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The Design and Validation of a Clinical Simulation Scenario in the Management of a Cardiac Arrest during Hemodialysis Session

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Abstract

The teaching of a complex content such as the managing of a Cardio-Respiratory Arrest should not be executed on real patients by means of assisted practice, for there is an elevated risk of unfavorable outcome. Based on that, the simulation is an excellent teaching strategy to that end. **Methods**: Methodological studies, descriptive, of quantitative approach for the design and validation of a realistic Clinical Simulations Scenario performing two steps, namely: 1) designing a clinical simulation scenario, and 2) validation of the clinical simulation scenario's content by judges. **Results**: A scenario was designed and validated for the teaching and improvement of the CRA management in patients during a hemodialysis session. **Conclusion**: The study succeeded in designing and validating the content of a Clinical Simulation Scenario with teaching or improvement purposes, for students from the health academic field, on managing a CRA in specific situations, which demand proper knowledge for action, on a CRA case, during hemodialysis session. This study contributes to the improvement of teaching and assisting students from the health academic field, for presenting a Clinical Simulation Scenario with its content validated: for being of simple implementation to teachers and facilitators; for taking the most actual and reliable scientific evidences into account; as well as for enabling its adaptation and usage in other contexts, since it has a script of how the design and validation were conceived, favoring the spreading of the scientific knowledge in this scope.

Keywords

Cardio-Respiratory Arrest, Cardiopulmonary Resuscitation, Hemodialysis, Clinical Simulation

1. Introduction

The Cardio-Respiratory Arrest—CRA is a prevailing cardiovascular emergency and of high morbimortality for the possibility of irreversible brain damage and decease. It is, definition, the absence of ventricular mechanical activity and respiratory movements (Kalil Filho et al., 2019).

The data on the cardiac arrest incidence in national territory is sparse. It is estimated an occurrence of 200.000 cardiac arrests annually in Brazil, from which 50% occur in-hospital, and the other 50% out-of-hospital. The lack of consistent information is a graving factor for the action planning to minimize the impacts of these intercurrences to the population (Moura, Brito, Rocha, & Moura 2019).

It is known, however, that the main in-hospital rhythm of cardiac arrest is the non-shockable ones, with worse prognosis and low survival rates under 17%. This data demonstrates the importance of having trained health professionals who are prepared to quickly recognize CPA and immediately initiate CPR maneuvers, in order to reduce mortality rates and unfavorable neurological outcomes (Kalil Filho et al., 2019).

In that sense, the American Heart Association [AHA] points out that the CPR is an emergency procedure that saves lives in the face of a CRA, coming to double or even triple the victim's chances of survival; whereas, for each minute the person in CPR does not receive the maneuver, there is a decrease of 10% chance of survival (AHA, 2020).

In regard to the in-hospital cases, it is worth noticing that the CRA can occur at any place and any time. Thus, the professionals must be prompt to handle the patient accordingly, that is to say, they must be fit to perform the CPR algorithm correctly; and, also, be attentive to the specific recommendations to special circumstances such as a CRA during a hemodialysis session, for this environment has its own peculiarities, which can increase the complexity of the health care (Moscarelli et al. 2020).

It is important to highlight the high rate of mortality due to CRA on patients with Chronic Kidney Disease—CKD—in terminal stage during the realization of replacement therapy, hemodialysis. These patients have higher chance of CRA in relation to the population in general, and the rates of mortality are also higher, compared to non-CKD patients (Saeed, Adil, Malik, Schold, & Holley 2015).

Pun et al. (2019) indicated the difficulties of performing an effective CPR on patients during a hemodialysis session, occasion in which the majority of the CRAs occur, such as: low number of practices in this specific environment; higher difficulty to recognize a CRA, for the patients, not rarely, sleep during the hemodialysis treatment; desensitization of the staff to the machine's alarm, once in the event of a CRA there will be an abrupt shift in the Blood Access Pressure which shall trigger the equipment's alarm; and the need to adapt traditional CPR procedures and techniques in this specific environment of the clinic.

However, to meet the necessary skills for a quality CPR, practices with real patients are not recommended due to the high risk of adverse outcomes. Simula-

tion is an excellent teaching strategy to that end, and has been widely applied, once it carries structured activities where the apprentice experiences situations similar to real life, in a secure, controlled environment, allowing from the practicing of specific skills to the resolution of complex clinical cases (Lima, D'eça Junior, Silva, & Pereira Junior, 2021).

It is important to highlight that the clinical simulations have collaborated a lot with health education in recent years; especially in the teaching of complex content, such as the management of CRAs, which is a content that needs an approach beyond tradition so that the student is able to manage a patient under these conditions without putting the patient's safety at risk (Nascimento et al., 2021).

In the preparation of the simulated activity, an elaboration of the simulated scenario takes place, being, this step, one of the most important for the success of the teaching strategy. At this stage, the subject to be addressed to is identified, a careful scientific investigation is carried out, the elaboration of learning objectives and a survey of all the necessary resources for the satisfactory development of the simulation cases is set (Lima, D'eça Junior, Silva, & Pereira Junior, 2021).

The simulated scenario can be defined as the report of a clinical situation that enables the development of learning objectives. This should not be confused with a clinical case, since the clinical case is used in a static way, as a trigger for a theoretical approach to a certain content, while the scenario, necessarily, has the interaction of the participants with the didactic instrument (Neves, Iglesias, & Pazin-Filho, 2017).

Therefore, it is important for the teaching of health professionals using clinical simulations to have simulated scenarios built with methodological rigor, adequate structuring and, mainly, to be validated by specialists in the area, which will provide the necessary reliability for their application in various teaching methods (Nascimento et al., 2021).

In this context, it is believed that designing and validating a simulated scenario for teaching CPA management during hemodialysis sessions can help in the training or improvement of health professionals, and thus contribute to the reduction of mortality rates and negative neurological outcomes in this population. Therefore, the present study is justified both by the scarcity of works that bring the construction and validation of scenarios in the management of CRA, and by the specific situation that CRAs can occur, which requires greater knowledge and preparation to provide quality care.

2. Methods

A Methodological, descriptive study, of quantitative approach, was elaborated for designing and validating a scenario of realistic simulation. It was performed in two steps, namely: 1) building a scenario of clinical simulation, and 2) validation by judge of a simulation scenario's content.

The methodological researches concern the development, validation and as-

sessment of instruments, and researching methods which favor the attainment of "solid and reliable results, strict tests for intervention, and sophisticated procedures for obtaining data" (Polit, Beck, & Hungler, 2011: p. 330). This kind of research has largely increased, considering the need of coming up with tools which can guarantee fundamental results, and accuracy on the execution (Polit, Beck, & Hungler, 2011).

Descriptive studies, on the other hand, aim to describe the characteristics of a given population or phenomenon, and establish a relationship between the variables (Gil, 2017).

Regarding the quantitative approach Appolinário (2011: p. 150) states that the "predetermined variables are measured and expressed numerically. The results are also analyzed with the predominant use of quantitative methods".

2.1. Designing the Clinical Simulation Scenarios

The design of clinical simulation scenarios for managing the CRA was performed with basis on situations experienced by the researcher in her day-to-day professional routine during hemodialysis sessions. After a bibliographical survey on performing the CPR in the aforementioned context, it appeared that there are not many published papers on this subject, especially nationwide. There were not any validated instruments for teaching, assessing or practicing on this subject to be found, being that the trigger for the kickstart of the scenario.

All the publications selected in regard to this theme underwent reflective reading, meaning to extract the most relevant information for the design of the scenarios.

Bloom's Taxonomy is a theory that guides educators in the elaboration of teaching strategies, as it guides in a clear and structured way the construction of the instructional objectives of the educational activity for an effective and lasting learning. This theory supported the elaboration of the learning objectives for the simulated activity. The elaboration of the scenarios based on taxonomy made possible the organization of the educational process so that the cognitive development obeys a hierarchical structure of learning, and, in the end, enabling the apprentice to apply and transfer the acquired knowledge to their professional practice, that is to say, the management of the CPR on situations covered in this study (Ferraz & Belhot, 2010).

This study regarded cognitive, emotional, and psychomotor domains. The cognitive domain will be more detailed and is related to the idea of controlling knowledge, to the learning process, and its objectives are classified in hierarchical levels of complexity; but that, in certain situations, can assume greater flexibility and interpolation, as in: 1) remembering, 2) understanding, 3) applying, 4) analyzing, 5) synthesizing, and 6) creating. The emotional domain is related to feelings and postures, and its categories are: 1) receptivity, 2) response, 3) appreciation, 4) organizing, and 5) characterization. As for the psychomotor domain, related to physical skills, its categories are: 1) imitation, 2) manipulation,

3) articulation, 4) naturalization. On the three domains, only by acquiring these former competences it is possible to advance in the process of comprehending the further categories, since for each latter competence, a former one is required (Ferraz & Belhot, 2010).

Another theory that supported the elaboration of instruments in this study was Ausubel's theory (2000) of Meaningful Learning, which points out that the cognitive structure of the subject is constantly rearranging, promoting dialogues between the new knowledge and the old. The former knowledge of the learner is a powerful starting point in the formative process which gets meaning as it acquires new information.

The design of the scenarios followed the items suggested by Fabri et al. (2017) who pointed out, in their studies, what items are necessary for composing a clinical simulation practice, and succeed in the process of teaching and learning.

2.2. Assessment of the Clinical Simulation Scenario

This study assessed the validity and reliability of the instrument, these being the main appropriate measures to guarantee solid scientific results (Souza, Alexandre, & Guirardello, 2017).

The validity can be defined as in what grade the instrument measures the intended object, which should not be the instrument's particular feature, but determined according to a particular matter (Souza, Alexandre, & Guirardello, 2017).

The reliability is one of the main assessment criteria of an instrument's quality, being the dimension of the consistency with which the instrument measures the attribute (Polit, Beck, & Hungler, 2011).

On selecting the judges, some criteria proposed by Fehring (1987) were used, adapted to this research, naming as specialist judge they who obtain 5 points out of 14, among the following criteria: a title on Master or Doctor in the field of interest of the research (4 points), Master's essay in the field of interest of the research (1 point), Doctorate thesis in the field of interest (1 point), clinical practice with a year or more of experience on the theme of the research (2 points), specialization on the theme of the research (2 points), article published in the field of interest on relevant magazines (2 points). It is worth mentioning that the field of interest in this research is the realistic simulation, cardiology, urgency and emergency, nephrology and intensive care.

For collecting the data, an electronic form was elaborated with the help of Google Forms®, sent by email or an instant messaging application to the judges, after their acceptance.

The judges assessed the scenarios in three dimensions, with the instrument assessed by Andrade (2016), and adapted for the research, those are: objective (8 items), structure and presentation (7 items), and relevance (6 items), by means of a scale based on Likert's analysis with four categories of importance, and only one possible answer for each analyzed item, as follows: totally appropriate (4),

appropriate (3), inappropriate (2), totally inappropriate (1).

The data were initially inserted and grouped in an MS Excel's spreadsheet. Then, the variables were organized on tables based on frequencies. As for the data description, such measurements were applied: absolute frequency, relative frequency in percentage, content validity index—CVI—, and Cronbach's Alpha coefficient.

A CVI calculation was made to validate the scenario, which is the proportion or percentage of concurring judges on certain aspects of the instrument and their items, being this measure most accepted and widely literally published to validate instrument contents (Yusoff, 2019).

In this study, the CVI of each item was calculated and called I-CVI (I = Item) from the three domains, and the general CVI identified as S-CVI/AVE (S = Scale; AVE = Average Variance Extracted).

For the calculation of the I-CVI, the answers from each judge "3" and "4" were summed up in each item of the questionnaire, divided by the total amount of answers. The attained values can vary from 0 to 1 where I-CVI > 0.79 is relevant; from 0.70 to 0.79 the item needs revision; and if the value is lower than 0.70 the item is eliminated. It was possible for the judge to comment, suggest and make remarks about each one of the domains (Yusoff, 2019).

A scenario of domain was also assessed by summing up the answers "3" and "4" from the domain, divided by the total of answers, multiplied by 100; and by the sum of the answers "1" and "2", divided by the total of answers, multiplied by 100. The domain was considered valid with its value equal or superior to 90%, and a 5% level of significance (Alpha). Thus, p values higher than 0.05 indicate a ratio of concurring judges on the adequacy and relevance of each domain.

For the assessment of the reliability of the instrument (in general, making use of every matter by dimension) Cronbach's Alpha coefficient was calculated, meaning to measure the correlation between answers from the questionnaire, by analyzing the pattern of answers given. This is a medium correlation among questions (Hora et al., 2010). According to Landis & Koch (1977), the value of Alpha can be categorized by internal consistency, such as: from 0.0 to 0.20 (small); from 0.21 to 0.40 (fair); from 0.41 to 0.60 (moderate); from 0.61 to 0.80 (substantial); from 0.80 to 1.0 (almost perfect). The software for statistics used for these analyses was the SPSS version 15.0.

The suggestions from the judges were assessed according to their relevance and analyzed with its literature inspiration, with modifications made whenever necessary.

The study followed ethical standards for the clinical research with human beings, following the resolution 466/12, from the National Health Council, Ministry of Health, and presents protocol number of approval 4.545.720, on February 18th, 2021.

3. Results and Discussion

In this study, a scenario of clinical simulation was elaborated and validated for

teaching and improving the management of the CRA on patients during the hemodialysis session. The design of the scenario regarded Bloom's taxonomy and the Theory of Meaningful Learning from the items proposed by Fabri and contributors with potential to prepare the professionals to act in face of these emergencies, for these are instruments strictly built on scientific foundations.

Simulation-based teaching has become an internationally accepted model in the education of students, professionals and training of health teams because it is a teaching strategy that allows the training of technical and communication skills and is capable of providing clinical reasoning in a safe and controlled environment, but its success depends on the knowledge of "its principles and techniques, through planning, definition of strategies and constant evaluation" (Schuelter et al,. 2021: p. 2).

Teaching with simulation, using well-developed simulated scenarios, preferably validated by specialists in the area, has been proven to be quite effective in the training of health professionals, as it corroborates the structuring of the necessary competencies for health care that was designed in the construction of the scenery (Neves, Iglesias, & Pazin-Filho, 2017).

This scenario, besides bringing elementary concepts on clinical simulation, is available for free access in e-book version made to serve the educators who want to use the clinical simulation in their educational practices through https://www.editorahawking.com.br/simulacao-clinica-cenarios-validados-da-pcr-em-situacoes-especiais.

Teaching or improvement by means of clinical simulation has been increasing, lately, these years; and such fact is notable by the increase on the number of publications on the subject. These studies portray that, among other things, its methodology is rather efficient to practice the emergencies, especially for the CPR. That is because by this practice, the apprentice is able to develop the behavioral and technical competences necessary to an effective assistance, in a safe environment which imitates the reality of the clinical practice, and not compromising safety, theirs or the patient's (Nascimento et al., 2021).

A systematic revision that assessed the impact of the teaching strategies on students from the nursing school, on acquiring communication skills, returned significant results in all the requested interventions for developing this skill. Nevertheless, it is worth emphasizing that most part of the study used the simulation as a teaching strategy that demonstrates the strategical preference and relevance for developing capable professionals on their cause (Gutiérrez-Puertas, Hernández, Gutiérrez-Puertas, Granados-Gámez, & Aguilera-Manrique, 2020).

Meanwhile, the amount of studies addressing the design and validation of scenarios to perform the clinical simulation is still quite incipient, generating a growing concern on the quality on the design of the simulated scenarios, for the lack of guidelines can compromise the quality of the teaching methodology (Andrade, 2016).

Therefore, the items proposed by Fabri et al. (2017) for elaborating a clinical simulation scenario acknowledged in this study were: previous knowledge of the

student, learning objectives, theoretical foundations, theme, name of the responsible, complexity/fidelity of the scenario, documentation, human resources, time of the scenario, development of the scenario (decision-making flow), debriefing, assessment.

The guidelines of a theoretical and practical script to elaborate a scenario for a simulated activity corroborate the rigor, scientific basis, and supply with greater reliability to its use in several teaching methods. Similar steps were used for designing and validating simulated scenarios from the nursing care professionals to patients with colostomy, in which the items considered were: the previous knowledge of the student, objective of the apprenticeship, theoretical foundation of the activity, preparing the scenario, developing the scenario, debriefing and assessment (Negri, Pereira-Júnior, Cotta-Filho, Franzon, & Mazzo, 2019).

After setting the specific situation for the managing of the CRA, and the objectives for learning with the simulated activity, the developing of the scenario was started.

The **first step** was to establish which previous knowledge was necessary to participate in the clinical simulation. Students from the nursing school or medicine were considered for this scenario, who had finished the subject Urgency and Emergency or Medical Practice, or medicine or nursing professionals in permanent education.

The **second step** was defining the objectives of apprenticeship of the scenario. To that end, it was established that the professional will be able to assist the patient who present CRA during a hemodialysis session. The activity included: keeping proper vigilance, preventing, and treating clinical conditions before pre-CRA: To immediately recognize the CRA and call the Specialized Medical Service; performing specific procedures to patients in CRA during a hemodialysis session; performing early CPR, emphasizing chest compression; and performing the right algorithm for the CRA's heart rate; performing post-CRA care.

It is worth mentioning that the success of any teaching strategy is related to a proper planning, which is lead by goals to be achieved, such as: building knowledge, developing skills, and building attitudes (Batista, Vilela, & Batista, 2015). At the clinical simulation, it is important that the objectives of the teaching strategy and scenario be clear, succinct, measurable and relevant. Not being appropriated to build the scenario without considering the objectives of apprenticeship of the teaching strategy. This planning favors the organization of the teaching activity that may provide the apprentice with a new positive experience, and induce him to critical thinking, decision making, and successful problem solving (Neves, Iglesias, & Pazin-Filho, 2017).

That said, before initiating the design of the scenario, the objectives of apprenticeship on the simulated activity were set from the cognitive, affective and psychomotor domains of Bloom's taxonomy. These were planned to be evoked, when possible, in all steps of the clinical simulation; in other words, pre-simulation, simulation and debriefing. Negri, Pereira-Júnior, Cotta-Filho, Franzon & Mazzo (2019) reported the use of the taxonomy on the planning and organization of the

learning process and that many times in the clinical simulation scenario the domains weren't treated separately, for they complement themselves. However, it was not clear in the study if the taxonomy was used on the planning of the simulated activity or only in the scenario.

The **third step** was defining which material would be available beforehand for the apprentice to base their theory. Considering that this study was supported on the guidelines of the American Heart Association, this material had its version available in Portuguese. Also, the European protocol was available, which addresses the CRA particularly during the hemodialysis session, as well as on article.

All the material selected to be available for the apprentices's theoretical foundation subsidized the design of the simulated scenarios.

Rocha et al. (2021) point out the importance of the apprentice's previous knowledge for the development of the simulated scenario, in order that this one "be capable of comprehending, organizing, incorporating, and memorizing, so that new information become significant" (p. 08). It is worth showing, as well, the importance of the selected materials for previous availability that need to be current in order to equalize the level of the participants.

The **fourth step** was to build a clinical case. There was a concern by the authors on being the most selfsame from reality, and look on the instrument with suggested clinical parameters to identify the possibility of occurrence of a CRA and its management. To give even more accuracy to the scenario, the site where the activity takes place must be an environment similar to a clinic of hemodialysis. The initial information must be passed by the author who will play the patient arriving at the clinic to their session. After loss of consciousness, they must be switched to a compression dummy.

To succeed on the clinical simulation using the simulated scenarios, these must be: credible, initiate opportunities that involve critical thinking and decision making, and problem solving. To that end, the scenario must be relevant, involving, realistic, and informative (Neves, Iglesias, & Pazin-Filho, 2017).

The **fifth step** was listing the human and material resources. For this study, the minimum of three, and the maximum of five participants was a criterion. As for the minimum of participants, it was defined that: one of them would be responsible for the chest compression, one to ventilate, and another on was meant to prepare and administer the medications requested by the acting doctor, who would also be responsible for giving hints to the progress of the case, according to the decision making flow if necessary.

Rocha et al. (2021) highlight the importance that the scenarios should immerse the apprentices in a wide context of clinical thinking and decision making, thus, developing the necessary skills to properly manage the patient, like on the CRA, which is an educational matter, hard to teach and learn without a teaching strategy that is based on experience.

The **sixth step** was the debriefing, with triggering inquiries for the apprentice

to reflect on the activity, which are: ask from the participants to describe the scenario they're inserted, ask from the participants to describe the feelings and reactions on the simulation practice, potencialize the assets occurred throughout the realization of the scenario and reflection on details to be improved, discuss the possibilities for applying the content on professional practice.

The **seventh step** was choosing the tools for the assessment. For this scenario it was defined that the assessment will be done by means of a degree of satisfaction and self-assurance in the apprenticeship. The degree of satisfaction with the simulated clinical experiences, and a theoretical assessment with objective questions.

The **eighth step** was designing the structure of the checklist. Such item is part of the requested documentation for a good practice of the clinical simulation. To elaborate this instrument, Bloom's taxonomy (Ferraz & Belhot, 2010) and the Theory of the Meaningful Learning (Ausubel, 2000) were also considered, and its structure was based on the CTM3 methodology (Santos, Alves, Warren, & Wyszomirska, 2019).

On the CTM3 methodology, firstly, a conception of the product is made. In this case, a checklist—instrument that works as a support for the assessment of the simulated practice. Then, after the reflexive lecture of the bibliographic references used for designing the scenario, the requested competences and skills, as well as their sequence throughout the simulation, were elaborated. Posteriorly, the elements for a better effectiveness in communication were added, intending to reach the most number of communication channels of the reader. The checklist was structured, adding the three states of the Ego (parenthood, adulthood, childhood), the multisensory (sight, sound, smell, taste and touch), and the Neuro-Linguistic Programming (NLP) by inserting the anchor (a drawing of a heart with a sinusal cardiac graphic line on the bottom of the checklist).

The competences and skills were ordered in: performed, partially performed, and not performed. For each elaborated skill an image related to the requirements was chosen, evoking, in different situations, by either image or the competence expected, the senses or different structures of the individual's personality. The images used are of public domain, or were bought on the Canva App, or belonged to the researcher's personal archive.

It is believed that the way the checklist was built can contribute positively to the achievement of directive feedback during the development of the scenario—being that the agreement among the participants—, and even facilitate the debriefing. Some authors recommend that the moderator of the debriefing have a reference of the apprentice's expected performance. It is also recommended a blank space so relevant notes can be taken (Franco & Franco, 2021).

As for the content assessment process: 11 judges participated, being 63.6% of female gender, and 36.4% of male gender. The majority had age between 31 and 40 years old (36.4%). All the judges had at least one specialization in the field of research, as well as experience in clinic. All the selected judges claimed to have

been involved with researches or publishing in the field of the research.

The score attained by the judges, following Fehring's criteria (1987), varied from 6 to 12 points, where one judge got 12 (9.1%) points, six judges with 10 (54.5%), and four judges with 6 (36.4%) points.

Most of the judges had MA degree, 54.5%; followed by specialists, 36.4%; and Doctorate degree, 9.1%. As for the academic education, 81.8% were nurses, and 18.2% were physicians. The time of formation for most of the judges was up to 10 years of graduation, 63.6% (Table 1).

Yet on the academic title, it is worth pointing out that all of them had specializations related to the theme of the research. The mentioned courses were: nephrology (n = 5), formation in Intensive Care Unit (n = 5), Urgency and Emergency (n = 4), teaching (n = 4). The sum of *n* by specialization course is larger than the amount of participating judges, for some had more than one specialization.

Table 1. Characterizing the judges (n = 11).

AGE GROUP	N	%
20 - 30	3	27.3
31 - 40	4	36.4
41 - 50	3	27.3
51 - 60	1	9.1
GENDER		
Male	4	36.4
Female	7	63.6
SCHOLARITY LEVEL		
Post-graduation, Latu Sensu.	4	36.4
Post-graduation, Stricto Sensu (Master Degree)	6	54.5
Pós-graduation, Stricto Sensu (Doctoral Degree)	1	9.1
ACADEMIC FORMATION		
Nursing	9	81.8
Medicine	2	18.2
YEARS OF FORMATION		
0 - 10	7	63.6
11 - 20	2	18.2
21 - 30	1	9.1
31 - 40	1	9.1
20 - 30	3	27.3
31 - 40	4	36.4
41 - 50	3	27.3
51 - 60	1	9.1

Source: The author herself.

The validation of the scenario for managing the CRA during the hemodialysis was made through the CVI of each item (I-CVI) and global CVI (S-CVI/AVE), described in Table 2, through the percentage calculation of the assent of the judge committee by both domain and value, described in Table 3, and the calculation of Cronbach's Alpha for the verification of the internal consistency of the scenario, described in Table 4.

Table 2. Description of the content validity index of the clinical simulation scenario of CRA procedure during a hemodialysis session. Alagoas, 2021.

ASSESSED ITEMS		
OBJECTIVES: REFERRING TO THE INTENDED PURPOSES, GOALS OR ENDS TO BE ACHIEVED WITH THE SCENARIO'S SCRIPT	**N**	**I-CVI**
The content consist with the objective of the clinical simulation scenario	11	1.0
Objectives of apprenticeship are clear and coherent	11	1.0
The content of the scenario allows critical thinking	11	1.0
The presented information are scientifically correct	11	1.0
There is a logical sequence of the proposed content	11	1.0
The information presented in the scenario (quantity and level of complexity) can cover well the content about the management of the CRA in patients during hemodialysis session	11	0.9
The information/content are important to the quality of the care provided	11	1.0
The objective of the realistic simulation scenario motivates behavioral and attitudinal changes of students and health professionals over the CRA during a hemodialysis session	11	1.0
STRUCTURE AND PRESENTATION: REFER TO THE WAY OF PRESENTING THE ORIENTATIONS (GENERAL ORGANIZATION, STRUCTURE, STRATEGY OF PRESENTATION, CONSISTENCY AND FORMATTING)		
The script of the scenario is appropriated	11	1.0
The language used is easy to understand	11	1.0
The data are presented structurally and objectively	11	1.0
The presentation of the scenario contributes to the learning	11	1.0
Contextual details provide clues basing the intended results	11	0.9
The profile of the patient provides enough data to accomplish a clinical judgment	11	1.0
The pages or sections are organized	11	1.0
MATERIALITY: REFER TO THE FEATURES THAT ASSESS THE DEGREE OF SIGNIFICATION IN THE PRESENTED SIMULATION SCENARIO		

Continued

The script of the scenario allows the transfer of knowledge and learning related to the management of the CRA during a hemodialysis session	11	1.0
The theme portrays key aspects that should be reinforced	11	1.0
The model allows the transfer and generalization of the apprenticeship in different contexts	11	1.0
The script of the scenario proposes the construction of knowledge	11	1.0
Can be used by the health care or education professionals	11	1.0
The scenario of realistic simulation concerning the CRA in patient during hemodialysis session can spread around the scientific environment	11	1.0
S-CVI/AVE		0.99

Source: The author herself.

Table 3. Description of assessment percentage and *p* value by domain of the scenario and clinical simulation on the management of the CRA on the patient during hemodialysis session. Alagoas, 2021.

DOMAIN	*Adequate/Totally adequate*		*Inadequate/Totally inadequate*		*p*-value
	N	%	*n*	%	
Objectives	87	98.9	1	1.1	
Structure and presentation	76	98.7	1	1.3	0.6638
Relevance	66	100.0	0	0.0	

Source: The author herself.

Table 4. Description of Cronbach's Alpha coefficient on the clinical simulation scenario of the CRA procedure on the patient during hemodialysis session. Alagoas, 2021.

DOMAIN	*Cronbach's Alpha*
Objectives	0.7961
Structure and Presentation	0.8821
Relevance	0.9231
General	**0.9550**

Source: The author herself.

All the items got I-CVI equal or higher than 0.9, which indicates validity to the instrument, for it is higher than 0.79 suggested by the literature as expected to consider the item legit (Yusoff, 2019). Therefore, considering the items individually, they are all validated.

When analyzed, the global CVI of the instrument, the attained value was 0.99, what is considered excellent to the validity of the content (Rodrigues, 2017).

The percentage of conformity by domain was calculated and the result was

that none of the domains were assessed with less than 98.5%, as it follows on Table 3, being considered valid when the domain is analyzed separately.

All the judges agreed that the script of the scenario proposes the construction of knowledge (I-CVI = 1). From the proposed scenario, the apprentice will be stimulated to reflect about their knowledge and build new ones turned to professional excellency, and resignify the learning. One of the theories that guide the clinical simulation is the constructivism, which states that "learning is not reproducing a reality, but being capable of elaborating a personal representation on a presented situation" (Melo et al., 2017: p. 23).

All the judges agreed that the scenarios can be used by health and education professionals (I-IV = 1.0) and that also they allow the transfer of knowledge and learning (I-CVI = 1).

After comparing the attained proportions among the dimensions (objectives, structure and presentation, and relevance) related to the answers (Table 3), it was found that there was no significant difference (p = 0.6638). That said, there is no difference between the answers when they are matched by domain and the judges agree to the adequacy and relevance of each assessed domain.

As for the valuation of the internal consistency of the instrument, Cronbach's Alpha coefficient of the general instrument and domain was calculated according to Table 4.

In general, analyzing the internal consistency of the answers, it was acknowledged that, such instrument of measurement, presented almost perfect reliability where it was applied. Cronbach's Alpha value, in brief, was of 0.9550, meeting the preference established by Landis & Koch (1977), where it suggest that the coefficient values be from 0.81 to 1.0.

Analyzing the internal consistency by domain (Table 4), the domain "objectives" revealed that such instrument of measurement presented substantial reliability where it was applied with Cronbach's Alpha value of 0.7961. The domains "structure and presentation" and "relevance" revealed that such instrument of measurement presented almost perfect reliability with Alpha values of 0.8821 and 0.9231, respectively, meeting the preference established by Landis & Koch (1977), where he suggest that the values of the coefficient be from 0.61 to 0.80 from an instrument with substantial consistency, and from 0.80 and 1.0 for an almost perfect internal consistency.

On assessing the scenario, in general, the answers of the judges were quite favorable to validation and reliability of the content, as the results show. The scenario of CRA procedure in patients during hemodialysis session got a global assessment of 0.99, corroborating Negri, Pereira-Júnior, Cotta-Filho, Franzon & Mazzo (2019), who designed and validated scenarios for nursing care to patients with colostomy, which reached a CVI of 1, and with similar methodology to this study.

Even though the therapy was satisfactory, small adjustments suggested by the judges were made, resulting in a safer and more realistic scenario to be used on teaching the CRA procedures. All the suggestions were discussed among partic-

ipants of this study on the basis of the actual literature.

Rocha et al. (2021) point out on their study that the considerations made by the judges add even more quality to the scenario, strengthening the goal of looking on technical and non-technical competencies, and unraveling the apprentice's clinical thinking and decision-making skills.

4. Conclusion

The study succeeded in designing and validating the content of a Clinical Simulation Scenario to be used for teaching or even to improvement of students from the health area in the management of CRA during a hemodialysis session.

This study contributes to the improvement of practices, and teaching students from the nursing and medicine school: for presenting a Clinical Simulation Scenario with its contents validated for being suitable to teach, and for taking the most recent and trustworthy scientific evidences into account, as well as allowing its adaptation and usage in other contextualization, as it brings up the script to how the design and validation came to be, which favors the spreading of the scientific knowledge in this scope.

The present study yet identified a gap in the publications about designing and validating the clinical simulation scenarios on the scope of the management of the CRA. However, the results of the designing and validity of this study's scenario show that the instrument is well structured on high level of scientific foundation, and able to be used in various educational means, contributing to the formation or perfection of critical thinking and reflectiveness of health professionals, besides encouraging the design and validation of new scenarios.

A development of other studies that are also methodologically well defined to assess the effectiveness of the scenario in this study on increasing the competences of either students or health professionals is suggested, as well as encouraging the use of the simulation in the forming or perfecting the health professionals.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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