# VALIDATION OF EVALUATING INSTRUMENT FOR TRAINING NURSES IN CARDIOPULMONARY RESUSCITATION

Validação de instrumento avaliativo para capacitação de enfermeiros em ressuscitação cardiopulmonar

Validación de instrumento evaluador para la formación de enfermeras en reanimación cardiopulmonar

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## ABSTRACT

**Objective:** to validate criteria of an instrument for assessing the qualification of nurses in cardiopulmonary resuscitation. **Method**: methodological study for criterion validation of a previously validated instrument for content. The application of a pre and post test instrument of a training with 20 nurses from a hospital in the interior of the state of São Paulo was performed. **Results**: pre and post test answers were analyzed on the participants' understanding before and after the theory of the cardiopulmonary resuscitation simulation. The variables objectivity, simplicity, clarity and relevance were evaluated, highlighting that the participants agreed that the criteria mentioned were met. **Conclusion**: the instrument investigated is related to the defined standards and has been validated. By using this instrument during the assessment of training in cardiopulmonary resuscitation, workteams, students and patients will benefit through standardization and effectiveness of care.

**DESCRIPTORS:** Nurses; Heart arrest; Cardiopulmonary resuscitation; Validation study; Inservice training.

## RESUMO

**Objetivo:** validar critérios de um instrumento para avaliação da capacitação de enfermeiros em ressuscitação cardiopulmonar. **Método:** estudo metodológico para validação de critério de um instrumento previamente validado quanto ao conteúdo. Realizou-se a aplicação de

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um instrumento pré e pós-teste de uma capacitação com 20 enfermeiros de um hospital do interior do Estado de São Paulo. **Resultados:** realizou-se a análise das respostas do pré e pós-teste sobre o entendimento dos participantes antes e após a realização de teoria atrelada a simulação sobre ressuscitação cardiopulmonar. Foram avaliadas as variáveis objetividade, simplicidade, clareza e pertinência, destacando-se que os participantes concordaram que os critérios citados foram atendidos. **Conclusão:** o instrumento investigado possui relação com os padrões definidos, sendo comprovadamente validado. Ao utilizar-se deste instrumento durante a avaliação de capacitações em ressuscitação cardiopulmonar, as equipes de trabalho, alunos e pacientes serão beneficiados, garantindo a padronização e melhor efetividade no atendimento a PCR.

**DESCRITORES:** Enfermeiras e enfermeiros; Parada cardíaca; Reanimação cardiopulmonar; Estudo de validação; Capacitação em serviço.

### RESUMEN

**Objetivo:** validar los criterios de un instrumento para evaluar la calificación de las enfermeras en reanimación cardiopulmonar. **Método:** estudio metodológico para la validación de criterios de un instrumento previamente validado para el contenido. Se realizó la aplicación de un instrumento de prueba previa y posterior a una capacitación con 20 enfermeras de un hospital en el interior del estado de São Paulo. **Resultados:** las respuestas previas y posteriores a la prueba se analizaron según la comprensión de los participantes antes y después de la teoría de la simulación de reanimación cardiopulmonar. Se evaluaron las variables objetividad, simplicidad, claridad y relevancia, destacando que los participantes estuvieron de acuerdo en que se cumplieron los criterios mencionados. **Conclusión:** el instrumento investigado está relacionado con los estándares definidos y ha sido validado. Al utilizar este instrumento durante la evaluación de la capacitación en reanimación cardiopulmonar, los equipos de trabajo, los estudiantes y los pacientes se beneficiarán mediante la estandarización y la eficacia de la atención.

**DESCRIPTORES:** Enfermeras y enfermeros; Paro cardíaco; Reanimación cardiopulmonar; Estudio de validación; Capacitación en servicio.

# INTRODUCTION

Cardiorespiratory arrest (CRA) is characterized by interruption of breathing and circulation, manifested by apnea, absence of central pulse and loss of consciousness. Despite improvements related to prevention and treatment in recent years, many lives are still lost annually in Brazil due to CRA.[1-2]

In the occurrence of CRA, cardiopulmonary resuscitation (CPR) is recommended, which restores circulation and oxygenation, providing the survival of the victim and reducing the probability of sequelae.[3]

The adequate care provided by health professionals is extremely important to increase this survival. The competence, that is, the knowledge, skills and attitudes of these professionals are fundamental for effective CPR, since the intervention to reverse the situation has as fundamental principles the application of a set of procedures to restore circulation and oxygenation.[4]

Knowledge on the subject is part of the daily routine of health teams and promotes an efficient intervention that reflects on the improvement of patient care. Studies indicate that the presence of at least one professional with advanced life support (ALS) training increases the survival of patients victims of CRA.[3,5] It is estimated that each minute of stay in CRA decreases the probability of patient survival by 10%.[4]

The trainings or training related to CPR must provide knowledge about the technical procedure, equipment and conditions necessary for the development of psychomotor skills, in addition to an evaluation of these trainings, based on previously established criteria.[5]

These trainings have questionnaires or measurement instruments aimed at evaluating health outcomes for use in research and clinical practice, however many are inadequately validated, so the researcher must choose a precise and reliable instrument to guarantee the quality of the results obtained.[6]

In research using tools or instruments from other researchers, reliability and validity must be established. Measurement tools should reflect the concepts of the theory being tested so that the conclusions drawn from the empirical phase are validated.[7]

The term validate refers to the degree to which the instrument used is adequate to measure the true value of what it proposes to measure, that is, how much the results obtained represent the truth or how far from it. There are three main types of validity that vary according to the information presented and the purpose of the researcher: validity of content, validity of construct, and validity related to the criterion.[7]

The validity related to the criterion indicates to what degree the performance of the research participant and his real behavior are related, when the measurement tool is used, that is, it consists of the relation between scores of a certain instrument and some external criterion. This criterion should consist of a measure that correlates with existing and well accepted measures.[6-7]

To propose, then, the validation of a criterion for theoretical and practical training of nurses in the care of CRA is to bring closer to their practical reality the knowledge that is being produced on the subject, contribute to a standardization of care of CRA and facilitate the form of evaluation of the training conducted.

Given the above, the objective of this study was to validate criteria of an instrument for evaluating the training of nurses in cardiopulmonary resuscitation.

# METHODS

Study for the validation of criteria of an instrument used for training nurses in CPR. Criteria validation consists of an externally accepted measure, in which the measure of the study performed is compared with the standard measure.[6]

The validation of the instrument's content was previously carried out[8] with the purpose of systematizing the opinions of experts on the subject, who composed the judging panel and evaluated the relevance of each multiple-choice question. The elaboration of instruments with content validation that use reliable measures corroborates with the scientific development of Brazilian nursing.[9]

In this study, the instrument was divided into three parts, the first directed to professional characterization, the second referring to the variables pertinent to the study theme that were

based on the CPR[10] guidelines and related to the recognition of CRA (request for help triggering the emergency medical service; positioning of the victim and the rescuer; the correct sequence of CPR maneuvers; carotid pulse evaluation; the compression/ventilation relationship and the correct use of the automatic external defibrillator), the third regarding the participants' understanding of the issues and the criteria to be evaluated regarding the presentation of each issue of the instrument.

For the practical evaluation of each question, the instrument was applied during a training with 20 nurses from a philanthropic hospital in the interior of the State of São Paulo in April 2018.

The inclusion criteria consisted of being a nurse at that hospital, signing the Free and Informed Consent Term and participating in all phases of the study. Nurses on medical leave or on leave on the day of application of the instrument and those who did not participate in all phases of the study were excluded.

The methodological approach for the application of the instrument was divided into three stages: pre-test application, capacitação/treinamento theoretical-practical and post-test application. The pre and post test instruments had the purpose of understanding the changes that occurred in the understanding of the instrument.

The instrument applied in the pre-test and in the post-test contained the same variables and only presented the questions in different order. The participant answered each question and performed an evaluation as to the understanding, clarity and mastery of the subject of the question.

Between the pre-test and the post-test there was the theoretical training phase on the subject with demonstration class and presented by a nurse specialist in cardiology, then there was a simulation of CRA care with subgroups of four nurses.

Participants evaluated the understanding of the instrument before and after the training. It should be noted that the purpose of the evaluation of the instrument by the participants referred to the validation of criteria for having obtained the applicability in practice and thus the faithful measurement of each variable proposed to the study.

The analysis of the results was carried out observing the pre and post-test answers and the understanding of the questions in the different phases, and for each question the participant should judge through one of the items listed: 1. I was able to understand the question, it is clear; 2. I could not understand the question; 3. I was able to understand, but I had doubts. It was considered acceptable 75% for the Content Validation Index (CVI) of the questions answered as: I managed to understand the question, it's clear (Item 1). The CVI measures the agreement between the judges to the items of the instrument.[11]

The protocol of this study was elaborated following the ethical standards for clinical research in human beings, according to the resolution 466/12 of the Ministry of Health and obtaining the approval of the Committee of Ethics in Research under the opinion nº CAAE: 42678915.5.0000.5504.

The participants who accepted to participate in the research signed the Termo de Consentimento Livre e Esclarecido.

## RESULTS

Regarding the characterization of the participants, 19 (95%) are female, with an average age of 34.3 years, the majority being between 26 and 41 years old. Regarding the time of experience, an average of 4.5 years was observed.

It was verified that 10 (50%) professionals have some updating or training in the health area, being four (20%) specialized in urgency and emergency, three (15%) with specialization in neonatal ICU and pediatrics, two (10%) with specialization in cardiology and one (5%) specialized in oncology. Of the participating nurses 15 (75%) have courses related to CPR.

Regarding the work sector, eight (40%) participants work in the surgical clinic sector, four (20%) in medical clinic, four (20%) in clinic unit médica∕ surgical health plans, two (10%) in prompt care and two (10%) in permanent education.

For the validation process, the participants' understanding of the pre and post-training instrument linked to simulated practice was analyzed, obtaining the results presented in Table 1 referring to the pre-test.

**Table 1 -** Pre-test answers regarding the understanding of the questions. São Carlos, SP, Brazil, 2018

| Questions | Answers | | |
| --- | --- | --- | --- |
| | They understood n (%) | Didn't understand n (%) | Doubt n (%) |
| Q1 | 13 (65,00%) | 0 (00,0%) | 7 (35,0%) |
| Q2 | 19 (95,00%) | 0 (00,0%) | 1 (05,0%) |
| Q3 | 20 (100,0%) | 0 (00,0%) | 0 (00,0%) |
| Q4 | 17 (85,00%) | 0 (00,0%) | 3 (15,0%) |
| Q5 | 16 (80,00%) | 2 (10,0%) | 2 (10,0%) |
| Q6 | 17 (85,00%) | 0 (00,0%) | 3 (15,0%) |
| Q7 | 17 (85,00%) | 0 (00,0%) | 3 (15,0%) |
| Q8 | 19 (95,00%) | 0 (00,0%) | 1 (05,0%) |
| Q9 | 19 (95,00%) | 1 (05,0%) | 0 (00,0%) |
| Q10 | 19 (95,00%) | 0 (00,0%) | 1 (05,0%) |
| Q11 | 18 (90,00%) | 0 (00,0%) | 2 (10,0%) |
| Q12 | 18 (90,00%) | 0 (00,0%) | 2 (10,0%) |
| Q13 | 20 (100,0%) | 0 (00,0%) | 0 (00,0%) |
| Q14 | 19 (95,00%) | 0 (00,0%) | 1 (05,0%) |
| Q15 | 16 (80,00%) | 1 (05,0%) | 3 (15,0%) |
| Q16 | 15 (75,00%) | 1 (05,0%) | 4 (20,0%) |
| Q17 | 17 (85,00%) | 0 (00,0%) | 3 (15,0%) |
| Q18 | 10 (50,00%) | 6 (30,0%) | 4 (20,0%) |

**Legend:** Q1: Correct sequence of CPR; Q2: Identification of CPR; Q3: Justification of pulse check; Q4: Positioning of the victim; Q5: Depth of compressions; Q6: Chest compressions per minute; Q7: Compression x Ventilation; Q8: Airway permeability in victim without trauma; Q9: Airway opening in victim with trauma; Q10: Start of CPR maneuvers; Q11: DEA sequence; Q12: Patterns of rhythms found in CPR; Q13: Time interval that evaluates heart rhythm in CPR; Q14: Non-shockable heart rhythms; Q15: Electric charge of manual cardioverter; Q16: Electric charge of biphasic cardioverter; Q17: Access routes when venous access is not obtained; Q18: Drugs administered.

Table 1 shows that of the 18 questions elaborated, 14 obtained the understanding of at least 16 (80%) participants. The questions: Correct sequence of CPR (Q1), Electric load of the manual converter (Q15) and Drugs administered (Q18) presented a percentage of understanding lower than 16 (80%) participants, with emphasis on question number 18 (Q18) in which 10 (50%) nurses understood the question, six (30%) did not understand and four (20%) presented doubts.

For questions 5, 9, 15, 16 and 18 related to the depth of compressions, opening of airways of the victim with trauma, electrical load of the manual cardioverter, electrical load of the biphasic cardioverter and drugs administered, respectively, there were participants who did not understand the question, and the other participants only presented some doubts. The CVI presented in this pre-test phase was 96%.

After theoretical training and realistic simulation of CRA care, the instrument was reapplied for a second analysis of the participants, obtaining the results of understanding presented in Table 2.

**Table 2 -** Post-test answers regarding the understanding of the questions. São Carlos, SP, Brazil, 2018

| Questions | Answers | | |
|---|---|---|---|
| | They understood n (%) | Didn't understand n (%) | Doubt n (%) |
| Q1 | 20 (100,0%) | 0 (00,0%) | 0 (00,0%) |
| Q2 | 19 (95,00%) | 0 (00,0%) | 1 (05,0%) |
| Q3 | 17 (85,00%) | 0 (00,0%) | 3 (15,0%) |
| Q4 | 18 (90,00%) | 1 (05,0%) | 1 (05,0%) |
| Q5 | 19 (95,00%) | 1 (05,0%) | 0 (00,0%) |
| Q6 | 20 (100,0%) | 0 (00,0%) | 0 (00,0%) |
| Q7 | 19 (95,00%) | 1 (05,0%) | 0 (00,0%) |
| Q8 | 20 (100,0%) | 0 (00,0%) | 0 (00,0%) |
| Q9 | 19 (95,00%) | 1 (05,0%) | 0 (00,0%) |
| Q10 | 19 (95,00%) | 0 (00,0%) | 1 (05,0%) |
| Q11 | 19 (95,00%) | 1 (05,0%) | 0 (00,0%) |
| Q12 | 18 (90,00%) | 2 (10,0%) | 0 (00,0%) |
| Q13 | 19 (95,00%) | 1 (05,0%) | 0 (00,0%) |
| Q14 | 18 (90,00%) | 2 (10,0%) | 0 (00,0%) |
| Q15 | 18 (90,00%) | 2 (10,0%) | 0 (00,0%) |
| Q16 | 18 (90,00%) | 2 (10,0%) | 0 (00,0%) |
| Q17 | 18 (90,00%) | 1 (05,0%) | 1 (05,0%) |
| Q18 | 18 (90,00%) | 1 (05,0%) | 1 (05,0%) |

**Key: Q1:** Correct sequence of CPR; **Q2:** Identification of CR; **Q3:** Justification of pulse check; **Q4:** Positioning of the victim; **Q5:** Depth of compressions; **Q6:** Chest compressions per minute; **Q7:** Compression x Ventilation; **Q8:** Airway permeability in victim without trauma; **Q9:** Airway opening in victim with trauma; **Q10:** Start of CPR maneuvers; **Q11:** DEA sequence; **Q12:** Patterns of rhythms found in CR; **Q13:** Time interval that evaluates heart rhythm in CPR; **Q14:** Non-shockable cardiac rhythms; **Q15:** Electric charge of manual cardioverter; **Q16:** Electric charge of biphasic cardioverter; **Q17:** Access routes when venous access is not obtained; **Q18:** Drugs administered.

Table 2 shows that the percentage of people who understood the issue increased significantly after the training, all issues obtained an understanding greater than or equal to 17 (85%) participants. In questions related to correct sequence of CPR (Q1), chest compressions per minute (Q6) and airway permeability in trauma-free victims (Q8) there

was the understanding of all participants. Question number three related to the justification of the pulse check obtained the lowest rate of understanding, that is, 17 (85%) nurses. The percentage of doubts decreased in the post-test, if compared to the pre-test. The CVI calculated for the post-test was 95%.

The criteria used for understanding the instrument in the pre-test are presented in Table 3.

**Table 3 -** Criteria evaluated in pre-test and post-test instruments. São Carlos, SP, Brazil, 2018

| Variables | Yes | No | Result |
|---|---|---|---|
| Objectivity | 100,00% | 00,00% | POSITIVE |
| Simplicity | 100,00% | 00,00% | POSITIVE |
| Clarity | 100,00% | 00,00% | POSITIVE |
| Relevance | 100,00% | 00,00% | POSITIVE |
| Variety | 90,00% | 10,00% | POSITIVE |

From Table 3, it is understood that for the variables "objectivity", "simplicity", "clarity" and "relevance", participants agreed that the questions had all the criteria met. Only for the variety variable, 18 (90%) agreed that the criterion was met, even so, being within the expected for the approval of this criterion.

**Table 4 -** Variables of the instrument after criterion validation. São Carlos, SP, Brazil, 2018

| Variable |
|---|
| Sequence of cardiopulmonary resuscitation (CPR) with automatic external defibrillation (AED) |
| Identification of cardiorespiratory arrest (CRA) |
| Carotid pulse check in adult patient |
| Surface suitable for victim positioning in CPR |
| Position of hands and depth of compression in CRA |
| Compressions per minute in CPR |
| Compression ratio ventilation without definitive airway |
| Airway Permeabilization in victim without trauma |
| Airway Permeabilization in Trauma Victims |
| Indicated way to ventilate a patient in the intra-hospital until the medical team arrives |
| Correct automatic external defibrillation sequence |
| Rhythms found in CRA at cardiography |
| Time interval in the evaluation of ventricular tachycardia (VT) and ventricular fibrillation (VF) during CPR |
| Non-shockable rhythms |
| Electric charge for a single phase defibrillator |
| Electric charge for a biphasic defibrillator |
| Route of access in venous route indisposition |
| Drugs used in CPR |

At the end of the study, as shown in Table 4, there was no need to change the variables between the pre and post-test, due to the participants' good understanding of the issues proposed for the instrument studied.

## DISCUSSION

Validation studies have increased in recent years and have included clinical investigation of the phenomenon studied, demonstrating interest in the subject, as well as contributing to nursing, as a science, using the evaluation and measurement of its results.[7]

In Brazil, the increase in the number of scientific researches on validation consolidates the teaching of post-graduation, contributing to the development of Brazilian nursing. Validation studies are widely used in various research areas of knowledge, both in national and international literature.[7] Even though only 9.5% of Brazilian studies were found in an integrative review of validation studies for clinical investigation of the phenomenon.[7]

Thus, using a validated instrument for the evaluation of training in cardiopulmonary resuscitation facilitates the evaluation of learning, since measuring instruments interact clinical practice with research in different areas of knowledge and can provide reliable measures.[6]

Regarding the characterization of the study professionals, the time of professional experience corroborates with the literature, which emphasizes that the longer time of experience and continuous training for CRA care is directly related to the effectiveness of care.[12]

On the professional qualification of the participants, studies prove that the time for the loss of skills, after a CPR training consists on average of three to six months, if not practiced continuously.[13]

In view of this information, the importance of the periodicity of training of health professionals in the care of victims of CRA is emphasized. The nurse must present improved leadership and knowledge to perform CPR, and it is also necessary to update the team through theoretical and practical training, with the purpose of improving patient care.[14]

The performance of professionals in hospitalization units has a significant impact on skills in CPR situations, as they have less contact with emergencies in their work routines than nurses in critical units.[15]

Regarding the subject, a study carried out shows an important deficiency in the knowledge of health professionals on the diagnosis and care of adult CRA in a public hospital, with the approval of only 10.2% of participants. Also, in this study, intensive care unit professionals obtained more hits than those in hospitalization and emergency room units, but the difference was not statistically significant.[16]

Another study aimed at validating the content of the CPR training instrument for health professionals, showed that the process of teaching and learning in CPR is complex and a quality evaluation practice is required.[8]

In this study, the percentage of understanding of the issues was maintained or increased after the training, reinforcing the proposal that the doubts were of content. In a study that tested the psychomotor and cognitive abilities of nursing students, through previous tests and after the training, it was found that more knowledge was acquired immediately after the activity, but with a significant decrease after two and a half months of the proposed activity.[17]

It is noteworthy that the addition of the traditional method to the realistic simulation method demonstrates effectiveness, contributing to the development of theoretical knowledge.[18] The study points out as a valid resource the alternative of online courses on VAS in the care of CRA in adults, which integrates technologies with innovative educational strategies.[19]

It is evident that nursing can evolve through the use of specific simulation centers to train teams, without prejudice to the patient or family.[20]

When analyzing the questions about criteria validation of the instrument, which is the main objective of this study, for the variables "objectivity", "simplicity", "clarity" and "relevance", it was verified that the participants of the research agreed that the questions had the criteria met.

For criteria validity assessments, researchers test the validity of a measure by comparing the results of the measure to a 'gold standard' or established criterion, therefore, they are already existing and well accepted measures, and their results should check with the results of the 'gold standard'.[6] In general, the variables in this study obtained positive results for criteria validation.

## CONCLUSION

This study aimed to discuss the main aspects for validation of criteria for an evaluation tool for training nurses in cardiopulmonary resuscitation.

The results obtained allow us to affirm that, when analyzing the proposed instrument, for the variables "objectivity", "simplicity", "clarity", "pertinence" and "variety", the criteria were met with positive results. It can be verified that the measure investigated has a relationship with defined standards, being proven validated.

By using a validated instrument for the evaluation of training in cardiopulmonary resuscitation, the work teams, teaching centers and patients will benefit, ensuring standardization and better effectiveness in CRA care.

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