

ORIGINAL ARTICLE

Perceptions experienced by nursing undergraduates in a tele-simulation scenario about neonatal hypoglycemia*

HIGHLIGHTS

1. Identification of the facilities and barriers in teaching-learning mediated by tele-simulation.
2. Role of the nurse in the management of neonatal hypoglycemia.
3. Tele-simulation encouraged critical-reflective thinking for decision-making.
4. Tele-simulation allowed for self-reflection on future professional performance.

Nylze Helena Guillarducci Rocha¹ Gabriella Gomes Lopes Prata² Janaína Aparecida Maia Silva¹ Rubinéia Stefania da Silva¹ Maria Paula Custódio Silva³ Luciana Mara Monti Fonseca⁴ Divanice Contim⁵ 

ABSTRACT

Objective: Describe perceptions experienced by nursing students in the tele-simulation scenario about neonatal hypoglycemia and expressed in self-assessment. **Method:** Exploratory, descriptive study with a qualitative approach involving 36 nursing undergraduates during an elective course in a nursing degree program at a federal public university in the interior of Minas Gerais - Brazil. Data production took place between August and September 2021, through a virtual platform, with questions for self-assessment of the activity, and was submitted to Bardin's content analysis. **Results:** Undergraduates considered tele-simulation as an opportunity for a new way of learning, through the ease of experiencing realism, developing a new perspective on how to care for a newborn. **Conclusion:** Tele-simulation allowed undergraduates to learn and acquire knowledge related to neonatal care, identifying the nurse's role in assisting the newborn in neonatal hypoglycemia.

KEYWORDS: Simulation Training; Neonatology; Students, Nursing; Education, Nursing; Distance Education.

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¹ Universidade Federal do Triângulo Mineiro, Programa de Pós-graduação em Atenção à Saúde, Uberaba, MG, Brasil.

² Universidade de Uberaba, Hospital Regional José Alencar, Uberaba, MG, Brasil.

³ Universidade Federal do Triângulo Mineiro, Hospital de Clínicas da Universidade Federal do Triângulo Mineiro, Uberaba, MG, Brasil.

⁴ Universidade de São Paulo, Escola de Enfermagem de Ribeirão Preto, Departamento de Enfermagem Materno-Infantil e Saúde Pública, Ribeirão Preto, SP, Brasil.

⁵ Universidade Federal do Triângulo Mineiro, Departamento de Enfermagem em Assistência Hospitalar, Uberaba, MG, Brasil.

INTRODUCTION

The teaching-learning process about neonatal nursing includes the development of theoretical and practical skills and competencies in care activities. In this space, active methodologies such as clinical simulation and tele-simulation have been used because they allow undergraduates to come into contact with real situations in controlled environments and acquire knowledge and technical skills before going into practical care¹⁻².

With the global COVID-19 pandemic, methodological transformations in learning came as a solution to social distancing, causing the educational methods traditionally used to be quickly replaced by emergency remote teaching-learning³⁻⁴. It is considered that the pandemic had a decisive impact on education, even after its end.

The resources of tele-simulation come from telecommunications and simulation together for educational or evaluative purposes⁵. This teaching strategy promotes interaction between participants and the facilitator through virtual learning platforms, and the learning outcomes focus on cognitive and behavioral skills⁵⁻⁶. Plays an important role in acquiring critical clinical skills and in reflective decision-making, necessary to provide safe patient care^{3,7}. When used in clinical internship modules with medical and nursing students, it can effectively promote the development of diagnostic and clinical assessment skills^{2,8}.

The simulation consists of three stages⁸: Pre-simulation, preparation of participants with emphasis on learning objectives, supported by available evidence, and explanation of its development before the subsequent stages. *Pre-briefing*, presentation, and explanation of the elements that make up the simulated scenario are to be conducted moments before the execution of the activity, followed by the participation stage, consisting of the execution of the simulated scenario^{6,8-10}. The *debriefing* is the essential component of simulation-based education; it can be carried out through self-debriefing (self-assessment), which provides a personalized experience in which the participant can reflect on the activity, enabling comparable learning outcomes, such as performance or knowledge gains¹¹.

Among the common conditions in the neonatal period, neonatal hypoglycemia stands out, determined when plasma glucose levels are below 47 mg/dl (< 2.6mmol/l), with or without signs and symptoms¹². Glucose is a source of energy for neurons; severe imbalances can trigger irreversible damage to the nervous system, impacting the future intellectual development of these children¹³. One must ensure an adequate food supply in the postnatal period and avoid fasting due to low glycogen reserves, especially in newborns (NB) who present risk factors¹³⁻¹⁴. From their training, understanding these mechanisms by health professionals is essential for more assertive assistance¹⁴.

In the face of challenges related to education in the health field, focusing on developing proactive skills and attitudes in their training process, tele-simulation presents itself as a promising pedagogical strategy in clinical practice in a real learning context in nursing care for newborns with hypoglycemia. Associated with these factors, it is noted that the applicability of active learning strategies such as clinical simulation, feasible during the period of restrictions on in-person classes, was only possible with the help of communication technologies for teaching-learning, referred to as tele-simulation; leading to the following guiding question: how did nursing students perceive and experience learning through a tele-simulation scenario on neonatal hypoglycemia? From this question, the study aimed to describe perceptions experienced by nursing students in the tele-simulation scenario regarding neonatal hypoglycemia and expressed in self-assessment.

METHOD

This is an exploratory, descriptive study with a qualitative approach, which investigated the perceptions experienced by nursing students in the tele-simulation scenario regarding neonatal hypoglycemia. The consolidated criteria for qualitative reporting, *Consolidated Criteria for Reporting Qualitative Research* (COREQ), were used to enhance the rigor and quality of the research¹⁵, through the three domains: Research team and reflexivity; Concept of the study and Analysis and results.

The team for this research was composed of three facilitators to conduct the interviews, all nurses, one with a doctorate, one with a master's degree, and one with a doctorate, with experience in conducting qualitative research. The study was developed in a virtual learning environment during an elective course of a nursing undergraduate program at a federal public university located in the interior of the State of Minas Gerais - BR.

The sample was constituted by convenience and included the following inclusion criteria: being undergraduate nursing students regularly enrolled in the elective course Nursing Care in Neonatology, having completed the courses in Pediatric Nursing, Gynecology and Obstetrics Nursing, and Women's, Adolescent, and Child Health Nursing. Undergraduates who suspended the subject/course during the study period were excluded.

A week in advance of the scheduled date for the topic of neonatal hypoglycemia in the schedule, the content was made available on the virtual learning platform *Moodle* (*Modular Object-Oriented Dynamic Learning Environment*), along with the lesson plan that would be taught, and the guide from the Ministry of Health that addresses the research topic¹⁶. The activity was offered to all students enrolled in the course. After the class, the Informed Consent Term (TCLE). was presented. Those who agreed to participate were redirected to the sociodemographic characterization form.

Data was collected from August to September 2021 after the tele-simulation activity on neonatal hypoglycemia in the Nursing Assistance in Neonatology course. Through the Google Meet® platform, it was possible to develop the tele-simulation that, at first, the *pre-briefing*, synchronously, the students received guidance on the pre-recorded scenario used for the activity and guidance on discussions that would take place at the end of the video presentation, learning objectives, duration of the scenario, participants in the scene, and location of the scene.

The pre-recorded scenario was previously validated¹⁷, it was built from the simulated scenario Nursing Management in the Face of Neonatal Hypoglycemia provided by another researcher. The elaboration process included the validation of the script/*storyboard*, carried out by ten judges with doctoral degrees and specialists in realistic simulation and/or maternal-infant area, and thus, in light of the considerations presented, changes were made, and subsequently, the rehearsal with the actors and the recording of the video took place. After recording the footage, five researchers specializing in neonatology conducted their evaluations and the suggested modifications were made.

The scenario used in the video is classified as a hybrid. It involved two simulated participants (a nurse and the mother of the newborn) and a low-fidelity mannequin representing the baby. To provide greater realism in the scenes, the environment of a laboratory at a university in the interior of Minas Gerais was used, prepared to match a shared accommodation ward.

It lasts 18 minutes and, between the scenes, there were questions about the actions that should be taken in response to the circumstances presented in the scenario: What is the best conduct (in response to the low blood sugar level of the newborn)?; What is the best care plan (in light of the persistence of hypoglycemia)? and "The newborn is not improving, what now?". The questions aimed to promote critical-reflective thinking among undergraduates and greater interaction and participation from them, giving the impression that they were participating in the scenario.

After everyone watched the pre-recorded scenario together, a *debriefing* was held, that is, a synchronous discussion lasting 30 minutes about the actions that occurred in the scenario and the questions raised during it, providing space for clarification of doubts. The *debriefing* was structured and guided by the emotional, descriptive, evaluative, analytical, and conclusive phases^{2,11}.

After this stage, questions were sent through the *Moodle®* platform for the *self-debriefing* about the activity performed: What was it like to experience this? How did this methodology contribute positively to your learning? What are the negative aspects you experienced in this learning process? Would you like to say anything else about this topic? The answers were recorded on the platform itself and extracted by the researchers, subsequently transcribed and stored through a document of the *Microsoft Office Word®* software.

A descriptive analysis of the characterization of the participants was carried out, and content analysis¹⁸ was applied to the materials seized from the speeches. This process went through three phases: pre-analysis, characterized by the transcription of raw data and floating reading, aiming to generate initial impressions about the material made available for analysis; exploration of the material: organization of categories relevant to the content to be analyzed, through excerpts of expressions or words from the text for later aggregation of the data into categories; treatment of results and interpretation, with the purpose of analyzing the selected theoretical material or in new theoretical dimensions. At the end of the stages, the researcher was allowed to make deductions and interpretations regarding the proposed objectives and to systematize the analysis categories.

The study was approved by the Research Ethics Committee of the Universidade Federal do Triângulo Mineiro-UFTM, process CAEE 23740719.0.0000.5154, opinion no. 3.719.938. To preserve the participants' identities, alphanumeric codes were used, accompanied by the vowel "E" for Student, followed by a number, respecting the order of insertion of the interview on the platform Moodle. Thus, they were identified as 1E, 2E...1E36.

RESULTS

A total of 36 undergraduate students participated in the study, distributed as follows: four (11.1%) were in the seventh semester, 16 (44.4%) in the eighth, 15 (41.7%) in the ninth, and one (2.8%) in the tenth semester of the nursing course, all female, with a minimum age of 20 and a maximum of 40 years.

All had internet connection at home and frequent access to scientific studies, 32 (88.8%) had accessed some information/content about neonatology. For the development of academic activities, 16 (44.4%) used a laptop and 20 (55.6%) used a mobile phone. The most used tools were *Google Meet* and *Moodle* 36 (100%) and

the social network *WhatsApp*, 33 (91.6%) for participation in meetings, classes, group work, and file sharing.

Based on the speeches, it was possible to grasp the perceptions experienced by nursing students in the clinical tele-simulation scenario regarding neonatal hypoglycemia and to organize them into two categories: "learning a new way of learning" and "learning a new way of caring."

Learn a new way of learning

Nursing undergraduates presented lived perceptions about the learning opportunity through contextualized tele-simulation in the scenario of neonatal hypoglycemia in an elective course during the COVID-19 pandemic, demonstrating that the strategy achieved its final objective, favoring teaching-learning through a pre-recorded scenario.

[...] I learned that even virtually it is possible to learn and establish a study routine so that my performance is the best it can be. [...] it was a very good and facilitating experience in every way [...] I was very discouraged because of the pandemic and the classes were tiring [...] in this subject there was more interactivity. (23E)

[...] was an important experience during the pandemic, because everything was very difficult, studying [...] managing [...]. learning [...] this subject made me be reborn. (18E)

[...] experiencing this experience was very rewarding, everything contributed a lot to my learning. (17E)

For me, your teaching methods were amazing, this significantly helped in learning. (25E)

Excellent teaching method! The classes were very engaging, clear, and helped a lot in the learning process. (E28)

Taking into account the perceptions of the graduates who participated in the learning experience through tele-simulation allowed them to monitor their learning and maturation process, and thus, they discussed the opportunities offered by the strategy, such as the ease of experiencing the realism of a newborn care case inserted in a virtual environment.

[...] it was very good with the recorded practices [...] it was an incredible experience, as we could watch as many times as necessary [...], it facilitated my learning, everything I learned was very useful. (6E)

[...] it was a very pleasant and good experience, it was different and exciting, we were a bit lost, not knowing what to do, this methodology helped me get excited to go back to studying ... it was positive. (19E)

[...] for me it was an innovation in the way of teaching [...]. (15E)

For me, I can only say that all the content was useful, especially the videos made by the collaborators, this way I was able to solidify the practices. (24E)

I really liked the videos made by the teachers who taught the subject to demonstrate the practice [...]. (5E)

The videos of the practices were very helpful for me to better visualize the knowledge. (7E)

The simulations were great to see the unfolding of some situations in practice. (8E)

The students were able to recognize that the tele-simulation, in that context, occurred due to the determination of distancing. Because it happened virtually, the impossibility of execution in practice became a negative point. In addition, inherent flaws in the process, such as internet fluctuations, led to losses in the progress of the strategy, such as interference in the audiovisual understanding of the scene.

the bad thing is the lack of personal interaction with other colleagues, but I understand that it is because of the moment we are living. (1E)

[...] the biggest obstacles were the lack of in-person practices and the difficulty with ICTs (Information and Communication Technologies). (4E)

[...] the issue of the Internet connection that disrupted some times [...] and the technical problems at the beginning of the classes, but this is sometimes inevitable [...] disrupted. (32E)

It would be even better in person, it's a shame I participated at this moment when social isolation is required. (34E)

Learn a new way to take care

The tele-simulation exposed us to the specificities of neonatal care, the characteristics of a newborn in the context of hypoglycemia, the care for the mother-child dyad, and the professional's role in this circumstance. This thematic category allowed us to understand how tele-simulation influenced graduates to develop a new perspective on caring for the newborn.

[...] the recorded classes with the practices were very good [...] we can have an idea of how to perform in practice as future nurses [...], everything I learned was very useful. (3E)

[...] I learned about the main issues regarding care for the newborn [...] it was a good experience, since the organization of the discipline was very important given the moment we were experiencing during the pandemic. (27E)

I wanted to learn more about how nursing works in the care of newborns, and I was able to learn a lot about the nurse's role in neonatal care. (9E)

I could see that the neonate is much more than I thought, and that we should know more areas without having a preconceived notion. (E22)

[...] exceeded expectations, although the RN is more fragile, it encouraged me to study and delve deeper into the subject. (26E)

Experiencing a real situation and developing skills and competencies in caring for the newborn, combined with prior knowledge and the ability to recognize their progress in this aspect, allowed for the awakening of critical-reflective thinking and highlighted the importance of the nurse's role in the care presented in the simulation with the aid of tele-simulation.

[...] I learned that we need to learn and pay close attention to the care of the baby[...] that any change, even the smallest, requires greater attention[...], it can prevent suffering and greater wear on the patient and the mother. (10E)

[...] I learned crucial details in caring for the baby [...] how to identify and how to proceed with problems associated with the health of this newborn. (2E5)

I learned from the basics to the most complex ways to deal with a situation involving a newborn. (16E)

Exceeded my expectations and made me love the content and understand the importance of neonatology. (11E)

I learned the importance of nursing in neonatal care. (20E)

I didn't imagine that neonatology encompassed all these topics that interested me and made me study beyond what was covered in class. It helped to associate this knowledge with other subjects. (31E)

I learned crucial details in caring for the newborn and how to identify and proceed with problems associated with their health. (33E)

DISCUSSION

The results of this study involved the perceptions and experiences of nursing undergraduates regarding teaching-learning mediated by tele-simulation, set in the context of the COVID-19 pandemic. Undergraduate students who attended in-person classes had to adapt to remote learning, which significantly impacted their academic training, bringing important challenges to the forefront for both students and teachers^{4-5,19}.

In this study, tele-simulation was recognized as a teaching-learning strategy that had a positive effect on the new way of learning, providing ease in the process of knowledge construction, facilitated by the realism of the scenes and in the guidance of the facilitators of the tele-simulated activity²⁰⁻²¹. Although it was an innovative strategy, the interviewees reported high levels of satisfaction with the new way of learning. The contentment with the tele-simulation occurred because it is a driver of interest stimuli in students, strengthening the understanding and the connection between theory and practice²²⁻²³.

The study's results highlight the relevance of tele-simulation as an innovative method, especially when students and tutors are separated by the barriers imposed by time and distance, a situation experienced during the research. Tele-simulation to teach theoretical-practical cases, even the most complex ones, is a somewhat new

situation that is still evolving. Still, nonetheless, it is an interactive and challenging strategy that allows involvement in a real, authentic, and immersive scenario, enabling the replication of practices in clinical stages and future professional performance^{8,24}.

The study demonstrated that nursing graduates viewed tele-simulation as an important tool for skill development, training, and maturation in the face of the opportunity to experience the realism of a case of care for the newborn, which corroborates with other studies, highlighting students' satisfaction with their learning process, feeling committed and stimulated to think critically-reflectively about their active or observational involvement^{22, 24-25}.

The results found reinforce the suitability of rethinking the way of teaching and learning through a combination of resources that work together to promote meaningful learning, whether by providing support to work on aspects in advance, sparking students' interest, or being a strategy that enables reaching other stages that involve learning²⁶.

The students also reported that another important gain provided by tele-simulation was the possibility of visualizing the nurse's role in neonatal care. During the training period, nursing graduates have few opportunities to develop practical activities with this audience, which hinders training, generating fear and doubts^{2,18,21,24}. This strategy proves to be viable in neonatal nursing education as a way to prepare graduates for realistic training in a safe environment and to stimulate critical-reflective thinking by providing support for appropriate, quality, and safe professional practice in the care of the newborn^{1,27}.

Providing nursing students with contact with situations typical of the profession significantly favors the development of their professional identity, especially in contexts that involve specific areas²⁸, such as newborn care.

The neonatal population has its own particularities and thus requires meticulous and complex care, which must be exercised safely and based on scientific evidence. In this way, preparing students to plan, implement, and evaluate this mode of assistance is a complex task that requires responsibility and commitment from the teacher to adopt strategies, such as tele-simulation, that facilitate the teaching-learning process and foster interest in learning and the development of critical-reflective reasoning²⁹.

It was possible to perceive the various benefits that tele-simulation provides for educational practices in teaching; however, it has its limitations, as evidenced by the participants' statements in the study, who explained the lack of opportunity to undergo training in technical skills and tactile practices, even though they can observe them, which can lead to the feeling of not having learned enough to experience clinical practice^{6,22,30}. Thus, in the context of tele-simulation, we can focus our learning objectives on cognitive skills, in order to highlight why certain behaviors are performed and how to plan for making appropriate decisions for each presented case⁸.

Other obstacles were signaled, such as those inherent to the limitations of remote activity, such as internet fluctuations, audiovisual impairment, and distractions, results also found in other studies, which pointed to the need for improvements in technological infrastructure and ongoing education for the enhancement of teachers^{6,30}.

Even in the face of some inherent barriers to the strategy, it stands out, parting from the students' perceptions, that this teaching strategy presents itself as promising as a method of teaching and learning in nursing. It represents new opportunities in health training through the articulation of theory and practice and decision-making, reflecting better professional qualification⁶.

Study Limitations

As a limitation, the study presented infrastructure issues, such as the unavailability of equipment at the educational institution, internet fluctuations, audio clarity, and difficulty visualizing the scene.

CONCLUSION

Through the results found, it was possible to highlight the perceptions of nursing undergraduates related to the teaching-learning mediated by tele-simulation. The exposed facilities were centered on the realism of the scenes from the pre-recorded setting, which facilitated the learning process, allowing gains in knowledge related to neonatal care. Another preponderant factor is the identification of the nurse's role in assisting the newborn, including in the context of neonatal hypoglycemia. The tele-simulation allowed undergraduates to immerse themselves in the scene and encourage critical-reflective thinking for decision-making, self-reflection, and *self-debriefing* about their future professional performance, factors that ensured meaningful learning.

The barriers presented were related to the impossibility of practical execution, internet fluctuations that compromised the audiovisual understanding of the scenes, and difficulties faced by the mediators of the activities and the objects facilitating knowledge. However, they indicate that these issues can be improved through the continued practice of this strategy.

Future studies should explore the incorporation of tele-simulation in education as a teaching-learning strategy.

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Corresponding author:

Nylze Helena Guillarducci Rocha

Universidade Federal do Triângulo Mineiro

Av. Getúlio Guaritá, 330, Bairro Nossa Senhora da Abadia, Cep: 38025440.

E-mail: nylze@hotmail.com

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