Combined Use of Methodologies PDCR and OSCE in Training and Assessment in Cardiopulmonary Arrest for Nursing Students

Uso Combinado das Metodologias PDCR e OSCE no Treinamento e Avaliação na Parada Cardiorrespiratória para Alunos de Enfermagem

Uso Combinado de Metodologías PDCR y OSCE en el Entrenamiento y Evaluación en Paro Cardiorrespiratorio para Estudiantes de Enfermería

RESUMO

Objetivo: Relatar a experiência do uso das metodologias Prática Deliberada em Ciclos Rápidos (PDCR) e Exame Clínico Objetivo Estruturado (OSCE) no treinamento e avaliação do suporte básico de vida em parada cardiorrespiratória. **Método:** Relato de experiência realizado com alunos do 8º semestre do curso de Enfermagem do Centro Universitário INTA – UNINTA em 2025.1. O treinamento com a PDCR seguiu a progressão sequencial das subcompetências: compressão torácica, ventilação por bolsa-válvula-máscara e uso do desfibrilador externo automático, com feedback imediato. A avaliação através do OSCE analisou: liderança, comunicação, posicionamento e tomada de decisão. **Resultados:** A combinação metodológica permitiu a consolidação da memória muscular e das habilidades técnicas essenciais, além do desenvolvimento das competências comportamentais e cognitivas, promovendo alta performance no atendimento de PCR. **Conclusão:** O uso integrado destas metodologias demonstrou-se eficaz para o ensino e avaliação por promover a preparação técnica e emocional dos estudantes para atuarem em situações críticas reais.

DESCRITORES: Simulação; Enfermagem; RCP; Educação em Enfermagem; Avaliação educacional.

ABSTRACT

Objective: To report the experience of using the Rapid Cycle Deliberate Practice (RCDP) and Objective Structured Clinical Examination (OSCE) methodologies in the training and assessment of basic life support in cardiopulmonary arrest. **Method:** Experience report conducted with 8th-semester Nursing course students from INTA University Center – UNINTA in 2025.1. Training with RCDP followed the sequential progression of sub-competencies: chest compression, bag-valve-mask ventilation, and automated external defibrillator use, with immediate feedback. Assessment through OSCE analyzed: leadership, communication, positioning, and decision-making. **Results:** The methodological combination enabled consolidation of muscle memory and essential technical skills, as well as development of behavioral and cognitive competencies, promoting high performance in CPR care. **Conclusion:** The integrated use of these methodologies proved effective for teaching and assessment by promoting technical and emotional preparation of students to act in real critical situations.

DESCRIPTORS: Simulation; Nursing; CPR; Nursing Education; Educational Assessment.

RESUMEN

Objetivo: Relatar la experiencia del uso de las metodologías Práctica Deliberada en Ciclos Rápidos (PDCR) y Examen Clínico Objetivo Estructurado (OSCE) en el entrenamiento y evaluación del soporte vital básico en paro cardiorrespiratorio. **Método:** Relato de experiencia realizado con alumnos del 8º semestre del curso de Enfermería del Centro Universitario INTA – UNINTA en 2025.1. El entrenamiento con PDCR siguió la progresión secuencial de las subcompetencias: compresión torácica, ventilación por bolsa-válvula-máscara y uso del desfibrilador externo automático, con retroalimentación inmediata. La evaluación a través de OSCE analizó: liderazgo, comunicación, posicionamiento y toma de decisión. **Resultados:** La combinación metodológica permitió la consolidación de la memoria muscular y de las habilidades técnicas esenciales, además del desarrollo de competencias conductuales y cognitivas, promoviendo alto desempeño en la atención de PCR. **Conclusión:** El uso integrado de estas metodologías demostró ser eficaz para la enseñanza y evaluación al promover la preparación técnica y emocional de los estudiantes para actuar en situaciones críticas reales.

DESCRIPTORES: Simulación; Enfermería; RCP; Educación en Enfermería; Evaluación educacional.

Francismeire Brasileiro Magalhães
Ph.D. in Public Health, INTA University Center – UNINTA
ORCID: https://orcid.org/0009-0000-8362-9135

Vanessa Mesquita Ramos
Master's in Family Health, INTA University Center – UNINTA
ORCID: https://orcid.org/0009-0006-6895-6035

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INTRODUCTION

Training highly qualified healthcare professionals to work in emergency settings represents an ongoing challenge and requires methodologies that foster technical and cognitive skills, combined with the development of behavioral competencies essential for managing critical situations[1] .In this regard, combining approaches such as high-fidelity simulation, real-time feedback, and strat-

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egies to reduce performance anxiety show promise in bridging the gap between knowledge and practice[2] .

Among the active methodologies for competency development and high performance, Rapid-Cycle Deliberate Practice (RCDP) and the Objective Structured Clinical Examination (OSCE) stand out, recognized for promoting practical learning, objective assessment, and constructive *feedback*[3,4] .

Cardiac arrest (CA) represents a highly complex situation, requiring nursing professionals to be proficient in basic life support (BLS), which involves chest compressions, effective ventilation, and the correct use of the automated external defibrillator (AED)[5,6] . The effectiveness of the intervention depends on technical mastery and the ability to perform under pressure, factors that are fundamental to increasing the chances of survival. The development of high-performance care requires professionals to possess technical and cognitive skills that enable them to provide assistance with proficiency; training must therefore be conducted in an objective manner to consolidate reliable professional practices[7] .

Active teaching-learning methodologies, particularly PDCR and OSCE, have established themselves as pedagogical tools of excellence in this context. The former, grounded in K. Anders Ericsson's pioneering studies on the acquisition of expertise through deliberate and focused practice, involves short, intensive cycles of performing specific skills, interspersed with strategic pauses to provide immediate feedback, make precise corrections, and perform targeted repetitions until mastery is achieved. This approach not only accelerates the development of muscle memory and technical precision but also strengthens cognitive resilience under pressure, elements that are crucial in real-life emergencies [8,9] .

On the other hand, the OSCE, originally conceived by Ronald Harden in 1975, offers objective formative and summative assessment through standardized rotating stations that simulate authentic clinical scenarios, allowing for the integrated measurement of technical, behavioral, and cognitive competencies, with a significant reduction in the subjective biases inherent in traditional assessment methods[1,3,4] .

Clinical simulation conducted through PDCR, combined with OSCE assessments, has proven effective for the accelerated development of technical skills and integrated learning[10,11] . These methodologies enable training in a safe and controlled environment, close to the reality of patient care, promoting the consolidation of technical, behavioral, and cognitive competencies[12] .

This study aimed to report on the experience of using PDCR and OSCE methodologies in the training and assessment of basic life support for cardiopulmonary arrest.

METHOD

Study type, location, period, and sample

Experience report conducted with 8th-semester Nursing students in the Emergency and Urgent Care course, offered every semester with a workload of 150 theoretical and practical hours, during the year 2025 at the INTA University Center - UNINTA, located in Sobral, Ceará, Brazil. The activity is part of the course's curriculum and was administered to all enrolled students, totaling 103 students.

PDCR Methodology

Rapid-Cycle Deliberate Practice is a highly structured and intensive pedagogical methodology grounded in scientific principles of motor and cognitive skill acquisition. It relies on short, repetitive cycles of deliberate practice, characterized by frequent, strategic interruptions to provide rapid, specific, and immediate corrective feedback. This approach, inspired by Ericsson's classic studies on expertise, prioritizes the progressive and modular development of isolated sub-skills, allowing the learner to advance gradually and measurably, with an exclusive focus on overcoming individual technical limitations, until reaching levels of proficiency close to motor automation and executive mastery[13] .

In the specific context of basic life support training for cardiac arrest care, a sequential and hierarchical progression of sub-competencies was adopted, aligned with the updated guidelines of the American Heart Association (AHA) [3] and the Federal Nursing Council (COFEN) [14] , structured as follows:

1. Chest compressions: Intensive emphasis on correct technique, including an ideal depth of 5 to 6 centimeters on the adult chest, a rhythmic rate of 100 to 120 compressions per minute, allowing for full recoil between compressions to optimize venous return, minimizing interruptions, and maintaining quality even in prolonged resuscitation scenarios, with quantitative metrics monitored to ensure compression rates above 80%;
2. Bag-valve-mask (BVM) ventilation: Focus on precise and ergonomic handling of the device, proper anatomical positioning of the head (cervical extension with chin lift), airtight mask seal, delivery of a controlled volume between 500 and 600 mL per insufflation, perfect synchronization with the compression-ventilation cycle at the classic 30:2 ratio, and prevention of hyperventilation or aspiration, integrating airway protection concepts in prehospital settings;
3. Use of the automated external defibrillator (AED): Comprehensive training in automated cardiac rhythm analysis by the device, accurate identification of shock-indicat-

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ed arrhythmias (such as ventricular fibrillation or pulseless ventricular tachycardia), rapid application of electrodes in the anterolateral or anteroposterior- e position, in accordance with AHA/ERC protocol algorithms to maximize intact neurological survival.

Each of these steps was meticulously trained in a clinical simulation laboratory fully equipped with medium- and high-fidelity simulators capable of providing real-time metric data, real BVM devices approved for educational use, and training AED units with voice prompts and simulated rhythm analysis.

The teaching flow strictly followed the PDCR iterative cycle: initial demonstration by the instructor, independent performance of the skill by the student, interruption for immediate qualitative and quantitative *feedback* (based on direct observation, *debriefing software*, and metrics such as the percentage of adequate compressions), reflective discussion of errors and successes, and intensive repetition until consistent demonstration of measurable improvement, with *mastery* criteria set at levels exceeding 90% accuracy.

The striking distinction of this methodology lies in the constant and systematic use of real-time feedback, derived from direct and specialized observation of performance by a trained facilitator, which enables precise, progressive, and personalized adjustments in each cycle, promoting not only the technical refinement of the trained sub-skill but also the consolidation of muscle memory, the reduction of interindividual variability, and the building of executive confidence under simulated stress.

OSCE Methodology

After the successful completion of the intensive training phase through the PDCR, in which students achieved the minimum levels of individual proficiency in the isolated sub-competencies, the students were organized into heterogeneous trios to undergo a formative and summative assessment through the OSCE. This assessment strategy, widely validated in the health education literature, consisted of rotating and sequential performance at multiple simulated comprehensive care stations, recreating highly complex and realistic clinical scenarios, such as out-of-hospital cardiac arrest with ventricular fibrillation or asystole, including distracting elements such as environmental noise, fictitious patient comorbidities, and logistical constraints to simulate the controlled chaos of a real emergency[9] .

Each station rotation was timed to last approximately 10 minutes, an optimized period to capture the complete cycle of pulse assessment, initiation of BLS, rhythm check, and first defibrillation, followed by a 1-minute transition between stations, allowing for recovery and mental preparation; the time was meticulously divided for a multifaceted and integrated analysis of the following competencies:

- Leadership and team communication: Ability to assume rotating roles (leader, compressor, ventilator), clear delegation of tasks, use of the SBAR protocol (Situation, Background, Assessment, Recommendation) for assertive information exchange, closing communication loops ("Do you confirm that you will prepare the AED?"), and resolution of emerging conflicts under time pressure;
- Positioning and workflow: Ergonomic optimization of space (work triangle around the manikin), efficient alternation of roles without unnecessary interruptions in compressions (>10s), organization of materials (BVM, AED, oxygen), and maintenance of a continuous, high-quality workflow;
- Decision-making based on SBV protocols: Rapid and accurate clinical judgment according to the AHA/ERC algorithm (responsiveness check, call for help, rhythm assessment in <2 minutes, decision to defibrillate or continue compressions), adaptation to changes in the scenario, and prioritization of life-saving interventions;
- Technical execution of trained sub-skills: Fluid and simultaneous integration of CPR skills (compression quality >85%, leak-free ventilation, error-free AED use), assessed by objective manikin metrics.

The active participation of each member of the trio was closely observed by peer evaluators (BLS/ACLS-certified instructors and instructors), whose observations were systematically and uniformly recorded on validated *checklists* (a 1–5 *Likert* scale per item, with descriptive rubrics for reference). This methodology allowed not only for the objective quantification of performance but also for the provision of detailed, individualized, and constructive *feedback* immediately after each station, through structured *debriefing* sessions (PEARLS model—*Promoting Excellence and Reflective Learning in Simulation*) [15], promoting reflective group discussion, identification of recurring failure patterns, and strategic planning for the continuous improvement of professional performance in highly complex contexts.

Environment and Resources

The educational activity was conducted entirely in a high-fidelity clinical simulation laboratory, with infrastructure specifically designed for emergency scenarios, equipped with advanced CPR-compatible torso and full-body manikins, certified Automated External Defibrillator (AED) equipment for non-therapeutic training,(BVM) in adult and pediatric sizes with oxygen reservoirs, oropharyngeal masks, and airway accessories.

The physical space included designated areas for realistic simulations such as: an out-of-hospital scene with

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floor mats, projectors for initial demonstrations, and integrated *debriefing software*. To complement the assessment tools, standardized *checklists* in both printed and digital formats, global scoring rubrics, and qualitative *feedback* forms were used. The entire protocol strictly adhered to institutional disinfection and biosafety standards, including the sanitization of manikins with 70% alcohol solutions between uses and the provision of personal protective equipment (nitrile gloves, disposable aprons, and surgical masks).

Ethical and Legal Principles of the Study

This study is a case report, and therefore an ethical review by a committee was not required in accordance with CNS Resolution 510/2016. It should be noted that no data on the subjects involved were reported in the research; the study focused solely on the educational objectives of the initiative whose experience is described.

RESULTS

The results of this study demonstrated significant impacts of the Rapid Cycle Deliberate Practice and Structured Objective Clinical Examination methodologies on student performance, ranging from the improvement of technical skills in Basic Life Support to the development of cognitive and behavioral competencies, as well as the enhancement of assessment processes and formative feedback.

The findings are presented below, organized into three main areas: technical development (chest compressions, ventilation, and use of the defibrillator), cognitive and behavioral competencies (leadership, communication, teamwork, and time management), and assessment and *feedback* (performance on the OSCE *checklists* and effects of structured *debriefing* sessions).

Technical Development

Students participating in the training demonstrated significant and measurable progress in motor automation and the precise execution of the fundamental techniques that comprise Basic Life Support, with observable improvements beginning as early as the first intensive CPR sessions. This progression was particularly evident in the quantitative metrics recorded by high-fidelity simulators, which captured consistent improvements in critical parameters such as the quality of chest compressions, the effectiveness of ventilation, and precision in defibrillator use.

Initially, baseline performance showed adequate compression rates of around 45–55% (considering a depth of 5–6 cm, a frequency of 100–120/min, and full *recoil*), with frequent interruptions and early fatigue; however, after just three cycles of PDCR, these rates rose to over 90%, indicating robust consolidation of muscle memory and a drastic reduction in individual technical variability.

The concentrated and iterative practice inherent to PDCR was the main catalyst for the specific improvement in the depth and rhythm of chest compressions, in which students learned to maintain compression rates above 80% of the total resuscitation time, minimizing per-intervention pauses and optimizing simulated cardiac output. Concurrently, the effectiveness of bag-valve-mask ventilation increased markedly, shifting from inconsistent tidal volumes and frequent leaks to controlled deliveries of 500–600 mL, with a tight seal and precise synchronization at a 30:2 ratio, preventing simulated hyperventilation and hypoxia.

Furthermore, the correct use of the automated external defibrillator was ensured through training sessions that emphasized rhythm analysis within 10 seconds, precise electrode placement, and the delivery of shocks without procedural errors—aspects that are absolutely critical to the success of care for cardiac arrest, since every second of delay can reduce the chances of intact neurological survival by 7–10%, according to AHA guidelines[3] .

Cognitive and Behavioral Skills

The dynamics of mandatory rotation and the strictly limited time at the OSCE stations created a high-fidelity simulated environment that significantly facilitated the acquisition and refinement of non-technical skills essential for effective teamwork during critical emergencies.

Among these skills, the following stood out: assertive communication, exemplified by the standardized use of the SBAR protocol to report scenario developments and delegate tasks without ambiguity; emergent leadership (in which a member of the trio took rotating command, coordinating actions without rigid hierarchies); efficient time management (with fluid transitions between roles: compressor, ventilator, AED to avoid interruptions in compressions exceeding 10 seconds); and, above all, the ability to react quickly, safely, and adaptively to the scenario's unpredictable demands (such as the introduction of distractions, e.g., agitated family members or a simulated failure in the BVM).

The collaborative and reflective interaction among students as they moved through the assessment stations not only stimulated joint reflection on optimized teamwork strategies but also fostered the development of emotional resilience and collective intelligence—crucial elements for performance in real pre-hospital scenarios.

Assessment and Feedback

The OSCE's structured design allowed for an objective, detailed, and multifaceted assessment of both individual and collective performance of the trios, with a strategic emphasis on immediate and actionable corrections

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made during post-station *debriefing* sessions, promoting a virtuous cycle of continuous learning. Standardized *checklists*, composed of items on a *Likert* scale (1–5) anchored to descriptive rubrics, quantified domains such as integrated technique (final average: 4.5/5), leadership (4.2/5), and clinical decision-making (4.4/5).

The post-rotation *feedback* sessions, conducted using the structured PEARLS model [15], lasting 8–10 minutes per group, consolidated learning and reflective discussions guided by questions such as "What worked well? What could be adjusted?" This process not only reinforced the retention of knowledge and skills but also substantially increased students' confidence in real clinical practice, reporting perceived readiness for authentic CPR, preparing them for safe transitions to the curricular internship in urgent and emergency care.

DISCUSSION

Active teaching-learning methodologies, paradigmatically represented by PDCR and OSCE, are emerging in the contemporary healthcare education landscape as essential and transformative pedagogical tools, capable of synergistically and holistically integrating the fundamental pillars of professional training: in-depth theoretical mastery, intensive and repetitive practice in controlled environments, and objective, standardized performance assessment[16] .

This aligned triad not only transcends the limits of traditional lecture-based teaching, but actively promotes the development of highly prepared nursing professionals with integrated competencies to resolve complex, multifactorial, and urgent clinical situations, such as CPR in prehospital settings, with exceptional levels of performance, operational efficiency, and patient safety, aligning with the growing demands of public health systems in Brazil[17] .

PDCR, through its iterative and structured cycle of deliberate practice interspersed with rapid, specific, and multidirectional (quantitative and qualitative) *feedback*, facilitates the rapid and lasting retention of essential psychomotor technical skills, such as high-quality chest compressions and effective bag-valve-mask ventilation. Furthermore, this approach demonstrates statistically significant improvements in clinical judgment under time pressure and emotional stress, reducing critical errors by up to 40–50% compared to conventional training, by promoting cognitive automation and executive resilience through spaced repetitions and real-time corrections[18,19] .

The OSCE, in turn, masterfully complements this training process by providing a highly standardized summative and formative assessment, conducted at rotating stations that comprehensively and integrally cover both isolated technical skills and complex interpersonal skills, including , assertive communication (via the SBAR protocol), distributed leadership within teams, and interdisciplinary collaboration[20,21] .

These dimensions are fundamental for training nurses who are not only technically proficient but also integrated into the care continuum, equipped with sharp critical thinking and the ability to act effectively in highly complex scenarios, where non-technical errors account for up to 70% of adverse events in emergency settings[22,23].

The strategic and sequential integration of these two methodologies in specific BLS training demonstrated, in this reported experience, significant and measurable practical, cognitive, and behavioral gains, with improvements observed in metrics such as compression rates (>90% post-training) and team scores on the OSCE (>4.3/5). This pedagogical synergy optimizes learning by combining the technical excellence of BLS with the evaluative realism of the OSCE, resulting in professionals who are better prepared for real-world practice[24] .

The sequential and modular progression of sub-competencies in CPR, beginning with chest compressions, advancing to BVM ventilation, and culminating in AED management, allows students to consolidate their learning safely, gradually, and without risk to real patients, building a solid foundation of motor proficiency before integration into complex scenarios.

At the same time, the OSCE faithfully simulates situations close to clinical reality, such as out-of-hospital cardiac arrest with environmental distractions, promoting joint reflection in structured *debriefings* (PEARLS model), the assertive management of limited resources, and dynamic adaptation to unpredictable case developments, thereby fostering a high-performance team mindset[22,25,26] .

This experience reinforces the applicability of these methodologies in the educational context, demonstrating that they contribute significantly to patient safety and the effectiveness of emergency care, aligning with international trends in competency-based education[8,16,27] .

CONCLUSION

The integration of PDCR and OSCE methodologies proved effective for developing the technical and behavioral skills necessary for basic life support in situations of cardiopulmonary arrest. This experience report clearly and empirically demonstrates the strategic importance of structured practical teaching, based on iterative cycles of repetition with immediate *feedback*, combined with objective and standardized assessment through rotating stations, in the training process of nursing students.

This dual pedagogical emphasis

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transcends the traditional lecture-based model, promoting a safe and confident transition from the simulated environment to real clinical practice in urgent and emergency care services, such as SAMU, preparing professionals with high technical and emotional performance, capable of raising standards of intact neurological survival in out-of-hospital cardiac arrest.

It is anticipated that this educational model will encourage other institutions to incorporate active methodologies for the improvement of teaching, the development of technical and behavioral competencies, and the consequent promotion of patient safety in cardiac arrest scenarios.

It is hoped that this validated educational model, aligned with the National Curriculum Guidelines and the international guidelines of *the American Heart Association*, will serve as a catalyst to encourage other higher education institutions in Nursing in Brazil to systematically and institutionally incorporate similar active methodologies. Such widespread adoption would foster the continuous improvement of practical teaching and the accelerated and measurable development of technical competencies, contributing to the construction of a national network of professionals prepared to strengthen the chain of survival, reduce cardiovascular morbidity and mortality, and align academic training with the real demands of the Unified Health System.

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