

Designing of a High-Quality CPR Simulation Game Clinical Scenario for Nursing Students: A Qualitative Study

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ABSTRACT

Cardiopulmonary resuscitation (CPR) is an important skill for nursing students. The process of learning high-quality CPR with a simulation-based learning method can be developed into a simulation game. In order to develop a CPR HQ simulation game, a clinical scenario that can be used as a guide in carrying out storyboards is needed. This research aims to formulate a simulation scenario that will serve as the basis for developing a high-quality CPR simulation game to increase nursing students' competency. This qualitative research uses a Participatory Action Research (PAR) approach by inviting 15 respondents from the prospective user population, namely Emergency Nursing Lecturers, Emergency Room Nurses, BLS Trainers, and nursing students, to carry out Focus Group Discussions. The study's results revealed clinical scenarios that were arranged based on 4 themes, including 1) suitability of the competency being tested, 2) minimum competency for 5 cycles of CPR, 3) settings in the pre-and intrahospital scope, and 4) choice of patient outcome. These components are crucial when designing simulation scenarios that support students' cognitive processes to achieve High-Quality CPR in nursing students. Thus, the results of this research can then be used as a guide in developing the HQ-CPR game as a learning medium for nursing students.

Keywords: *High-Quality CPR, Scenario for Game Simulation, Simulation-Based Learning, Nursing Education*

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INTRODUCTION

Cardiopulmonary resuscitation (CPR) is an important skill that nursing students in Indonesia need to learn to become competent and confident health professionals ¹. This is stated in the Indonesian National Qualifications Framework regarding the basic competencies of intermediate expert nurses based on Presidential Regulation number 8 of 2012 ². At STIKES Bina Usaha Bali, Cardiac arrest is one of the study materials in the semester 6 placement emergency nursing course with the

expected competency being that students are able to master Basic Cardiac Life Support skills, one of the most important competencies is performing high-quality CPR ³.

Traditionally, CPR training has relied on didactic lectures, written materials, and low-fidelity simulations. However, these methods may not equip students with the skills and knowledge necessary to perform CPR effectively in real-life situations ⁴. Even though cardiopulmonary resuscitation is a lifesaving intervention, studies have clearly demonstrated a lack of public knowledge and skills in

providing CPR ⁵. To prepare for professional practice, there is a need to improve the provision of a stimulating and safe learning environment for student nurses to practice clinical skills and application of knowledge and clinical decision making, especially in dealing with critical situations such as cardiac arrest patients ⁶.

Simulation-based learning (SBL) is a pedagogy widely used to train health care providers and students in academic and clinical settings to improve care delivery and client outcomes. Nursing instructors play an important role in SBL by creating scenarios that stimulate students to develop their cognitive processes, especially decision-making, and problem-solving skills. problems in clinical practice ⁷. Simulation enables students to work in an environment closely resembling that of a hospital and helps them to gain healthcare and nursing experiences, even before they start working as professionals. The students are able to put everything they have been taught into practice, cope with any difficulties and problems, and even make mistakes without causing damage, and all that in a safe environment, without any risk ⁸.

Several studies have proven the effectiveness of simulation methods in learning CPR. According to ⁴, simulation-based training in health courses is effective in enhancing communication skill, self-efficacy and clinical competence. Simulation learning media using videos can remind what has been learned and can be played repeatedly so as to improve nursing students' skills in performing CPR ⁹.

From several literature reviews, SBL is a standard method in nursing education that focuses on theoretical content and clinical practice as well as cognitive abilities, such as making clinical judgments and solving problems per individual patient situation and context ⁷. In preparing simulation activities, an explanation of the simulation scenario occurs, because this step is one of the most important steps for the success of the teaching strategy ¹⁰.

Simulation scenarios are artificial representations of real-world situations to achieve educational goals through experience-based learning ¹¹. Simulation scenarios can be defined as clinical situation reports that allow the development of learning objectives. This should not be equated with clinical cases, because clinical cases are used statically, as triggers for theoretical approaches to certain

content, while scenarios of course have participant interaction with didactic instruments. It is therefore important for teaching healthcare professionals using clinical simulations to have the simulation scenarios constructed with methodological rigor, adequate structuring, and, above all, to be validated by specialists in the field, which will provide the necessary reliability for their application in various teaching methods ⁸.

This research aims to design a simulation scenario that will be used as a basis for developing a High-Quality CPR simulation game to increase the competency of nursing students.

METHOD

This research use qualitative methods with a Participatory Action Research (PAR) approach. PAR research is a research model that involves all relevant parties to study an ongoing action in order to make changes and improvements towards a better direction (12). Data collection was carried out using the focus group discussion (FGD) method with the aim of formulating a CPR clinic scenario. The clinical scenario will be used as a guiding point into the direction of using simulations and game-based approaches for resuscitation training to increase authenticity on the one and on the other hand allowing the application of knowledge to the problem context in which it may occur.

The participants involved 15 respondents who came from the prospective user population, namely Emergency Nursing Lecturers, ER Nurses, BLS Trainers, and nursing students. Determining research subjects, researchers took samples with purposive sampling technique. Purposive sampling is a data source sampling technique using certain considerations with the inclusion criteria being nursing lecturers who teach emergency nursing courses, emergency nurses with BTCLS training certification and at least 5 years of work experience in the emergency room, Basic Life Support (BLS) trainers , as well as final semester students who have experienced learning High Quality CPR. As exclusion criteria were nurses who were not members of the Emergency Nursing Association in Indonesia.

This research has been declared ethically sound by the KEPK STIKES Bina Usada Bali health research ethics committee

with Ethical approval number no.234/EA/KEPK-BUB-2023. Before data collection and voice recording, the participants gave written informed consent and had the right to refuse participation or withdraw at any point. Confidentiality and anonymity were protected throughout the study. This research was carried out for 2 weeks from 7 to 19 August 2023. Participants were divided into 2 Focus Group Discussion (FGD) groups and guided by a moderator. To assist in acting on the concerns and to enrich the process, meeting agendas, the first author provided summary documents and new information. The focus group discussion (FGD) guide was developed based on the literature survey along with the specific key words (cardiac arrest, clinical scenario, high quality cardio-pulmonary resuscitation) related to the needs and expectations in developing a simulation game. The developed draft guide was validated by the experts.

The information from audio recordings were transcribed and translated into English. We analyzed the data or information by using thematic analyses manually as outlined by Braun and Clarke¹³. The process of data analysis begins with the researcher writing transcripts based on the results of interviews that have been recorded, reading and reread the transcripts to obtain the overall meaning of the interview results, identifying keywords from specific statements said by participants based on meaningful statements and frequently uttered statements then labelling the statements, eliminate irrelevant statements, classify statements based on the question and related statements, making categories and sub categories of the selected relevant key words and the categories that have been formed will be arranged to form sub-themes which will then be classified in the form of themes, then the researcher recheck with the participants regarding the data that has been collected¹⁴.

Trust worthiness is achieved by Credibility, Dependability, and Conformability. Credibility was established through peer debriefing, member checking, and triangulation. Peer debriefing was accomplished by checking the transcripts' content with an expert advisory team to ensure the recorded data's accuracy. Data triangulation was achieved in multiple cases using the same

focus group discussion/ in-depth interview guide to improve credibility. As for member checking, the findings were returned to three participants to check the data and verify the findings. Finally, conformability was obtained by establishing an audit trail using field notes, checking and rechecking the raw data with the experts as external auditors, and analyzing and synthesizing data throughout the study¹⁵.

RESULTS

This study involved 15 participants with characteristics as in table 1 below:

Tabel 1. Characteristics of Participants

No	Age (year)	Gender	Education Level	Position
1	43	Male	Master Degree	BLS Trainer
2	33	Female	Master Degree	Emergency Nursing Lecturers
3	31	Female	Master Degree	Emergency Nursing Lecturers
4	34	Male	Master Degree	Emergency Nursing Lecturer
5	35	Male	Master Degree	BLS Trainer
6	26	Male	Master Degree	BLS Trainer
7	46	Male	Master Degree	BLS Trainer
8	38	Female	Master Degree	ER Nurses
9	21	Female	Under-graduated	Nursing student
10	21	Male	Under-graduated	Nursing student
11	21	Female	Under-graduated	Nursing student
12	21	Male	Under-graduated	Nursing student
13	22	Female	Under-graduated	Nursing student
14	27	Male	Ners	ER Nurses
15	30	Male	Ners	ER Nurses

Tabel 2. Recapitulation of demographic data participant

Age (year)	N	%
21-30	8	53.4 %
31-40	5	33.3%
41-50	2	13.3%
Gender		
Male	9	60 %
Female	6	40 %
Education Level		
Under-graduated level	5	33.4 %
Graduated (Ners)	2	13.3%
Post-graduated (Master Degree)	8	53.4%

Based on table 2, it can be seen that the majority of respondents (53.4%) were in the 21-30 year age range and only 2 respondents (13.3%) were in the 41-50 year age range. Most of the respondents (53.4%) had a master's degree, and 60% of the respondents were male. The respondents of this study were designed to consist of potential users of the HQ CPR game that will be developed, namely emergency nursing lecturers, emergency nursing clinical instructors and nursing students. This is in accordance with the paradigm of PAR research include shift away from the positivist model of science is needed to understand participatory methods. This shift can come only after developing an understanding of critical theory and having some familiarity with critical social science ¹⁶.

Based on the results of the thematic analysis, four themes were obtained, in which 1) suitability of the competencies tested, 2) at least 5 cycles of CPR competence, 3) settings in the pre- and intrahospital setting, and 4) patient outcome options after CPR.

1. Suitability of the competency being tested

In developing a CPR clinical scenario, the objectives of the scenario must be adjusted to the competency to be tested, namely evaluating how to check the patient's pulse and breath, evaluating participant decision making in determining nursing problems, evaluating the performance of High Quality CPR and the performance of Rescue Breathing. As expressed in the following respondents in group 1:

"..... like the main goal in our discussion, the scenario must contain basic life support competencies where participants will perform

quality compressions and provide breathing assistance during the work stage, but before the work stage there must be a story line for the participants to check their pulse and breath" (WU , 43 years old)

"Hm...I think we need to determine the story scenario in detail, whether this story is for the case of an adult patient or a child, including the location of the incident so that it is in accordance with the expected competencies and can be clearly tested" (KY, 33 years old)

The objective of nursing education, in addition to the acquisition of solid theoretical knowledge, is the acquisition of clinical skills. The scenario in any simulation must be able to form students' competence in thinking critically and making optimal decisions (8)

2. Minimum assess the performance of 5 cycles

This theme emerged in both FGD groups with repeated emphasis as expressed by the following respondents:

"....., 30 compressions 2 times, just 1 cycle of ventilation and a minimum of 5 cycles of CPR for 2 minutes to maintain the quality of compressions (CA, 26 years old, Group 2)ideally, after 2 minutes of CPR, we can evaluate the patient's pulse and breathing" (AS, 46 years old).

"....Yes...I think so too, at least we can do 5 cycles to memorize the minimum compressions that need to be given to patients in cardiac arrest, because if we go too fast we'll forget the count...hehe (laugh)" (AD, 22 years old)

The main focus for maintaining high quality CPR is to maintain chest compressions with a constant rhythm, a depth of 5 cm, minimal interruptions and maximum recoil. The compression quality will decrease by around 20% within 2 minutes ¹⁷. High quality CPR includes an average of 100 compressions/minute, compression depth of 5 cm, minimal interruptions, full recoil which is evaluated after 2 minutes ¹⁸.

3. Settings in the scope of pre- and Intrahospital

Emergency life-threatening cases such as cardiac arrest can occur anywhere, including

in the hospital or out of hospital as expressed by the following respondents:

".....cardiac arrest cases can occur anywhere and anytime, therefore nurses must be alert in dealing with various situations" (GA, 21 years old)

".....in the hospital, I often find cardiac arrest patients in the inpatient room and emergency room....." (WP, 31 years old)

"...Determining the setting where the attack occurs will also determine the scenario we create, so it must be clear whether it is pre-hospital or intra-hospital..." (DP, 34 years old)

4. Patient outcome options after CPR

".....termination stage means that depending on the patient outcome we make whether the patient will ROSC or die" (MY, 35 years old)

"yes termination can also be done if help arrives, for example in the intrahospital environment the Code Blue team has arrived" (WU, 43 years old).

DISCUSSION

In game development, simulation scenarios are manifested in the form of text descriptions and supporting artwork such as storyboards and sketches that serve to illustrate scenes, settings, circumstances and situations, as well as possible sequences or choices of future events that make up the game's narrative flow (19). During the FGD it was also formulated that the clinical scenario was divided into 3 phases including the orientation phase, work phase and termination phase. The orientation stage assesses the participant's ability to assess pulse and breathing, the work stage assesses the student's ability to perform High Quality CPR and Resque Breathing and the termination stage depends on the patient's outcome after CPR.

These three phases correspond to Bloom's taxonomy. 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. The evaluation of the development of clinical competence, defined as the application of skills in all domains of practice, articulating knowledge, skills and attitudes in different clinical contexts (20).

The ability to perform CPR is also a basic competency that must be possessed by a nurse (9). Theme 1 shows that the competencies to be achieved in developing learning media must be clear. Several studies have proven that student learning outcomes are greatly influenced by the examiner's clinical assessment, therefore, in developing a clinical scenario, the competencies to be tested must be in accordance with the assessment items (7). Bloom's taxonomy can be used as a facilitating mechanism and theoretical-methodological framework in nursing simulation, to obtain the development of clinical competence in its participants. It encompasses the cognitive, psychomotor, and affective criteria, demonstrated by a set of educational objectives (21). Shaukat et al (2023) in their research also stated in their research that having appropriate competencies will foster students' self-confidence in providing help with CPR (22). Thus, the suitability of the competencies to be tested is an important basis for developing an assessment of CPR practice.

The findings highlighted, the clinical scenario not only focuses on the work stage or how to assess student performance in performing HQ-CPR, but also starts from the assessment stage, identifying whether the unconscious patient still has breathing and a pulse. This is consistent with (23), clinical scenario begins with a systematic assessment to determine the patient's physical, mental, emotional needs followed by ongoing assessment to diagnose the level of harm they are experiencing and examine the influence of clinical interventions on the assessment.

The results of this study also confirm that in assessing CPR ability, a minimum of 5 cycles should be evaluated. According to the AHA Guidelines 2020, there are several things

that are recommended in providing quality CPR, namely performing chest compressions at a speed of 100-120x/minute and changing the compressor every 2 minutes (24). Quality of chest compression can be increased by changing the cycle length from 2 to 1 min (25). This is different from the face-to-face and non-face-to-face formats for basic life support training method developed by Cho et al. (2022) using a standard of 7 cycles of 30 compressions, total of 2 minutes (26).

When developing a game scenario, it is very important to consider the level of difficulty of each scenario option. The FGD was formulated in an intra- and pre-hospital setting so that it approached the real situation. This is in accordance with the statement (27) concerning Hospitals, that the scope of emergency services includes pre- and intrahospital. A simulation scenario is an artificial representation of a real-world situation to attain educational goals through experience-based learning (7).

According to Chia (2016) another important thing in formulating a game scenario is ensuring the game is fun and interesting because this affects students' motivation to learn and complete the game. This is stated in theme 4, which focuses on how students complete the HQ-CPR game according to patient outcomes. If a patient has ROSC, the actions taken will definitely be different from the outcome of a patient who dies, or an advance officer comes to take over the assistance.

This research still has limitations during its progress. Researchers are aware of the difficulty of getting all participants to actively express their opinions during this time focus group discussion (FGD).

CONCLUSION

This study has implications for practice, education and research. Findings highlight to designing the scenario for HQ-CPR game development. To formulate the scenario of High Quality CPR is required the suitability of competencies tested, at least 5 cycles, settings in the pre- and intrahospital, and termination phase based on patient outcome options after CPR. These components are crucial when designing simulation scenarios that support students' cognitive processes to achieve High Quality CPR in nursing students. Finally, the results of this research can then be used as a

guide in developing the HQ-CPR game as a learning medium for nursing students. Further research is needed to improve the limitations of this study.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest of this research.

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