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RESEARCH ARTICLE (ORIGINAL)

Components of a computerized best practice guide for nursing simulation: Qualitative study

Componentes de um guia informatizado de boas práticas para a simulação em enfermagem: Estudo qualitativo

Componentes de una guía informatizada de buenas prácticas para la simulación de enfermería: un estudio cualitativo

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Abstract

Background: Simulation is recognized as a teaching strategy that allows connecting theoretical knowledge and the reality of care delivery, thus contributing to the development of certain skills in the teaching/learning process. The Good Practice Guides, in the context of training health professionals, allow for the guidance and support of simulated practices during the learning process of nursing students.
Objective: Identify the components of a computerized Best Practice Guide for simulation in nursing.
Methodology: This is a qualitative study using a Focus Group as data collection method, with recourse to an expert panel composed of six teachers from a Higher School of Health in the Northern Region of Portugal.
Results: Four components were identified, materials, access levels, scenario, and evaluation.
Conclusion: The identified components are fundamental for the construction of a Computerized Good Practice Guide for Simulation with an impact on the standardization of the entire structure and dynamics of learning in nursing.

Keywords: simulation; nursing; nursing education; good practice guide; software

Resumo

Enquadramento: A simulação é reconhecida como sendo uma estratégia de ensino que permite a interligação entre o conhecimento teórico e a realidade da prestação de cuidados, contribuindo para o desenvolvimento de determinadas competências no processo de ensino/ aprendizagem. Os Guias de Boas Práticas, no contexto da formação de profissionais de saúde, permitem a orientação e suporte às práticas simuladas no decurso do processo de aprendizagem dos estudantes de enfermagem.
Objetivo: Identificar as componentes de um Guia de Boas Práticas Informatizado para a simulação em enfermagem.
Metodologia: Estudo qualitativo tendo como método de recolha de dados um *Focus Group,* com recurso a um painel de peritos composto por seis docentes de uma escola superior de saúde da região Norte de Portugal.
Resultados: Foram identificadas quatro componentes, nomeadamente, materiais, níveis de acesso, cenário e avaliação.
Conclusão: As componentes identificadas são fundamentais para a construção de um Guia de Boas Práticas Informatizado para a Simulação com impacte na uniformização de toda a estrutura e dinâmica de aprendizagem na enfermagem.

Palavras-chave: simulação; enfermagem; educação em enfermagem; guia de boas práticas; software

Resumen

Marco contextual: La simulación es reconocida como una estrategia de enseñanza que permite conectar los conocimientos teóricos y la realidad de la prestación de cuidados, contribuyendo así al desarrollo de determinadas habilidades en el proceso de enseñanza/aprendizaje. Las Guías de Buenas Prácticas, en el contexto de la formación de los profesionales de la salud, proporcionan orientación y apoyo a las prácticas simuladas durante el proceso de aprendizaje de los estudiantes de enfermería.
Objetivo: Identificar los componentes de una Guía de Buenas Prácticas informatizada para la simulación en enfermeira.
Metodología: Se trata de un estudio cualitativo que utiliza un Grupo Focal como método de recogida de datos, recurriendo a un panel de expertos compuesto por seis profesores de una Escuela Superior de Salud de la Región Norte de Portugal.
Resultados: Se identificaron cuatro componentes: materiales, niveles de acceso, entorno y evaluación.
Conclusión: Los componentes identificados son fundamentales para la construcción de una Guía Informatizada de Buenas Prácticas de Simulación con impacto en la estandarización de toda la estructura y dinámica del aprendizaje en enfermería.

Palabras clave: simulación; enfermaría; educación en enfermería; guía de Buenas Prácticas; Software

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Introduction

Simulation has become a benchmark for student learning in higher education in the health area, allowing for the development of essential skills in the teaching-learning process (Mota et al., 2021).

There has been increased investment in material and human resources that, together with teaching/learning methodologies, can improve patient safety and consequently minimize clinical errors. These methodologies provide a safe and controlled environment for students to train and enhance their technical and non-technical skills, thereby improving safety and clinical outcomes (Elendu et al., 2024). A best practice guide can be a teaching tool to develop these skills, providing guidance and support for simulated practice throughout the student's academic journey. A computerized best practice guide in the area of simulation guides the planning and performance of simulated scenarios based on strategies essential for best practices in nursing. The guide must include the steps of the procedures, thus helping participants to train their skills and competencies and facilitating the verification of strengths and weaknesses to be improved or enhanced (Schuelter et al., 2021).

Implementing educational technology is a complex and multifaceted decision that requires input from many perspectives, so higher education institutions must consider stakeholders and theoretical foundations (Chugh et al., 2023). This study aims to identify the components of a computerized best practice guide for nursing simulation.

Background

Simulation is recognized as a teaching method that translates reality into simulated scenarios. The simulated environment recreates spaces of high realism and fidelity that allow for emotionally safe and simultaneously challenging learning spaces where students can build their learning process (Padilha et al., 2022).

Simulation is a pedagogical method that uses various techniques to promote student development and success in different aspects of learning (Mota et al., 2021).

Nursing simulation is an increasingly used methodology of great importance in healthcare and has several advantages for students' teaching-learning process (Pissaia et al., 2018).

The advantages of simulation in the preparation of nurses include the consolidation of knowledge, the improvement of technical and relational skills, the promotion of critical and reflective thinking, and the reduction of clinical errors. To ensure the most practical and effective use of clinical simulation, it is essential to integrate it with a computerized process, which in nursing is represented by the computerized best practice guides (Pissaia et al., 2018). This tool makes teaching simpler and more objective, but at the same time it promotes moments of clinical reasoning and critical-reflective thinking through dynamic interaction with the user (Mantovani et al., 2019).

Research question

What are the components of a computerized best practice guide for simulated practices in Fundamentals of Nursing?

Methodology

This exploratory qualitative study was conducted following the Consolidated Criteria for Reporting Qualitative Research (COREQ). This study used a focus group as the data collection method. Participants were selected from among the teachers who taught simulation classes in the Fundamentals of Nursing course unit at a higher education health school in northern Portugal. The following inclusion criteria were applied: specific training in the field of simulation; pedagogical management functions (course coordinator, head of the course unit, or member of the pedagogical council); researcher in the field of simulation. Participants were invited by e-mail. Two teachers with specific training in simulation, two pedagogical managers, and two researchers specialized in simulation agreed to participate. The higher education institution where the study was conducted has a simulation and interactive learning center registered with the Portuguese Simulation Society.

The focus group was conducted by the lead researcher. In order to facilitate the focus group, a guide was prepared beforehand, which included guiding questions on: Nursing education based on simulation and educational technologies; Organization of the best practice guide and its advantages, benefits, and importance; The Visual Basic digital platform; and Teachers' difficulties in simulated practices. Data were collected on October 4, 2021. The focus group lasted 51 minutes and was audio recorded. It was conducted in person on the premises of the higher education institution. The audio recording was then transcribed verbatim using the Microsoft Word tool, taking into account all notes taken during the focus group. Data were analyzed using content analysis without prior categorization, according to Bardin (2016). During the focus group, the researchers ensured that the interpretation was impartial (Júnior, 2022Participants were asked to sign an informed consent form to obtain their permission to participate in the study and to allow audio recording of the focus group. Data were kept confidential and anonymous by replacing the participants' names with an ordinal coding. This research study was approved by an Ethics Committee (Opinion No. 002/2021).

Results

Four categories emerged from the analysis: Material, Access Levels, Scenario, and Evaluation. The categories emerged from a semantic aggregation based on their relationship with the subcategories and coding units. In the content analysis tables, only the coding units that represent the identified category or subcategory are shown for better understanding.

Material

During the focus group, the expert panel identified the material needed for clinical simulation in Fundamentals of Nursing, which is related to procurement and request automation, as shown in Table 1.

Table 1

Category: Material

Category	Subcategory	Coding Unit
Material	Procurement	"list of material resources that would be needed ... validate these material resources, it would automatically link to SAGAR (Procurement)." - (P1, October, 2021)
	Request automation	"I automatically select the procedure that is already predefined and it says what the material is..." - (P1, October, 2021) "what would be the best way to select the material I'm going to request and it has to do with the type of material I can select ... the quantities." - (P4, October, 2021)

Access levels

Access levels are a fundamental aspect of enhancing the functionality of the platform and guaranteeing user-friendly interaction with it. The following subcategories were identified: type of access and type of user, as shown in Table 2.

Table 2

Category: Access levels

Category	Subcategory	Coding Unit
Access levels	Type of access	"The student has to be part of the whole process and have access to everything." - (P3, October, 2021) "accessible to both students and teachers ... the only difference is that I think the student may not have access to the link to SAGAR (Procurement) ..." - (P3, October, 2021)
	Type of user	"Obviously, for security and data protection reasons, for achieving objectives, etc., there are many reasons, but beyond the issue of the level of access is the possibility of knowing who is accessing it..." - (P2, October, 2021) "So that they can access the platform and then train on their own. . ." - (P3, October, 2021)

Scenario

The experts identified the Scenario as a key element for the development of an appropriate simulation scenario. The following subcategories emerged: planning, briefing, clinical cases, objectives, outcomes, debriefing, timings, language, and design, as described in Table 3.

Table 3

Category: Scenario

Category	Subcategory	Coding Unit
Scenario	Planning	"the planning of the whole course unit could also be done here on the platform ..." - (P1, October, 2021) "the planning of my lesson, of my simulation... preparing the briefing, preparing the material, preparing my scenario..." - (P4, October, 2021) "In planning, we also talk about the scenario, we talk about material resources and human resources." - (P1, October, 2021)
	Briefing	"It was very interesting that, during the briefing phase, the students could watch a short video of what they were going to do..." - (P3, October, 2021) "the preparatory phase ... goes to SAGAR then we have the briefing phase, it's presenting the objectives, the outcomes, the case, a video, the material, the student has access to everything ... when it goes to the performance, between the briefing and the performance, you insert the diagnosis ..." - (P3, October, 2021)
	Clinical cases	"Either having a case that is being built up or having a complex case that is being simplified according to the level I'm at, or wanting more of this or more of that." - (P4, October, 2021) "The clinical case ... if it's open for the teacher to put the case in there or if it's already standards." - (P4, October, 2021)
	Objectives	"...the end goal ... best practices can be prepared in advance with the goal in mind, regardless of the outcomes that will be achieved." - (P2, October, 2021) "these objectives have to be shared with the student." - (P1, October, 2021) "the objectives must be SMART..." - (P1, October, 2021)
	Outcomes	"If this is a best practice guide, it's for driving success..." - (P3, October, 2021) "Our goal is to have health outcomes ... with good performance ... to prepare the student from the beginning to have the necessary skills to efficiently carry out the procedure and the clinical scenario ..." - (P1, October, 2021)
	Debriefing	"Now we're going to see in the debriefing what happened, and maybe the diagnostic data that are in the pre-test... I'll then see within the group who prepared themselves and who didn't, who answered the questionnaire and who didn't, what were the results of the Kahoot ... they may even have the opportunity to do the diagnosis more than once and there'll be a record of it..." - (P4, October, 2021) "If it's peer-feedback, if it's another structure that we're going to use here ..." - (P3, October, 2021)
	Timings	"timings for briefing and debriefing, as well as implementation and preparation." - (P1, October, 2021) "inserting the timing there or establishing the timing you want." - (P1, October, 2021) "We have to validate the timings here, the literature says that briefing should be two thirds of the simulation time and this will be respected..." - (P1, October, 2021)
	Language	"Bloom's objectives almost have a qualified language, we can't get away from that standard language, it has to be this one and it can't be any other because of the typology, the levels of the objectives." - (P2, October, 2021)
	Design	"The structure has to be very visual, very friendly, very easy..." - (P3, October, 2021) "a video that can be a maximum of 6 minutes ..." - (P1, October, 2021)

Evaluation

The Evaluation category includes parameters aimed at improving student development and achievement in simulated practices. Self-evaluation/Teacher evaluation and gamification were identified as subcategories, as shown in Table 4.

Table 4

Category: Evaluation

Category	Subcategory	Recording Unit
Evaluation	Self-evaluation/Teacher evaluation	"It would be important to have access to continuous evaluation grids." - (P3, October, 2021) "Student self-assessment ... we have an assessment tool for practical classes that allows students to assess their knowledge and performance in each class." - (P5, October, 2021) "Focusing on quality ... we could also have some questions to assess student satisfaction." - (P1, October, 2021)
	Gamification	"assessing students' knowledge with the Kahoots." - (P1, October, 2021) "the facilitator intervenes with the student, sometimes it's luck, what the facilitator asks or puts the student to the test. And this... would be something more standardized for everyone and where everyone would answer the same, giving everyone an equal opportunity. There's no "I didn't know that." - (P1, October, 2021) "Gamification. That makes the whole process more interactive." - (P1, October 2021) "We can also create something here to keep them engaged in the app ... have a prize, points, like the Olympics." - (P1, October, 2021)

Discussion

The analysis of the content of the focus group in relation to the Material category shows that the participants considered it essential to take into account procurement and request automation. According to Nascimento et al. (2021), materials are fundamental to carry out a clinical simulation, as they provide the realism and fidelity of each case, thus improving the teaching-learning process. In addition, material availability is feasible and has a direct relationship and dependency on request automation. Today it is important to create systems that increase the reliability of learning during the teaching process. They also help each user get the most out of each simulation, promoting success and stimulating a training process based on the best scientific evidence available (Alves, 2019). Each clinical scenario can be prepared in different ways, depending on what is assigned to each simulation in the system. In this way, the system should be prepared for the possibility of the user entering certain procedures or this being an automated process, directly related to the level of knowledge and skills, as well as the level of difficulty of each clinical simulation (Pissaia et al., 2018).

To make it easier for students to prepare for the simulation scenario, participants felt that it was important for the platform to be freely accessible. Ideally, students should be able to access the scenario beforehand and prepare for the practical class in order to better achieve their goals and meet pre-defined expectations (International Nursing Association for Clinical Simulation and Learning Standards Committee, 2021).

When building a simulation scenario, it is essential to consider several elements to make it as realistic as possible. These elements are important to the overall structure of the simulation and are set out in best practice simulation criteria to promote effective learning outcomes for participants. The scenario is a fundamental component of the planning and organization of any simulation. Its implementation takes place in stages, with the initial stage being the debriefing. The briefing involves planning the dynamics of a simulation and is a form of reflection prior to the scenario. This stage includes guidelines for the environment and a review of the objectives and competencies to be achieved through the scenario. This strategy allows for discussion and resolution of clinical scenarios prepared by faculty, encourages critical-reflective thinking, facilitates the development of decision-making skills, and promotes the management of time, emotions, and stress by students.

Another advantage of simulation is that students can access the scenarios in advance and prepare for discussion and performance in a specific clinical case through the briefing. Considering that the objectives of simulated practice should focus on promoting learning, critical-reflective thinking skills, and outcome assessment, the briefing is of great importance for achieving these goals (Nascimento et al., 2020).

According to the guidelines for the implementation of effective simulation scenarios, the objectives should be formulated based on the SMART methodology (Specific, Measurable, Achievable, Realistic, Timely). These objectives should be made available to the participants before the scenario takes place, keeping in mind that they should enable clinical reasoning and informed decision-making (Kaneko & Lopes, 2019).

It is of paramount importance to make the objectives available to students in order to direct their thinking towards the optimal solution to the case and to stimulate clinical reasoning and decision-making. Moreover, the objectives should not be oriented towards solving the scenario, as this would not foster critical thinking among students. Once the objectives for the simulation have been established, the clinical cases, which are an essential element, begin to be developed.

In order to implement an effective simulation scenario, the participants identified the following key compo-

nents: timings, design, language, and outcomes of each simulation, including debriefing. According to Silva et al. (2023), the simulation should be designed in such a way that students understand the objectives set for them and that it closely resembles reality. Therefore, the design of the simulation scenario should take into account the objectives of each simulation, the level of fidelity, the materials/equipment required, and the level of complexity (International Nursing Association for Clinical Simulation and Learning Standards Committee, 2021). In addition to these factors, the timings of each simulation must be respected, and these are not arbitrary, i.e. each timing must be defined by the teacher according to the objective of each exercise (Díaz-Guio et al., 2021).

In addition to design, the participants identified the need for a common language to achieve greater success during the simulation. This language is the Bloom's Taxonomy, whose main purpose is to identify objectives related to cognitive, affective, and psychomotor development. The cognitive domain encompasses the processes of acquiring knowledge, developing skills, and forming attitudes. The affective domain pertains to emotional issues, including behavior, attitude, responsibility, values, and emotions. Finally, the psychomotor domain includes speed, execution techniques, perception, and non-verbal communication (Cabral, 2019). The last stage of each simulation scenario is the debriefing and the analysis of outcomes. According to Padilha et al. (2019), the outcomes show that students are able to consolidate their knowledge more quickly through simulated practices. In addition, they demonstrate higher levels of satisfaction with the learning process. This satisfaction allows for the potential development of certain clinical skills in future professional practice, which ultimately enhance the safety and quality of nursing care. It is a criterion of best practice in simulation to conduct a debriefing session at the end of each simulation, as it not only enhances the practical experience itself, but also provides justification and rationale for all actions taken (Vilarinho et al., 2020).

The last category identified is evaluation. This is a stage of profound reflection, during which the skills acquired in the simulated practice are explained with a view to the improvement and evolution of each student in the teaching-learning process. The evaluation of the simulation covers several parameters that contribute to the student's overall development. From attitudes to technical, decision-making and clinical reasoning skills, all of these factors are important and should be considered when evaluating learning outcomes (Vilarinho, et al., 2020). In order to facilitate the evaluation process, gamification is regarded as a valuable tool that can enhance the effectiveness of simulated practice. The aim is to facilitate the use of digital elements with continuous feedback, based on interaction, the inclusion of errors and motivation (Gómez et al., 2019). This technological medium could also be used as a resource for diagnostic assessment at a formative level, depending on the desired outcomes. Consequently, this more interactive methodology will contribute significantly to enhanced learning outcomes in higher education, which translates into the ability to create and implement innovative pedagogical methodologies that ensure up-to-date and quality training (Padilha et al., 2024). As an active learning methodology, it is based on the premise that the focus should be on the student, rather than on the teacher. Students become more involved in the teaching-learning process, assume a proactive stance in building their body of knowledge, and reflect on the skills they have acquired, including autonomy, teamwork, capacity for innovation, and reflection on clinical situations. It is necessary to invest in simulation because of its advantages for the learning process of higher education students in the health area. A limitation of this study was the small number of intentionally selected participants, who may have been influenced by other participants and/or researchers.

Conclusion

The components of the computerized best practice guide for nursing simulation are as follows: Material (procurement and request automation), Access levels (type of access and type of user), Scenario (planning, briefing, clinical cases, objectives, results, debriefing, timings, language and design), and Evaluation (Self-evaluation/ Teacher evaluation and gamification).

This study is an excellent contribution to the teaching-learning process, facilitating cohesion and the development of simulation scenarios.

By standardizing the entire structure and learning dynamics, all participants in the simulation will engage in more rigorous critical reflection and a more consistent and well-founded assessment, with a view at promoting academic success and continuous improvement for both the student and the expert coordinating the simulated practice.

Future studies should put into practice the knowledge and skills identified as fundamental in a simulation context, as well as implement the computerized best practice guide to enable its standardization and application in other higher education settings.

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