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Validation of pedagogical tools: support for hybrid teaching of neonatal cardiopulmonary resuscitation

Validação de ferramentas pedagógicas: subsídio para o ensino híbrido da ressuscitação cardiopulmonar neonatal

Validación de herramientas pedagógicas: subsidio para la enseñanza híbrida de reanimación cardiopulmonar neonatal

ABSTRACT

Objective: To develop and validate learning and assessment tools for hybrid teaching of neonatal cardiopulmonary resuscitation. **Method:** An applied research for technological production and validation of pedagogical tools was conducted with 13 experts using First-order Agreement Coefficient. **Results:** A script and storyboard for a five-module video class and a simulation video on a clinical scenario of neonatal cardiopulmonary resuscitation care were developed, as well as a twenty-question questionnaire to assess cognitive knowledge and a five-station Clinical Examination Objective Structured to analyze psychomotor skills. All constructs had an almost perfect inter-rater agreement index. **Conclusion:** This study provides evidence-based validated pedagogical tools for neonatal cardiopulmonary resuscitation, which support hybrid teaching and the adoption of video-based clinical simulation.

Keywords: Cardiopulmonary Resuscitation; Infant, Newborn; Audiovisual Aids; Simulation Training; Teaching.

RESUMO

Objetivo: desenvolver e validar instrumentos de aprendizagem e avaliação voltados para o ensino híbrido da ressuscitação cardiopulmonar neonatal. **Métodos:** pesquisa aplicada, de produção tecnológica e validação de ferramentas pedagógicas com 13 *experts* por meio de *First-order Agreement Coefficient*. **Resultados:** desenvolveu-se o *script* e *storyboard* de uma videoaula com cinco módulos e um vídeo de simulação sobre um cenário clínico de atendimento da ressuscitação cardiopulmonar neonatal, além de um questionário de vinte perguntas para avaliação do conhecimento cognitivo e um Exame Clínico Objetivo Estruturado com cinco estações para análise das habilidades psicomotoras. Todos os constructos obtiveram índice de concordância interavaliadores quase perfeita. **Conclusão:** esta pesquisa disponibilizou ferramentas pedagógicas validadas e fundamentadas em evidências científicas sobre a ressuscitação cardiopulmonar neonatal que sustentam o ensino híbrido e adoção da simulação clínica baseada em vídeo.

Descritores: Reanimação Cardiopulmonar; Recém-Nascido; Recursos Audiovisuais; Treinamento por Simulação; Ensino.

RESUMEN

Objetivo: desarrollar y validar herramientas de aprendizaje y evaluación dirigidas a la enseñanza híbrida de la reanimación cardiopulmonar neonatal. **Métodos:** investigación aplicada, de producción tecnológica y validación de herramientas pedagógicas con 13 expertos mediante el *First-order Agreement Coefficient*. **Resultados:** se desarrolló un guion y storyboard para una clase de video con cinco módulos y un video de simulación sobre un escenario de reanimación cardiopulmonar neonatal, un cuestionario de veinte preguntas para el conocimiento cognitivo y un Examen Clínico Estructurado con cinco estaciones para el análisis de las habilidades psicomotoras. Los constructos tenían un índice de acuerdo entre evaluadores casi perfecto. **Conclusión:** esta investigación permite disponer de herramientas pedagógicas validadas y basadas en evidencia científica sobre la reanimación cardiopulmonar neonatal, que apoyan enseñanza híbrida y adopción de simulación clínica basada en video.

Descriptores: Reanimación Cardiopulmonar; Recién Nacido; Recursos Audiovisuales; Entrenamiento Simulado; Enseñanza.

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INTRODUCTION

The first few minutes of life of a newborn (NB) are critical due to the transition from the intrauterine to the extrauterine environment. Therefore, birth is characterized as a phenomenon of vulnerability, susceptible to complex emergency situations that require multiprofessional action and assertive interventions, such as neonatal cardiorespiratory arrest (N-CRA)[1-2].

It is believed, however, that numerous neonatal deaths could be avoided with training programs on low-cost neonatal cardiopulmonary resuscitation (N-CPR), since, during academic training in health, many students do not experience a real N-CPR, a factor that hinders the development of clinical skills in this context[1-2].

Given this scenario, it is important to foster the teaching and learning process of N-CPR aimed at the multidisciplinary health team, through attractive pedagogical strategies that favor critical thinking and are based on the replication of real situations [3].

In this perspective, Blended Learning, known in Brazil as the Hybrid Approach, has been gaining ground, which is distinguished by the offer of teaching activities that articulate the face-to-face modality with a moment mediated by Digital Educational Technologies, an innovative strategy in the education of health professionals [4].

Among the Digital Educational Technologies, the adoption of the video class and, in a more current context, the simulation video stand out, a teaching strategy based on the presentation of clinical simulations through video, focusing on the development of clinical competencies pertinent to the performance necessary for emergency care [5].

It is believed that the video class and, more contemporaneously, the simulation video are configured as pedagogical mechanisms or tools, capable of being integrated into the classroom, favoring a hybrid teaching, providing an experiential component for learning and contributing to the increase of satisfaction, self-confidence and knowledge of learners[4-5].

These technological and innovative learning objects may be able to promote greater student involvement and even present advantages over a training carried out in the laboratory, by eliminating the need for the organization of groups of participants to fulfill the practical activity, effectively complementing the content, without requiring preparation time and additional expenses [5].

Even in view of this potential, and given the difficulties imposed by the pandemic period of Sars-CoV-2 (Severe Acute Respiratory Syndrome related Coronavirus-2) for the execution of face-to-face activities, scientific exploration on the development and validation of these pedagogical tools is scarce, especially within the scope of N-CPR. Research on instruments for assessing skills aimed at N-CPR care is also incipient, which leaves important gaps in the hybrid process of teaching and learning in health and nursing, which instigate the development of scientific research to support this context[1-2,5]. This study aimed to develop and validate learning and evaluation instruments aimed at the hybrid teaching of neonatal cardiopulmonary resuscitation.

METHODS

Applied research, of technological production [6], developed at the Ribeirão Preto School of Nursing of the University of São Paulo (EERP- USP), Ribeirão Preto, Brazil, from July 2020 to April 2021, considering the development and validation of four contemporary learning objects: (1) video lesson script and storyboard; (2) simulation video script and storyboard; (3) multiple choice questionnaire (MCQ) and (4) Structured Objective Clinical Examination (SOCE), aimed at N-CPR, in the in-hospital environment, for the teaching and learning of students and nursing professionals and adaptable to other health areas.

The sample consisted of 13 experts, including physicians and nurses from the neonatal and pediatric area, working in the delivery room and/or Neonatal Intensive Care Units (NICU) of the health

care network of a municipality in the countryside of the State of São Paulo and the capital of the State of Minas Gerais, who had specialization in the area of interest and obtained a minimum score of five points, according to the eligibility criteria adopted[7].

Thirty professionals were invited, *a priori*, through e-mail and messaging application, adopting a non-probabilistic sampling technique, called "snowball", in which the selected participants invite new individuals from their knowledge network[6]. Of these, 13 professionals agreed to participate, who answered two instruments: the first, built from the free electronic tool Google Forms, brought an explanation of the research, Informed Consent Form (ICF) and a questionnaire for profiling; the second contained the criteria for evaluating the content of the videos[7], MCQ and SOCE[8]. A deadline of 30 days for response was determined.

To prepare the scripts and storyboards of the educational videos – MCQ and SOCE – the following theoretical-methodological references were adopted: 1) updated guidelines of the American Heart Association for N-CPR[9-10]; 2) manual of the neonatal resuscitation program of the American Academy of Pediatrics[11], in association with the American Heart Association[12]; 3) specific evaluation criteria for video construction [13]; and 4) pedagogical framework of Constructivism[14].

A methodological path [15] was adopted for the elaboration of videos consisting of two phases: 1) phase I – pre-production and 2) phase II – development and validation of constructs by experts. The simulation scenario was determined as the in-hospital environment, specifically a delivery room, the maternity sector and the NICU, covering the N-CPR, focusing on identification, performance of N-CPR maneuvers and leadership.

The MCQ was based on the criteria contained in the manual entitled National Board of Medical Examiners (NBME)[16] and in the guidelines of the American Heart Association[9]. For the SOCE, the guidelines of the Medical Council of Canada[17] were adopted, defining five NB care stations: The first four stations addressed the stages of N-CPR care, lasting four minutes each, and the last station involved aspects inherent to leadership during N-CPR, lasting 10 minutes.

The stations were presented in a seven-column table, with the following information: 1) duration of the station; 2) scenario; 3) content; 4) skills developed at the station; 5) clinical case; 6) necessary resources; and 7) observations regarding the evaluator. The assessment of skills in each station was given by a checklist, which addressed the actions that the participant must perform, evaluated as "correct", "partially correct" and "incorrect", with a maximum value of 10 points for the station.

To validate the *scripts* and *storyboards* of the video lesson and simulation video, six criteria were considered: 1) objectives; 2) content; 3) relevance; 4) environment; 5) verbal language; and 6) inclusion of topics[7], using a *three-point Likert-type* scale for evaluation characterized by: "agree", "disagree" and "I don't know". Already, the SOCE and the MCQ were validated according to the criteria of: 1) organization; 2) clarity; and (3) objectivity[8].

To analyze the data, a spreadsheet of the Microsoft Excel 2010® software was made, with double typing, by two different people. A descriptive analysis (absolute frequency and percentage) was performed. To evaluate the inter-rater agreement on the proposed educational tools, we used the statistic first-order Agreement Coefficient (AC1)[18], based on the software R - R Core Team, 2020, version 4.0.1. The level of significance was set at 5%.

The categorization of inter-rater agreement considered the following values: results < 0.00 – poor agreement; from 0.00 to 0.20 – mild agreement; from 0.21 to 0.40 – acceptable agreement; from 0.41 to 0.60 – moderate agreement; from 0.61 to 0.80 – considerable agreement and from 0.81 to 1.00 – almost perfect agreement [19]. It was defined to obtain a

result equal to or greater than 0.80 to indicate the validated constructs.

The present study was submitted to the Research Ethics Committee of the School of EERP-USP and followed the legal instructions defined in Resolution 466/2012 of the National Health Council (NHC), receiving as opinion number: 3,194,149.

RESULTS

A priori, the video class' script was developed consisting of: 1) title and objectives of the class; 2) characterization of the presenter; 3) explanation of the modules; 4) indication of reading of the proposed guidelines; 5) exposition of the main concepts about N-CPR; 6) materials used; 7) execution of N-CPR maneuvers; and 8) invitation to access the simulation video. Its modules were characterized by: 1) Module A: initial evaluation of the NB and the stages for stabilization; 2) Module B: actions related to ventilation and oxygenation; 3) Module C: maneuvers of coordinated external chest compressions with ventilation; 4) Module D: administration and dilution of drugs used during N-CPR and volume infusion; and 5) Module E: post-CPR care focusing on the referral of the NB to the NICU, hemodynamic and glycemic control, implementation of a therapeutic hypothermia protocol, neurological care for premature NB and order of suspension of CPR.

The video lesson storyboard was prepared as a four-column box, which addressed: 1) Audio/Narration; 2) Images/Scenes; 3) Photos; and 4) References, based on the content of the script.

A total of 13 *experts* validated the content of the proposed pedagogical tools, of which nine (69.2%) were nurses, four (30.8%) physicians and 11 (84.61%) women. The mean age of the participants was 39.69 years. The mean time of training was 15 years, and working in the areas of interest, 13.84 years.

The data related to the validation process of the video lesson by the *experts* are presented in table 1.

Table 1 – Distribution of the responses of the experts (n=13) related to the evaluation of the script and storyboard of the video class and results of the inter-rater agreement. Ribeirão Preto, SP, Brazil

Items	I agree		I disagree		I don't know	
	n	%	n	%	n	%
Objectives						
The objectives are consistent with practice in N-CPR*	13	100	0	0	0	0
The objectives are consistent with those proposed	13	100	0	0	0	0
The objectives are adequate to be effective	13	100	0	0	0	0
Total	39	100	0	0	0	0
Content						
The content of the script corresponds to the objectives	13	100	0	0	0	0
The content facilitates the teaching-learning process	13	100	0	0	0	0
The content allows understanding of the topic	13	100	0	0	0	0
The content obeys a logical sequence	13	100	0	0	0	0
It addresses in-hospital N-CPR* in an orderly manner	13	100	0	0	0	0
It disposes the materials for in-hospital N-CPR*	12	92.31	1	7.69	0	0
The list of script information is correct	13	100	0	0	0	0
Total	90	98.90	1	1.09	0	0

(continua)

Items	I agree		I disagree		I don't know	
	n	%	n	%	n	%
Relevance						
Illustrations are pertinent to in-hospital N-CPR*	13	100	0	0	0	0
Images, scenes and photos are relevant to high-quality in-hospital N-CPR*	13	100	0	0	0	0
Images, scenes and photos transfer the learned content to practice	11	84.62	2	15.38	0	0
Total	37	94.87	2	5.12	0	0
Environment						
The scenario is suitable for the transmission of the video lesson	13	100	0	0	0	0
The scenario is suitable for learning the theme	13	100	0	0	0	0
Total	26	100	0	0	0	0
Verbal language						
The script language is accessible to the target audience	13	100	0	0	0	0
Verbal language is easy to assimilate	13	100	0	0	0	0
Total	26	100	0	0	0	0
Inclusion of topics						
Objective of the video class	13	100	0	0	0	0
Concepts of N-CRA† and N-CPR	13	100	0	0	0	0
Stages of care to NB in CRA‡ (A-B-C-D)	13	100	0	0	0	0
Total	39	100	0	0	0	0
Grand total	257	98.84	3	1.15	0	0
AC1§	0.9777					
P-value	<0.0001					

*N-CPR= Neonatal cardiopulmonary resuscitation; †N-CRA= Neonatal cardiorespiratory arrest; ‡CRA= Cardiorespiratory arrest; §AC1= First-order Agreement Coefficient

Source: Developed by the authors.

The inter-rater evaluation of the video class obtained "almost perfect" agreement, with a statistically significant p-value. The main modifications made were: 1) adequacy of nomenclatures and definitions; 2) inclusion of materials and equipment; 3) explanation of the theory and practice interface, mainly with regard to the content of intraosseous puncture; 4) grammatical corrections; 5) organization of the text; and 6) inclusion of texts and images.

The script of the simulation video addressed the information regarding the clinical scenario, namely: 1) location; 2) mannequin; 3) team; 4) materials and equipment; 5) description of the case and scenes; 6) narration, speeches and actions of the actors. The storyboard consisted of a frame with three columns: 1) Audio/Narration; 2) Images/Scenes; and 3) Photos/Text. The narration and speeches were distributed in the Audio/Narration column and the actions performed in the simulation were detailed in the Images/Scenes column and the texts, images and logos and animations in the Photos/Text column.

Table 2 shows the responses of the experts (n=13) related to the evaluation of the script and storyboard of the simulation video and the results of the inter-rater agreement.

Table 2 – Distribution of expert responses (n=13) related to the evaluation of the script and storyboard of the simulation video and results of the inter-rater agreement. Ribeirão Preto, SP, Brasil

Items	I agree		I disagree		I don't know	
	n	%	n	%	n	%
Objectives						
The objectives are consistent with practice in N-CPR*	13	100	0	0	0	0
The objectives are consistent with the proposed objectives	13	100	0	0	0	0
The objectives are adequate to be effective	13	100	0	0	0	0
Total	39	100	0	0	0	0
Content						
The content presented in the script/*script* corresponds to the proposed objectives	13	100	0	0	0	0
The content facilitates the teaching-learning process of the theme	13	100	0	0	0	0
The content allows understanding of the topic	13	100	0	0	0	0
The content obeys a logical sequence	13	100	0	0	0	0
It incorporates all necessary stages to perform N-CPR in an orderly way in an in-hospital environment	13	100	0	0	0	0
The content has all the necessary materials for N-CPR* in an in-hospital environment	13	100	0	0	0	0
The list of information that the script presents is correct	13	100	0	0	0	0
Total	91	100	0	0	0	0
Relevance						
The images, scenes and photos illustrate important aspects for the practice of N-CPR* by professionals in the in-hospital environment	13	100	0	0	0	0
The images, scenes and photos are relevant so that the N-CPR* by professionals in the in-hospital environment is of high quality	13	100	0	0	0	0
Images, scenes and photos allow transfer of the learned content to professional practice	13	100	0	0	0	0
Total	39	100	0	0	0	0
Environment						
The scenario is suitable for the transmission of the simulated service video	13	100	0	0	0	0
The scenario is suitable for learning the topic	13	100	0	0	0	0
Total	26	100	0	0	0	0
Verbal language						
The script language is accessible to the target audience	12	92.31	1	7.69	0	0
Verbal language is easy to assimilate	12	92.31	1	7.69	0	0
Total	24	92.31	2	7.69	0	0
Inclusion of topics						
Objective of the simulated service video	13	100	0	0	0	0
Concepts of N-CRA† and N-CPR*.	13	100	0	0	0	0
Stages of care to NB in CRA‡ (A-B-C-D)	13	100	0	0	0	0
Total	39	100	0	0	0	0
Grand total	258	99.23	2	0.76	0	0
AC1§			0.9844			
P-value			<0.0001			

*N-CPR= Neonatal cardiopulmonary resuscitation; †N-CRA= Neonatal cardiorespiratory arrest; ‡CRA= Cardiorespiratory arrest; §AC1= *First-order Agreement Coefficient*

Source: Developed by the authors.

The evaluation of the inter-rater agreement of the simulation video also showed "almost perfect" agreement, with a statistically significant p-value. The changes made were: 1) spelling and grammatical correction; 2) inclusion of other materials; 3) emphasis on the action "cradle and incubator previously heated"; 4) adaptation of the language to the target audience; 5) inclusion of text during the narration and 6) use of standard acronyms.

The MCQ was then validated to evaluate the cognitive knowledge about N-CPR in an in-hospital environment, consisting of 20 questions, with four alternatives each (A, B, C and D), with only one being correct. Question 1 addressed the initial evaluation of the NB; question 2, the actions taken in the initial stages of stabilization of the NB; questions 3 to 8 on ventilation and oxygenation of the NB in CRA; questions 9 to 16 referred to external chest compression (ECC) and, finally, questions 17 to 20 addressed the administration of drugs and volume. Table 3 presents the answers of the experts related to the validation of the MCQ.

Table 3 – Distribution of the experts' answers (n=13), related to the evaluation of the MCQ and evaluation of the inter-rater agreement. Ribeirão Preto, SP, Brasil

Question	Organization				Objectivity				Clarity			
	Yes		No		Yes		No		Yes		No	
	N	%	n	%	N	%	n	%	n	%	n	%
01	13	100	0	0	13	100	0	0	13	100	0	0
02	13	100	0	0	12	92.31	1	7.69	11	84.62	2	15.38
03	13	100	0	0	13	100	0	0	12	92.31	1	7.69
04	13	100	0	0	13	100	0	0	11	84.62	2	15.38
05	13	100	0	0	13	100	0	0	13	100	0	0
06	13	100	0	0	13	100	0	0	13	100	0	0
07	13	100	0	0	12	92.31	1	8	11	84.62	2	15.38
08	13	100	0	0	13	100	0	0	12	92.31	1	7.69
09	13	100	0	0	13	100	0	0	13	100	0	0
10	13	100	0	0	13	100	0	0	13	100	0	0
11	12	92.31	1	7.69	12	92.31	1	7.69	12	92.31	1	7.69
12	13	100	0	0	13	100	0	0	13	100	0	0
13	13	100	0	0	13	100	0	0	12	92.31	1	7.69
14	13	100	0	0	13	100	0	0	12	92.31	1	7.69
15	13	100	0	0	13	100	0	0	13	100	0	0
16	13	100	0	0	13	100	0	0	12	92.31	1	7.69
17	12	92.31	1	7.69	11	84.62	2	15.38	11	84.62	2	15.38
18	13	100	0	0	13	100	0	0	13	100	0	0
19	13	100	0	0	13	100	0	0	12	92	1	8
20	13	100	0	0	13	100	0	0	13	100	0	0
Total	258	99.23	2	0.77	255	98.08	5	1.92	245	94.23	15	5.77
AC1[§]	0.9844				0.9614				0.8763			
P-value	<0.0001				<0.0001				<0.0001			

[§]AC1= *First-order agreement coefficient*

Source: Developed by the authors.

The MCQ validation resulted in a "almost perfect agreement" and a statistically significant p-value. The changes made were: 1) grammatical corrections; 2) change of utterance/alternatives to make them clearer; 3) coherence of objectives and alignment with practice and 4) standardization of nomenclatures and acronyms.

Finally, there was the validation of the SOCE, composed of five stations. Station 1, entitled Neonatal Cardiopulmonary Resuscitation – initial care of the newborn in the delivery room, consisting of 10 evaluation items, obtained a "almost perfect" agreement index, with a value of p <0.0001. Only the organization criterion, specifically the item "check the temperature of the NB", was readjusted, at the request of the experts.

Station 2 – Neonatal Cardiopulmonary Resuscitation: oxygenating and ventilating in rooming-in/maternity ward, composed of 16 items, obtained "almost perfect" agreement and p-value <0.0001. Clarity was adjusted after the observation that the NB in question would not be crying, considering the nature of the clinical case.

Regarding station 3 – Neonatal Cardiopulmonary Resuscitation: compressions coordinated with ventilation in a neonatal intensive care unit, almost perfect agreement was also verified. Experts have not suggested changes in this station.

Regarding station 4 – Neonatal Cardiopulmonary Resuscitation: administration of epinephrine in a neonatal intensive care unit, almost perfect agreement and p-value <0.0001 were obtained. Regarding clarity, three items were pointed out for readjustment, namely: 1) "aspirates 1 ml of epinephrine in a 10 ml syringe and diluted to 10 ml of 0.9% Saline solution"; 2) "correctly identifies the epinephrine syringe and aspirates the dilution in a 1 ml syringe"; and 3) "marks and firmly informs the time of epinephrine administration".

Station 5 – Neonatal Cardiopulmonary Resuscitation: leadership in the delivery room, composed of 40 items, obtained almost perfect agreement, with p <0.0001. There was no need to adjust any criteria at this station.

Table 4 presents the sum of the experts' answers, classified as "I agree" and "I disagree", referring to the organization, objectivity and clarity of each item, present in the five stations, obtaining an overall evaluation from the SOCE.

Table 4 – SOCE general evaluation: Sum of the total "I agree" and "I disagree" answers obtained in each station, referring to organization, objectivity and clarity according to the experts (n=13). Ribeirão Preto, SP, Brazil

Stations	Number of "I Agree" responses	%	Number of "I disagree" responses	%
Station 1	389	99.74	1	0.25
Station 2	623	99.83	1	0.16
Station 3	390	100	0	0
Station 4	386	97.43	4	1.02
Station 5	1,539	98.65	21	1.34
Total	3,327	99.28%	27	0.80%

Source: Developed by the authors.

In general, the proposed SOCE presented a satisfactory evaluation in 99.28% of its items. As for the suggestions made by the experts, there were opportunities for improvement on the execution time of the stations, inclusion of certain information, exclusion of unnecessary content, spelling and grammatical correction and change of terms.

DISCUSSION

Studies that propose to develop and validate hybrid teaching tools aimed at N-CPR are still incipient[2-3,4]. It is considered a valuable educational alternative, within the scope of N-CPR, to offer an online teaching stage based on videos, with face-to-face axes, aiming at learning adaptable to contemporary needs [4].

This research is unprecedented in the face of health sciences, as it contemplates innovative educational tools for the teaching and learning

process of N-CPR based on clinical simulation and made possible by video. These tools allow sustaining the hybrid teaching of this theme for nurses and physicians.

A video class on N-CPR was developed, considered a virtual pedagogical object capable of propagating knowledge without a high burden and also of exposing the subject in a simple way, facilitating the memorization and reflection of contents[5]. This perspective is corroborated by a study conducted with 16 nurses specialized in urgency and emergency, who validated a script and storyboard of a video class on CPR in adults and considered that this tool can favor the acquisition of practical skills and meaningful learning for the learner[20].

It is essential to emphasize, however, that adopting only the video class for the teaching of N-CPR may not be effective to develop clinical skills, a situation that instigates the adoption of video simulation in order to facilitate the observation of real situations, to reduce stress in the face of future practice and increase patient safety [5].

A randomized clinical trial study tested the effectiveness of a video simulation on bed bath to improve the psychomotor skills of undergraduate nursing students, considering 28 students for the control group submitted to face-to-face teaching and 28 students submitted to a simulation video on the subject, obtaining as an outcome a better performance in learning of the group that watched the video, which can signal its benefit regarding the development of nursing skills [21].

This research also valued the development and validation of evaluation tools for the teaching and learning process of neonatal CPR, which are scarce in the literature[22], such as the SOCE, a method of evaluation of clinical competence development that has been presenting satisfactory results in simulated activities in the context of urgency and emergency[23].

A research aimed at validating a SOCE station on adult CPR had the participation of 16 professional nurses, who evaluated 40 intervention criteria related to the links of the chain of survival of the American Heart Association, presenting almost perfect inter-rater agreement, which is similar to the results obtained in the present study[24]. It is believed, therefore, that the SOCE can function as an effective evaluation mechanism for the psychomotor skills of health professionals in learning N-CPR, allowing the strengthening of this knowledge[24-25].

This study presented as a limitation the exclusive fulfillment of the initial phases of the preparation of the video class and simulation video for the teaching and learning of CPR, in view of the difficulties imposed by the pandemic period. It is noteworthy, however, that the objects produced imply the advancement of knowledge, as they support the hybrid teaching process of N-CPR. In addition, it presents a product of strong social and scientific nature, because, by training health professionals for N-CPR, it returns to the society able first responders, positively impacting the morbidity and mortality of this population.

CONCLUSION

The script and storyboard of a video class and simulation video, multiple-choice questionnaire for theoretical knowledge evaluation and the Structured Objective Clinical Examination for analysis of practical skills in neonatal cardiopulmonary resuscitation were developed and validated.

This study contributes to teaching, research and health care by presenting hybrid teaching tools useful for learning neonatal cardiopulmonary resuscitation of nurses and other health professionals in an in-hospital environment.

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