitable environment for a child.

*'You want them to have a better environment with prerequisites for a good quality of life. Because in my judgmental eyes, this is a poor environment for life quality, it is more likely that they won't thrive here ...'* - Group interview 1, student 1

## 5. Discussion

The aim of this study was to explore the experiences of specialist nursing students' in simulating pediatric emergency care in an ambulance care setting. The results demonstrated that AN students perceived the SBE as realistic and that it evoked a variety of emotions. A major concern for the students was the inclusion of children as patients. In this specific SBE, the children were placed in an environment containing numerous risks to their well-being. Challenging the students' decision-making skills in various novel ways, as the scenario not only included medical aspects. The simulation stimulated the students reflective mindset during the debriefing, this reflective practice was something they wished to be maintained during their clinical work.

Work in ambulance care is unpredictable and places challenges on the ANs' decision-making skills. Previous research has identified children as a specific area that raises the uncertainty and that children are perceived as challenging to personnel working in the ambulance service. This is most likely due to pediatric patients accounting for a minority of patient calls (Näsström et al., 2023; Padrez et al., 2021; Page et al., 2021; Wihlborg et al., 2017). Based on these experiences among both student and professional ANs, gaining SBE experience with pediatric patients and related uncertainties before encountering them in a professional setting may be beneficial. However, Hanna et al. (2021) argue that a simulation environment does not provide sufficient opportunity to learn how to manage sensitive situations. Even so, SBE has been described as facilitating nursing students with awareness of their developmental areas, and that it is suitable regardless of previous experience of ambulance care (Andersson et al., 2023). Also, to have personal experience of similar incidents increases the ability to handle critical incidents when encountered again (Sjölin et al., 2020). Although this aspect was not specifically analyzed in this study, the authors observed that students with prior ambulance care experience appeared more confident during the simulation scenarios. They demonstrated greater structure in their assessments, engaged more actively with the parent, and seemed more comfortable with the lack of guideline support. These findings align with the theoretical foundation of learning through simulation (Zigmont et al., 2011) and Kolb (1984) experiential learning model, suggesting that these students may have entered the simulation in the active experimentation phase, testing new mental models formed through reflection on prior experiences.

SBE enabled AN students to recognize how societal norms, personal biases, and emotions influenced their actions. They also realized that their feelings played a greater role than they had previously acknowledged, creating conflicts between emotions, expectations, and professional responsibilities. Gaining such personal development experiences in a safe environment is challenging in clinical practice, especially since pediatric patients are in a minority compared to adults. Therefore, simulation scenarios in educational programs or through the ambulance organizations should be provided in order to build confidence in attending such calls. (Kim et al., 2023) suggested that scenario training provides ANs with experience of the physical care as well as the interaction with the child or the parents, while still enabling the opportunity to reflect and learn in an appropriate environment. Being in an environment suited for training and learning, being confronted with one's own personal values and attitudes, and being able to reflect on the ethical situations that can arise in relation to these can be vital for healthcare professionals (Andersson et al., 2022a; Hanna et al., 2021),

and is suggested to be incorporated in all nursing education, regardless of educational level (Sedgwick et al., 2021).

During debriefing and interviews, AN students reflected on various ethical dilemmas, primarily how to handle an interaction with an unengaged guardian and the uncertainty of whether confrontation might worsen the situation for the child. The SBE in this study was designed to emphasize children's welfare, aligning with Swedish law, which mandates that registered nurses, including ANs, report concerns about child welfare (SFS 2001:453, 2001). Additionally the Convention on the Rights of the Child is now a law in Sweden (SFS 2018:1197, 2018). Throughout the interviews, students discussed internal conflicts, such as whether to take only the injured child to the hospital while leaving the sibling with the parent or to stay longer and persuade the parent to accompany them. They also debated whether to address the unsuitable home environment directly with the parent. These dilemmas created uncertainty about whether confrontation would improve or worsen the situation. These findings are similar to Tiyagura et al. (2017) who found that ambulance personnel avoided confrontation as to not worsen the situation at hand, which is similar to other healthcare professionals encountering child maltreatment in other medical areas (Wilson and Lee, 2021). Ambulance personnel have a unique insight into the patients' home, they are more likely to detect signs of maltreatment or abuse. Being able to experience and reflect on these matters, and potential strategies for managing similar situations, is believed to enhance ANs' ability to handle a similar situation in the future, which aligns with Kolb (1984) experiential learning circle. According to Brukman et al. (2023) prehospital care providers might need to learn to understand national and local prevalences of child maltreatment, as well as various types of maltreatment and its related clinical presentations.

When forced into a situation where the most practical solution for the AN-student is not considered viable by the patient or their relatives forces the students to reassess the situation and find other possible solutions or to negotiate alternatives, this while coping with one's own emotional challenges. The emotional challenges were reflected upon by the students as to how their own expectations were influenced by societal norms, personal prejudices, and emotions – factors that often had a stronger impact than they realized or were willing to admit became evident to them. This dynamic created a conflict between their emotions, expectations, and professional responsibilities, resulting in uncertainty towards possible actions. To be able to manage various interests in a specific care encounter is described as a part of the clinical reasoning required in the prehospital setting (Andersson et al., 2019; Hanna et al., 2021) and in the overall nursing profession (Jiménez-Gómez et al., 2019). During debriefing and follow-up interviews, the AN students shared an interest in learning more about challenging encounters involving patients and their relatives. These findings might imply that providing SBE that includes not only straight-forward medical issues but that also incorporate various associated aspects considered important from the patient or their relative's point-of-view, is likely suitable for enhancing the students' decision-making skills.

As the prehospital context and ambulance organizations are evolving, the educational programs and the SBE must evolve too (Näsström et al., 2023). It is recommended that various ethical matters such as the welfare of children are implemented into SBE for nursing students, newly graduated nurses, and nurses undergoing continuing education (Lee and Lee, 2022; McClure et al., 2020). Even though, Wihlborg et al. (2024) presented SBE as an suitable tool to learn and enhance ethical competence among AN students, there is a need to further investigate suitable strategies for its implementation into education (Sedgwick and Yanicki, 2020). This study contributes to existing research by highlighting both the benefits and challenges of SBE in addressing children as patients in an ambulance service setting. However, future research should explore what nursing and postgraduate nursing students retain and apply in their professional practice. Continuous follow-up interviews, statistical questionnaires, or feedback from graduates on their professional development could help answer

these questions and guide further advancement in the field.

## 6. Limitations

This study utilized both individual and group interviews with students, conducted closely after their simulation sessions, which is considered a strength as the students should have a high recollection of their experiences. Additionally, the interviewers were not employed in the educational program and were not a part of the group of teachers who created the scenarios or planned the simulation session. This is believed to decrease the risk of social desirability compromising the result of the study. Furthermore, although field notes form only a small part of all collected data, they were taken as a measure to increase rigor and trustworthiness in this qualitative research (Phillippi and Lauderdale, 2018). Another approach that does not rely on a researcher taking notes could have been video recording. However, this was not possible due to ethical considerations for students who were not participating in the study. Trustworthiness and rigor were achieved by triangulating data from various sources among the authors, as all had access to the data. However, there are some potential limitations worth noting. One concern is that students who have completed their simulation session might discuss their experiences with classmates who have not yet participated. This could potentially influence students attending the simulation at a later time in different ways, such as mentally preparing them for the encounter. Another limitation could be the variability of the students' experience of emergency care prior to taking the specific course. This is a normal variation within the educational program as there is no requirement to hold a specialist degree in order to work in ambulance care in Sweden (Lindström et al., 2015). This means that students attending the program can have previous experience from the ambulance context from either being an emergency medical technician or working as a registered nurse. To have previous experience could provide the student with a sense of security of what is expected of them, and could also provide them with feeling secure about the normal workflow within the ambulance setting, which students without prior experience would lack (Andersson et al., 2023). This is something that may have influenced the results of this study. All authors have experience of conducting qualitative research and are well-accustomed to the various sources for data collection. Additionally, all authors are experienced in higher education teaching and SBE.

## 7. Conclusion

SBE can serve as a valuable pedagogical tool to enable AN students to experience emotionally demanding patient encounters in a safe environment. It would be interesting to further investigate what knowledge is transferred from SBE to professional practices for AN students, given the prior evidence on prehospital simulation effectiveness. This would provide insight into which aspects of the educational simulation scenarios are crucial to the students' experiential learning. Based on the current results, the following implications are suggested:

- Ensure that SBE is planned and conducted to support student learning, along with continuous evaluation of aspects carried on into their professional development after graduation.
- Recognize the crucial role of debriefing in SBE, as it allows students to reflect on and process their thoughts, feelings, and actions, thereby facilitating experiential learning.

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## CRedit authorship contribution statement

**Ulf Andersson:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization. **Jonas**

**Wihlborg:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Anna Kängström:** Writing – review & editing, Resources, Conceptualization. **Gabriella Norberg-Boysen:** Writing – review & editing, Resources, Methodology, Conceptualization. **Anders Sterner:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization.

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None to declare.

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