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**SPECIALIST NURSING INTERVENTION FOR THE CRITICAL
PATIENT WITH ACUTE AORTIC SYNDROME IN THE
PRE-HOSPITAL SETTING:
A SCOPING REVIEW**

**INTERVENÇÃO DO ENFERMEIRO ESPECIALISTA À PESSOA
EM SITUAÇÃO CRÍTICA COM SÍNDROME AÓRTICA AGUDA
NO CONTEXTO PRÉ-HOSPITALAR:
UMA SCOPING REVIEW**

**INTERVENCIÓN DE ENFERMERÍA ESPECIALIZADA PARA
EL PACIENTE CRÍTICO CON SÍNDROME AÓRTICO AGUDO
EN EL ÁMBITO PREHOSPITALARIO:
UNA SCOPING REVIEW**

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Abstract

Introduction: Acute Aortic Syndrome (AAS) is a time-dependent cardiovascular emergency, with mortality increasing by 1–2% per hour during the first 48 hours. In the pre-hospital setting, the intervention of the Critical Care Nurse Specialist (CCNS) is crucial for hemodynamic stabilization and determining the patient's clinical trajectory. **Objectives:** To map the available scientific evidence regarding specialist nursing interventions when providing care to patients with AAS within the pre-hospital environment. **Methods:** A scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology and sustained by the PCC (Population, Concept, and Context) strategy. The protocol was registered with PROSPERO (registration number CRD420251273983). A comprehensive search was performed in the PubMed, CINAHL, Cochrane Library, and RCAAP databases, encompassing studies published between 2015 and 2025 in Portuguese, English, and Spanish. Data selection and extraction were carried out through independent review. **Results:** Sixteen studies were included. The evidence synthesis identified four priority domains of intervention: (1) early differential diagnosis through assessment of pain and pulse asymmetry; (2) implementation of “anti-impulse” therapy with strict control of heart rate and blood pressure; (3) use of point-of-care ultrasound (POCUS) for diagnostic support; and (4) management of analgesia and anxiety control during transport. **Conclusion:** The CCNS's intervention based on structured protocols for the control of aortic shear stress and early diagnostic differentiation, is paramount to mitigating pre-hospital mortality, emphasising the role of advanced nursing in the management of these complex conditions.

Keywords: Acute Aortic Syndrome; Emergency Medical Services; Nursing Care.

Resumo

Introdução: A Síndrome Aórtica Aguda (SAA) representa uma emergência cardiovascular tempo-dependente, com uma mortalidade que aumenta 1% a 2% por hora nas primeiras 48 horas. No contexto pré-hospitalar, a intervenção do Enfermeiro Especialista em Enfermagem à Pessoa em Situação Crítica (EEPSC) é determinante para a estabilização hemodinâmica e decisão do destino do doente. **Objetivos:** Mapear a evidência científica disponível sobre as intervenções de enfermagem especializada na prestação de cuidados à pessoa com SAA em ambiente pré-hospitalar. **Método:** Elaborada uma *scoping review* seguindo as diretrizes do Joanna Briggs Institute (JBI) e sustentada na estratégia PCC (População, Conceito e Contexto). Protocolo registado na PROSPERO (n.º CRD 420251273983). A pesquisa foi realizada nas bases de dados PubMed, CINAHL, Cochrane Library e RCAAP, considerando estudos publicados entre 2015 e 2025, em português, inglês e espanhol. A seleção e extração de dados foram realizadas por revisão independente. **Resultados:** Foram incluídos 16 estudos de tipologia heterogênea (diretrizes, estudos observacionais e normas técnicas). A síntese de evidência identificou quatro domínios de intervenção prioritários: (1) Diagnóstico diferencial precoce através da avaliação da dor e assimetria de pulsos; (2) Implementação de medidas de controlo hemodinâmico específicas (controlo estrito da frequência cardíaca e pressão arterial); (3) Utilização da ecografia *point-of-care* (POCUS) para diagnóstico e (4) Gestão da analgesia e controlo da ansiedade durante o transporte. **Conclusão:** A atuação do EEPSC baseada em protocolos estruturados de controlo do *stress* de cisalhamento aórtico e diferenciação diagnóstica precoce é fundamental para mitigar a mortalidade pré-hospitalar, realçando o papel da Enfermagem avançada na gestão destas patologias complexas.

Palavras-chave: Cuidados de Enfermagem; Serviços Médicos de Emergência; Síndrome Aórtica Aguda.

Resumen

Introducción: El Síndrome Aórtico Agudo (SAA) constituye una emergencia cardiovascular dependiente del tiempo, con una mortalidad que aumenta entre un 1 y 2% por hora durante las primeras 48 horas. En el contexto prehospitalario, la intervención del Enfermero Especialista en Cuidados Críticos (EECC) es determinante para la estabilización hemodinámica y la toma de decisiones sobre el destino clínico del paciente. **Objetivos:** Mapear la evidencia científica disponible sobre las intervenciones de enfermería especializada en la prestación de cuidados a personas con síndrome aórtico agudo (SAA) en el ámbito prehospitalario. **Método:** Se realizó una revisión de alcance (*scoping review*) de acuerdo con la metodología del Joanna Briggs Institute (JBI) y respaldada por la estrategia PCC (Población, Concepto y Contexto). El protocolo fue registrado en PROSPERO (n.º CRD420251273983). La estrategia de búsqueda se ejecutó en las bases de datos PubMed, CINAHL, Cochrane Library y RCAAP, incluyendo estudios publicados entre 2015 y 2025, en los idiomas portugués, inglés y español. La selección de los artículos y la extracción de datos se llevaron a cabo mediante revisión independiente. **Resultados:** Se incluyeron 16 estudios. La síntesis de la evidencia identificó cuatro dominios prioritarios de intervención: (1) diagnóstico diferencial temprano mediante evaluación del dolor y asimetría de pulsos; (2) implementación de terapia “anti-impulso” con control estricto de la frecuencia cardíaca y la presión arterial; (3) uso de ecografía *point-of-care* (POCUS) como soporte diagnóstico; (4) manejo de la analgesia y control de la ansiedad durante el transporte. **Conclusión:** La intervención del EECC, fundamentada en protocolos estructurados para el control del estrés por cizallamiento aórtico y en una diferenciación diagnóstica temprana, resulta crucial para mitigar la mortalidad prehospitalaria, lo que resalta el papel de la enfermería avanzada en el manejo de estas patologías complejas.

Descriptores: Atención de Enfermería; Servicios Médicos de Urgencia; Síndrome Aórtico Agudo.

Introduction

Acute Aortic Syndrome (AAS) encompasses a spectrum of life-threatening aortic pathologies, including Aortic Dissection (AD), Intramural Hematoma (IMH) and Penetrating Aortic Ulcer (PAU). The common pathophysiology involves the disruption of the aortic wall integrity, leading to precarious hemodynamic stability. The literature estimates that approximately 20% of patients with AD die before hospital arrival, and in-hospital mortality without surgical intervention is roughly 50% within the first 48 hours⁽¹⁾.

The pre-hospital setting imposes complex challenges: limited technological resources, an uncontrolled environment, and an urgent need for rapid differential diagnosis with Acute Myocardial Infarction (AMI). The Clinical Nurse Specialist in Critical Care Nursing (CCN-CNS), integrated into Immediate Life Support (ILS) teams, Medical Emergency and Resuscitation Vehicles (MERV), and Helicopter Emergency Medical Services (HEMS), assumes direct responsibility for advanced monitoring and complex pharmacological therapeutic management.

Although robust medical guidelines have been issued by international societies, there is a substantial gap in the systematization and mapping of specific advanced nursing interventions within this care ecosystem. This scoping review is justified by the pressing need to gather and map recent multifaceted evidence (2015–2025) to support clinical decision-making and evidence-based advanced nursing practice.

Methods

A scoping review was developed based on the methodological framework recommended by the Joanna Briggs Institute (JBI). This study design proves to be the most appropriate given the heterogeneity of records and publications on the subject, allowing for a comprehensive mapping of the state of the art without applying restrictive exclusion filters based purely on the experimental design of the primary studies.

The formulation of the research question strictly followed the PCC (Population, Concept, and Context) strategy recommended for scoping reviews, and was structured as follows:

- **P (Population):** Critical Care Patient (age ≥ 18 years);
- **C (Concept):** Interventions of the Clinical Nurse Specialist for the patient with Acute Aortic Syndrome;
- **C (Context):** Pre-Hospital.

Inclusion and Exclusion Criteria

Studies published between 2015 and 2025, in Portuguese, English, and Spanish, focused on adult populations, and describing nursing interventions or multidisciplinary approaches in the pre-hospital setting were included. Given the nature of a scoping review, qualitative and quantitative primary studies, clinical guidelines, expert consensus, and institutional technical standards were admitted (methodologically justifying the sample size of $n = 16$). Studies exclusively focused on intra-hospital surgical approaches, pediatric populations, or major trauma contexts were excluded, as well as editorials or isolated case reports lacking methodological foundation.

Search Strategy and Identification of information sources

The literature search was conducted in December 2025, utilizing the electronic databases MEDLINE (by PubMed), CINAHL (by EBSCOhost), Cochrane Library and the Scientific Open Access Repository of Portugal (RCAAP). Controlled vocabulary terms of MeSH and DeCS were used, combined with Boolean operators, as follow: (“Aortic Dissection” OR “Acute Aortic Syndrome”) AND (“Nursing” OR “Critical Care Nursing”) AND (“Pre-Hospital” OR “Emergency Medical Services”), as demonstrated in Table 1, yielding a total of 281 articles.

Table 1: Search Strategy and Number of Articles Retrieved by Database.

Database	Searching Terms	Applied Filters	Identified Registries
PubMed (MEDLINE)	("Aortic Dissection"[MeSH] OR "Acute Aortic Syndrome" [MeSH] OR "Acute Aortic Syndrome") AND ("Nursing"[MeSH] OR "Critical Care Nursing"[MeSH] OR "Nursing" OR "Critical Care Nursing") AND ("Prehospital"[MeSH] OR "Emergency Medical Services" [MeSH] OR "Prehospital" OR "Emergency Medical Services")	Publication Gap: 2015-2025. Language: English, Portuguese, Spanish. Adults: Age ≥ 18 years.	115
CINAHL (via EBSCOhost)	((MH "Aortic Dissection+" OR "Acute Aortic Syndrome" OR TI "Aortic Dissection" OR AB "Acute Aortic Syndrome") AND (MH "Nursing+" OR MH "Critical Care Nursing" OR TI "Nursing" OR AB "Critical Care Nursing") AND (MH "Prehospital Care+" OR TI "Prehospital" OR AB "Emergency Medical Services"))	Publication Gap: 2015-2025. Language: English, Portuguese, Spanish. Adults: Age ≥ 18 years.	82
Cochrane Library	(([MeSH descriptor: "Aortic Dissection"] OR "Acute Aortic Syndrome") AND ([MeSH descriptor: "Nursing"] OR [MeSH descriptor: "Critical Care Nursing"] OR "Nursing" OR "Critical Care Nursing") AND ([MeSH descriptor: "Emergency Medical Services"] OR "Prehospital" OR "Emergency Medical Services"))	Publication Gap: 2015-2025. Language: English, Portuguese, Spanish. Adults: Age ≥ 18 years.	44
RCAAP	("Dissecção da Aorta" OR "Síndrome Aórtica Aguda") AND ("Enfermagem" OR "Enfermagem de Cuidados Críticos") AND ("Pre-hospitalar" OR "Serviços de Emergência Médica")	Publication Gap: 2015-2025. Language: English, Portuguese, Spanish. Adults: Age ≥ 18 years.	40

Data Extraction and Synthesis

Data extraction was conducted systematically by two independent reviewers, using the Joanna Briggs Institute (JBI) Data Extraction Instrument and aligned with the PRISMA 2020 guidelines. Initially, the titles and abstracts of the eligible studies were screened, followed by a full-text review of the selected articles.

For each study, relevant information was recorded in the extraction table, including: author(s), title, year, country, objectives, population and sample size, methodological design, main results, and conclusions. This approach ensured consistency and comparability across the studies.

The data synthesis was performed narratively, through a joint analysis by both reviewers until a consensus was reached, allowing for a structured organization and interpretation of the evidence regarding the interventions of the CCN-CNS for patients with AAS in the pre-hospital setting.

Results

The study identification and selection process was conducted in accordance with the PRISMA 2020 recommendations, as represented in the corresponding flowchart (Figure 1), and was developed across four distinct phases:

- **Identification:** The initial search resulted in the identification of 281 records. Following the automatic and manual removal of duplicates ($n = 73$) and the exclusion of studies outside the defined timeframe ($n = 25$), 183 articles remained for screening.
- **Screening:** Titles and abstracts were analyzed independently by two reviewers, ensuring that no relevant study was excluded due to error or individual interpretation. A total of 137 articles that did not meet the inclusion criteria were excluded.
- **Eligibility:** The 46 studies were independently evaluated by both reviewers, with 30 articles excluded based on pre-defined reasons (lack of focus on nursing interventions, pediatric or trauma populations, and case reports lacking a methodological basis).
- **Inclusion:** The 16 studies included in the final synthesis underwent methodological quality assessment (RoB-1), which was performed independently by both reviewers. Disagreements at any stage were resolved through consensus between the two reviewers or, if necessary, by the intervention of a third reviewer.

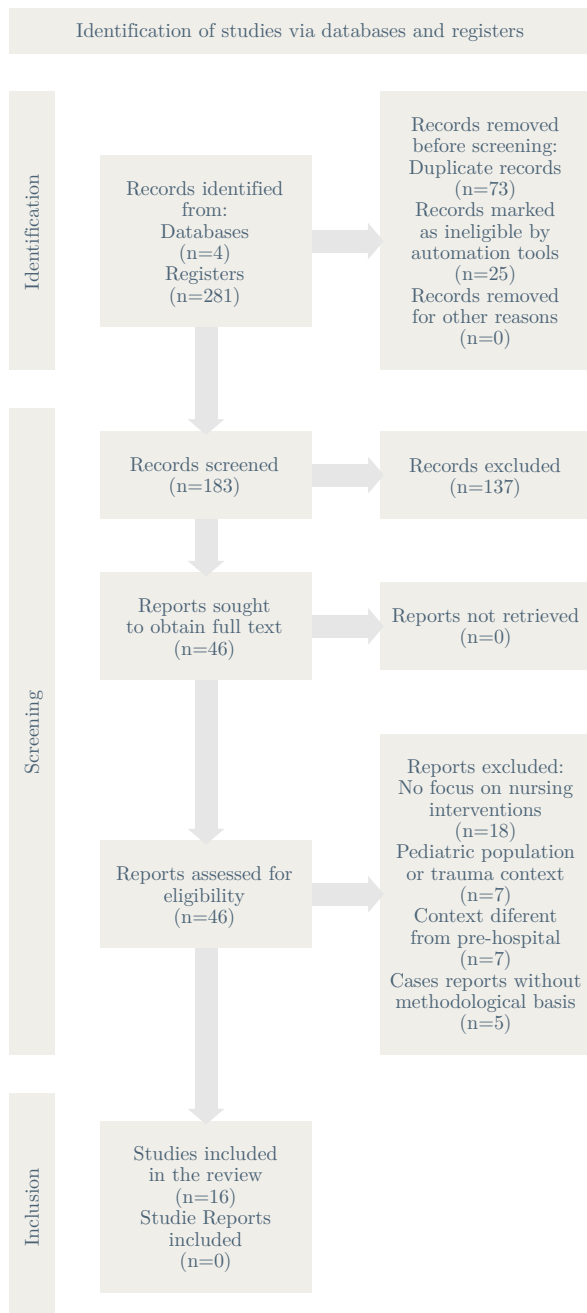


Figure 1: PRISMA 2020 flowchart for study selection.

The screening of titles and abstracts, full-text evaluation, data extraction, and methodological quality assessment were performed independently by the two reviewers. Across all phases of the review, no disagreements were observed regarding the inclusion or exclusion of studies.

The assessment of methodological quality and risk of bias of the included studies was conducted by two independent reviewers using the Cochrane Risk of Bias tool (RoB 1), which was appropriate for the design of the analyzed studies. Only studies presenting a low or moderate risk of bias were included in the final synthesis.

Data extraction was performed using a predefined, standardized grid capturing information regarding the authors, year of publication, country, study design, clinical setting, target population, described nursing interventions, and main results. The synthesis of evidence adopted a narrative approach, with data organized and grouped according to the main identified domains of intervention, which are presented in Table 1.

The initial search identified 281 records. Following duplicate removal and title/abstract screening, 46 articles underwent full-text assessment. Of these, 16 met the inclusion and methodological quality criteria, constituting the final sample (Table 2).

The results were categorized into four main thematic domains:

Differential Diagnosis and Clinical Assessment

The mapped evidence reiterates that the propaedeutic competence and high index of clinical suspicion of the CNS-CC constitute the patient's first line of defense. Abrupt-onset, excruciating, and tearing ("ripping") chest pain occurs in more than 85% of confirmed episodes^(1,2). Concomitant comparative assessment of Systolic Blood Pressure (SBP) between the upper extremities—valuing significant differentials ≥ 20 mmHg—alongside synchronous palpation of radial and femoral pulses emerges as mandatory critical nursing interventions, serving as vital steps in the rapid exclusion of isolated acute coronary syndromes^(3,4).

Table 2: Data Extraction and Evidence Synthesis Table.

ID	Author (Year)	Type of Study (JBI Level)	Sample/Context	Key Nursing Interventions	Main Outcomes
01	Isselbacher (2022).	Clinical Guideline (1).	Internacional/AHA.	Titration of IV Beta-blockers (Labetalol) and Vasodilators.	Target Settings: HR < 80 bpm and SBP 100–120 mmHg.
02	Harris (2022).	Coorte (3).	IRAD Registry.	Time Management & Continuous Transport Monitoring.	Reduced Mortality with Early Blood Pressure Stabilization.
03	Bossone (2021).	SLR (5).	USA/Italy.	Physical Assessment: Pulse Asymmetry and Tearing Pain.	Identification of “Sentinel” Signs for Surgical Team Activation.
04	Ribeiro (2023).	Qualitative Study (4).	Portugal.	Chest Pain Management and Multimodal Analgesia Protocol.	Reduction of Adrenergic Drive and BP Stabilization.
05	Mota (2022).	SLR (1).	Portugal.	Use of POCUS for Pericardial Effusion Diagnosis.	Increased Nurse Diagnostic Accuracy in the Pre-Hospital Setting.
06	Diercks (2015).	Policy Paper (1).	USA.	Systematic Screening for Focal Neurological Deficits.	Reduction of Diagnostic Errors in Type A Dissections.
07	Trimarchi (2021).	Coorte (3).	International.	Organ Perfusion Monitoring (Urine Output/Consciousness).	Early Identification of Systemic Malperfusion.
08	Evangelista (2018).	Observational Study (3).	Europe.	12-Lead ECG Monitoring for AMI Differential Diagnosis.	Prevention of Iatrogenesis via Antiplatelet Administration.
09	Nienaber (2015).	Technical Review (5).	Germany.	Patient Positioning (30° Head-of-Bed Elevation) and Comfort.	Minimizing Hypertensive Spikes During Ambulance Acceleration.
10	Braverman (2017).	Case Study (4).	USA.	Airway Management and Sedation in Critically Ill AAS Patients.	Hemodynamic Stability During Orotracheal Intubation.
11	Vilacosta (2021).	Consense (1).	Spain.	High-Risk Inter-Hospital Transport Protocols.	Nurse-to-Patient Ratio Definition for Critical Safety.
12	Czerny (2019).	Guideline (1).	Europe (EACTS).	Anticoagulation Management and Coagulopathy Control.	Drug Reversal Protocol, if necessary, in the Pre-Hospital Setting.
13	Urbaneja (2020).	Descriptive Study (4).	Spain.	Use of Specific Pain Scales for Aortic Pain.	Correlation Between Pain Level and Dissection Propagation.
14	Griffin (2024).	Experimental Study (2).	UK.	High-Fidelity Simulation in AAS Protocols.	Improvement in Response Time for ALS/EMS Nursing Teams.
15	Pape (2015).	Coorte (3).	International.	Biomarker Analysis (D-dimer) vs. Clinical Assessment.	Prioritizing Nursing Physical Examination Over Slow Lab Tests.
16	Portuguese Order of Nurses (2018).	Technical Standard (5).	Portugal.	Quality Standards in the Critically Ill Patient.	Definition of CNS-CC Competencies in AAS.

Hemodynamic Control: “Anti-impulse therapy”

The corpus of analyzed guidelines and consensus statements^(1–12) parameterizes rigid therapeutic targets for managing aortic wall shear stress, the clinical operationalization of which in the pre-hospital setting depends on continuous monitoring and rigorous drug titration by the CNS-CC:

- **Direct Chronotropic Priority:** Immediate reduction of Heart Rate (HR) to strict values between 60 bpm and 80 bpm. To this end, the direct and titrated intravenous administration of short- or ultra-short-acting beta-blockers (Esmolol or Labetalol) is recommended.
- **Blood Pressure Control Priority:** Maintenance of SBP between 100–120 mmHg. Studies emphasize that the administration of vasodilators (nitrates) without prior beta-blockade is an execution error that increases shear stress and the risk of dissection propagation.

Integration of Diagnostic Technologies: Point-of-Care Ultrasound (POCUS)

The most recent data in the literature validate the incorporation of clinical ultrasound performed by critical care nurse specialists as a substantial asset⁽⁵⁾. POCUS focused on screening for pericardial effusion, signs of cardiac tamponade, or the visual identification of an intimal flap in the abdominal aorta shortens decision-making times and optimizes the patient's logistical routing, bypassing hospitals lacking cardiothoracic intervention capabilities.

Analgesia Optimization and Stabilization During Transport

Severe pain acts as a potent adrenergic catalyst. Titrated administration of fast-acting opioids is considered foundational to attenuate endogenous sympathetic drive, thereby preventing deleterious blood pressure fluctuations⁽¹³⁾. Concurrently, proper patient positioning with a 30° head-of-bed elevation, temperature control (prevention of the lethal triad and coagulopathy), and the mitigation of kinetic and

acoustic stimuli within the ambulance cabin during transport are well-documented imperatives for the patient's clinical stability.

Discussion

The mapping performed by this scoping review reinforces that Acute Aortic Syndrome is one of the most challenging clinical entities in pre-hospital emergency medicine. The conceptual transition from a traditional systematic review to a scoping review allowed for the integration and valuation of not only pure biomedical data, but also institutional regulations⁽¹⁶⁾ and consensus statements⁽¹¹⁾ that govern the essential competencies of the specialist nurse in the direct coordination and management of these complex situations, addressing the critique of redundancy in purely medical algorithms.

The evidence gathered from the IRAD registry⁽²⁾ convincingly attests that each hour of delay in the initial management and specialized transport of Type A dissection leads to a linear increase of 1% to 2% in the mortality rate within the first 48 hours. This datum converts the intervention of the CNS-CC into a vital prognosis-modifying link, given that the immediate execution of anti-impulse therapy and early hemodynamic stabilization are the primary weapons available in the pre-hospital setting to contain the progression of the intimal lesion until definitive surgical intervention.

Regarding hemodynamic control targets, international guidelines place the responsibility for precise titration of negative inotropic and chronotropic agents in the hands of the CNS-CC⁽¹⁾. This process requires advanced competencies in continuous pathophysiological interpretation. The evidence clarifies that heart rate control must, invariably, precede any attempt to reduce systolic blood pressure. This approach prevents pure vasodilation from inducing a compensatory sympathetic response that would increase the ventricular ejection fraction, thereby worsening mechanical stress on the weakened aortic wall.

An innovative contribution of this mapping relates to the impact of demographic aging on the presentation and identification of AAS. Empirical data warn that the elderly population frequently presents with severely atypical, insidious, or even painless clinical manifestations^(3,4,8). Baseline cognitive decline, polypharmacy, or the presence of concomitant neuropathies often mask the typical tearing chest pain. In these scenarios, AAS may manifest as unexplained syncope, transient hypotensive episodes, or acute focal neurological deficits resulting from carotid malperfusion, which are easily misidentified as acute ischemic strokes. Consequently, systematic screening for pulse asymmetry across all four extremities and the monitoring of dynamic focal deficits stand as irreplaceable advanced nursing interventions in the geriatric population⁽⁵⁻⁷⁾. Additionally, this rigorous semiological triage performed by the CNS-CC mitigates the catastrophic risk of iatrogenic administration of antithrombotic and antiplatelet therapies—a common occurrence when chest pain or secondary myocardial ischemia due to retrograde coronary dissection are misdiagnosed as an ST-elevation myocardial infarction (STEMI)⁽⁵⁻⁹⁾.

The emergence of bedside point-of-care ultrasound (POCUS) by nurses' surfaces as one of the most promising technological innovations mapped⁽⁵⁾. Advanced training in this area substantially improves diagnostic accuracy in undifferentiated shock, allowing for the early documentation of critical complications, such as hemopericardium (bloody pericardial effusion)—which absolutely contraindicates aggressive blood pressure reduction due to the risk of obstructive collapse^(1,12). The integration of this technology into the praxis of the CNS-CC directly responds to current international quality standards, focusing clinical decision-making on safety and the optimization of transport times to the operating room^(3,9,14,16).

Conclusion

This scoping review allowed for the mapping and systematization of the spectrum of specialized nursing interventions directed at the person with AAS in the pre-hospital environment, demonstrating that the stabilization of these patients is highly complex and dependent on advanced, specialized care. The compiled evidence supports the emerging need to design and implement uniform clinical protocols across specialized medical emergency teams (ALS ground and air units), prioritizing a structured semiology, rigorous hemodynamic control through sequential anti-impulse therapy, and an aggressive, titrated analgesic approach.

The findings reinforce the importance of equipping CNS-CCs with advanced competencies in point-of-care ultrasound (POCUS) and advanced cardiovascular pharmacology. As the main limitations of this mapping, we note the marked heterogeneity in pre-hospital organizational models across different countries and the scarcity of controlled primary studies designed exclusively within the pre-hospital ecosystem. In summary, the CNS-CC stands out as a vital element in managing critical time and preserving the hemodynamic stability of the person with AAS, proving to be a key guarantor in reducing pre-hospital mortality and improving overall clinical outcomes.

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 VV: Study coordination, study design, data
 collection, storage and analysis, review and
 discussion of results.
 MC: Study design, data collection, storage and
 analysis, review and discussion of results.
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