



Multiprofessional team interventions in transporting critically ill patients: a systematic mixed-methods review

Intervenções da equipe multiprofissional no transporte de pacientes em estado crítico: revisão sistemática de métodos mistos

Intervenciones del equipo multidisciplinario en el transporte de pacientes en estado crítico: revisión sistemática de métodos mixtos

Ana Raquel Carreira Matias^{1,2}

Florinda Laura Ferreira Rodrigues

Galinha de Sá²

1. Hospital Professor Doutor Fernando Fonseca. Lisboa, Portugal.

2. Escola Superior de Enfermagem de Lisboa. Lisboa, Portugal.

ABSTRACT

Aim: To analyze how interventions of a multidisciplinary team promote the safe transportation of critically ill patients. **Method:** A systematic mixed-methods review was developed using an integrated convergent approach according to the Joanna Briggs Institute. This study was conducted using MEDLINE, CINAHL, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials electronic databases, which generated 107 references. After removing duplicates and applying inclusion and exclusion criteria, 17 articles were evaluated for methodological quality, resulting in 15 articles as the final sample. Data extraction was performed using a tool in the form of a table and synthesized through thematic analysis. **Results:** Thoughtful decision, planning, problem-solving action and action for improvement are interventions that the multiprofessional team promotes the safe transportation of critically ill patients. **Conclusion and implications for practice:** The standardization of transport (institutional protocols, a checklist, and equipment adequacy), continuing education, and skills training in the capacitation of teams foster a culture of safety that prevents harm to the patient. Further research is suggested on the subjective dimension and with the family in transportation.

Keywords: Clinical Competence; Critical Illness; Patient Care Team; Safety; Transportation of Patients.

RESUMO

Objetivo: Analisar como intervenções da equipe multiprofissional promovem a segurança no transporte de pacientes em estado crítico. **Método:** Revisão sistemática de métodos mistos elaborada com as recomendações do *Joanna Briggs Institute*, seguindo uma abordagem integrada convergente. A pesquisa foi realizada nas bases de dados MEDLINE, CINAHL, *Cochrane Database of Systematic Reviews* e *Cochrane Central Register of Controlled Trials*, resultando em 107 estudos. Após a remoção de estudos duplicados e a aplicação de critérios de inclusão e exclusão, 17 estudos foram avaliados quanto à sua qualidade metodológica, havendo 15 estudos na amostra final. A extração dos dados foi realizada por um instrumento em forma de tabela e sintetizada por meio de análise temática. **Resultados:** A decisão ponderada, o planejamento, a atuação na resolução de problemas e a ação para a melhoria são intervenções que a equipe multiprofissional promove na segurança do transporte de pacientes em estado crítico. **Conclusão e implicações para a prática:** A padronização do transporte (criação de protocolos institucionais, *check-list* e adequação de equipamentos), a educação permanente e o treinamento de competências na capacitação das equipes fomentam uma cultura de segurança que evita o dano ao paciente. Sugerem-se pesquisas sobre a dimensão subjetiva e a inclusão da família no transporte.

Palavras-chave: Competência Clínica; Equipe Multiprofissional; Estado Crítico; Segurança; Transporte de Pacientes.

RESUMEN

Objetivo: Analizar cómo las intervenciones del equipo multidisciplinario promueven la seguridad en el transporte de pacientes en estado crítico. **Método:** Revisión sistemática de métodos mixtos, elaborada según el Instituto Joanna Briggs, siguiendo un enfoque convergente integrado. La investigación se realizó utilizando las bases de datos electrónicas MEDLINE, CINAHL, *Cochrane Database of Systematic Reviews* y *Cochrane Central Register of Controlled Trials*, las cuales generaron 107 referencias. Después de eliminar los duplicados y aplicación de criterios de inclusión y exclusión, se evaluó la calidad metodológica de 17 artículos, resultando en 15 artículos como muestra final. La extracción de datos se realizó mediante una herramienta en forma de tabla, y sintetizados mediante análisis temático. **Resultados:** La toma de decisiones reflexivas, la planificación, la acción para la resolución de problemas y la acción para la mejora son intervenciones del equipo multidisciplinario que promueven la seguridad en el transporte de pacientes en estado crítico. **Conclusión e implicaciones para la práctica:** La estandarización del transporte (creación de protocolos institucionales, *checklist* y adecuación del equipo), la educación continua y el entrenamiento de habilidades en la capacitación de los equipos fomentan una cultura de seguridad que previene daños al paciente. Se sugiere investigar sobre la dimensión subjetiva y la inclusión de la familia en el transporte.

Palabras clave: Competencia Clínica; Equipo Multiprofesional; Estado Crítico; Seguridad; Transporte de Pacientes.

Corresponding author:

Ana Raquel Carreira Matias.

E-mail: anamatias@campus.esel.pt

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INTRODUCTION

Health care leads to a reflection on increasingly safe care in a complex and constantly changing world. Hence, patient safety emerges as one of the six attributes of quality,¹ and it has been a theme of growing concern — on a global scale — in recent decades.^{2,3}

The International Classification of Patient Safety (ICPN) defines safety as reducing the risk of unnecessary harm associated with health care to an acceptable minimum.⁴ Nevertheless, roughly 90,000 patients die due to medical errors annually,⁵ and about one in ten suffers some type of adverse event in hospitals.⁶

Given this scenario, it is essential to prioritize patient safety by implementing a cross-cutting and multiprofessional safety culture in care settings.^{7,8} This conceptualization is incorporated into the domains of critical patient care and based on diagnosis with surveillance, monitoring, and clinical error prevention and management.^{9,10}

A critically ill patient is one whose health situation has worsened, is severely ill, or is injured and unable to independently maintain physiological stability; this also includes those at a high risk of developing this condition rapidly, requiring continuous intensive care and technology support to survive.¹⁰

The transport of critically ill patients is necessary for reorganizing and stratifying healthcare systems. It is distinguished in intra-hospital transport (in the same hospital environment) and inter-hospital transport (between different health institutions), seeking to provide a higher level of care with diagnostic tests and/or therapeutic procedures that cannot be performed in the service/institution of origin.¹¹

However, the critically ill patient is at greater risk of clinical deterioration and more vulnerable to adverse events during transport.^{12,13} Evidence has shown that 91% of these events are preventable,¹² although most go underreported, and the true repercussion of their complications is unknown.¹⁴

Good practices in transporting critically ill patients define creating an institutional transport policy, the organization of properly trained multiprofessional teams with regular training in this area, and implementing follow-up and audit programs.¹⁴⁻¹⁶ Nonetheless, this transport is still performed by inexperienced/poorly experienced teams that do not know the patient or the equipment and in means of transport that are not adequate and/or to care settings that do not have the conditions for diagnosis or treatment.^{15,16}

Given the above, patient safety generates concern and impacts public health. Due to the relevance of the theme, this review sought to analyze how interventions of the multiprofessional team promote safety in the transport of critically ill patients. Thus, a preliminary search was performed in the Joanna Briggs Institute database, and no published or ongoing records on this theme were found.

METHOD

A systematic mixed-method review was developed by following a convergent integrated approach according to the Joanna Briggs

Institute. Such a procedure was performed in order to integrate quantitative, qualitative, and mixed evidence into a more holistic understanding of this phenomenon, guiding care practice.¹⁷ This method was carried out by two independent investigators and included seven steps: 1) Delimiting the guiding question; 2) Defining the inclusion and exclusion criteria; 3) Conducting the search strategy; 4) Identifying potentially relevant research by evaluating the title and abstract; 5) Selecting studies after reading the full text; 6) Evaluating the methodological quality; and 7) Data synthesis.¹⁷

The guiding question was carried out using the Population, Phenomenon of Interest, and Context (PICO) method recommended for this review.¹⁷ The following factors were defined: P - critically ill adult patients, I - transport safety, and C - all geographic contexts, as it was intended to map the entire dimension and range of existing evidence. The following guiding question was established: “How do multiprofessional team interventions promote safety in transporting critically ill patients?”

We included: national and international research from primary studies of qualitative, quantitative, and mixed-methods approaches in English and Portuguese from 2012 to 2021. Studies whose subject theme of the title, abstract, and full text unrelated to the review question, methodological quality below 80%, or in neonatology or pediatrics care settings were excluded.

Exploratory searches were conducted in the National Library of Medicine’s (MEDLINE), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials (via EBSCO) databases. The search was conducted in April 2021, and the descriptors used followed the Descriptors in Health Sciences/Medical Subject Headings (DeCS/MeSH): “Clinical competence,” “Critical illness,” “Patient care team,” “Safety,” and “Transportation of patients.” The Boolean operators “OR” and “AND” were used to combine the descriptors, and the search formulas applied were according to the specificities of each database, as shown in Chart 1 for the MEDLINE database search.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method was used to search for and select the studies, and a four-step flowchart was employed to guide the search.¹⁸

Methodological quality was assessed using the Mixed Methods Appraisal Tool (MMAT).¹⁹ The MMAT allowed us to evaluate quantitative, qualitative, and mixed evidence by assessing 25 quality criteria distributed in five methodological categories.¹⁹ The critical evaluation of each study yielded a final score on a scale of 0 to 100%. Disagreements during this process were resolved by dialogue between researchers.

Data from the selected studies were extracted using an instrument structured by the researchers, which includes information about the identification of the study [title, author(s), year], objective(s), method (study design, participants, phenomenon), and main results according to the objective and review question. This instrument allowed quantitative and qualitative data to be

Chart 1. Example of search formula for the MEDLINE electronic database.

MEDLINE search formula
<p>"[(critically ill patient OR MH "critical illness" OR MH "patients") AND (adult OR MH "adult" OR MH "middle aged" OR MH "aged" OR MH "aged, 80 and over")] AND [(team OR teamwork OR emergency medical teams OR formation OR training OR qualification OR competence OR MH "emergency medical services" OR MH "patient care team" OR MH "hospital rapid response team" OR MH "simulation training" OR MH "clinical competence") AND (transport OR transfer OR transport teams OR intrahospital transport OR interhospital transport OR handover OR handoff OR MH "transportation of patients" OR MH "patient transfer" OR MH "patient handoff")] AND [(critical care OR critical care unit OR intensive care unit OR intensive treatment unit OR intensive medicine OR emergency service OR MH "critical care" OR MH "intensive care units" OR MH "emergency service, hospital")] AND [(adverse events OR adverse events prevention OR safety OR outcomes OR vigilance OR surveillance OR health care quality OR MH "critical care outcomes" OR MH "safety" OR MH "patient safety" OR MH "sentinel surveillance" OR MH "quality of health care")]"</p>

Source: Prepared by the authors.

extracted independently but integrated concurrently to better understand the phenomenon.

Data synthesis was performed by thematic analysis and according to an inductive approach and their similarity.²⁰ Thematic analysis enabled us to describe and organize observations and interpret aspects of this phenomenon from qualitative, quantitative, and mixed-methods studies by transforming them into qualitative findings.^{20,21} This process was carried out in six steps: 1) Familiarizing the data (by repeatedly reading and searching for meanings or patterns); 2) Creating initial codes (from segments of the raw data or creating meaningful information about the phenomenon); 3) Constructing themes (by organizing, grouping, and categorizing the codes and classifying them); 4) Theme revision (by eliminating, redefining, or separating themes for coherence and identifiable distinctions among themes); 5) Theme definition and titling (final construction of the thematic map of the obtained data); and 6) Report production (final analysis and writing).²¹ Divergences during data extraction and synthesis were resolved by dialogue between the researchers.

RESULTS

The search resulted in 107 studies exported to the Mendeley software, and 20 were removed due to being duplicates; of the 87 remaining studies, 50 were excluded after reading the title and abstract, resulting in 37 studies to be read in full. Of these 37, 20 were then excluded by the inclusion and exclusion criteria, leaving 17 studies for methodological quality assessment. Two studies were removed due to having final scores below 80%, and 15 studies were selected for the final sample (Figure 1).

The 15 selected studies date from 2012 to 2020 and were published in English; they consisted of 10 quantitative studies, 4 qualitative studies, and 1 mixed-methods study. The included studies and summarized extracted data that answer the review question and objective are listed in Table 1.

Thematic analysis of the data allowed them to be organized into four themes: "Considered decision," "Planning," "Problem-solving action," and "Action for improvement" (Figure 2). These

themes correspond to the interventions of the multiprofessional team that promote safety in the transport of critically ill patients.

Considered decision

The weighted transportation decision relates to evaluating organizational aspects and coordinating existing resources. In most studies, the weighted transport decision was pointed out as it should be favorable when the benefits outweigh the risks so that the health needs of patients are met.

This decision involves assessing organizational aspects of the care environment, including the adequacy of the multiprofessional team to the specificity of the transport and the patient's clinical characteristics.^{22,25,32} The adequacy of the team performing the transport refers to its competence to coordinate existing resources, such as allocating and optimizing human, material, and available time resources.^{23,27,29,33,35}

In light of this, the decision about transport must be weighed as to its benefits and potential risks, avoiding harm to the patient and promoting safety.

Planning

Critical patient transport planning focuses on developing the skills of the multi-professional team and its ability to anticipate and stabilize clinical priorities, optimize equipment, and convey clinical information through communication and documentation.

Developing competencies focuses on the idea that safety in transport is promoted when performed by a qualified and experienced team that is properly trained and educated in the area.^{25,30,33} The focus is on mastery and competence gained from professional experience,^{22,28,29,33-35} familiarization with critical patient care,²² and informal learning in the work context.²⁸ At the same time, it emphasizes learning acquired by maintaining academic training³³ and developing educational programs that allow systematic training and intensive training in this area.^{22,23,27,28,31,35}

This development enables the team to be competent to anticipate needs arising from the patient's clinical condition or from the transport itself,^{24,27,32} as well as to recognize life-threatening situations, intervening early to stabilize clinical priorities.³³

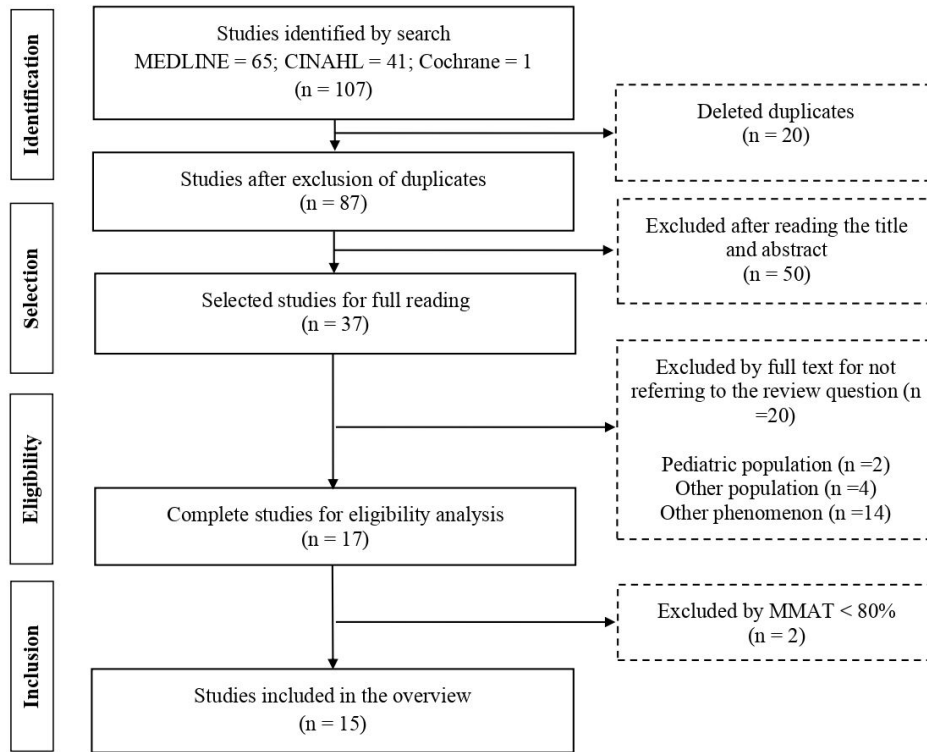


Figure 1. The selection process of the studies in the databases.
 Source: Prepared by the authors and adapted from PRISMA flow diagram.¹⁸

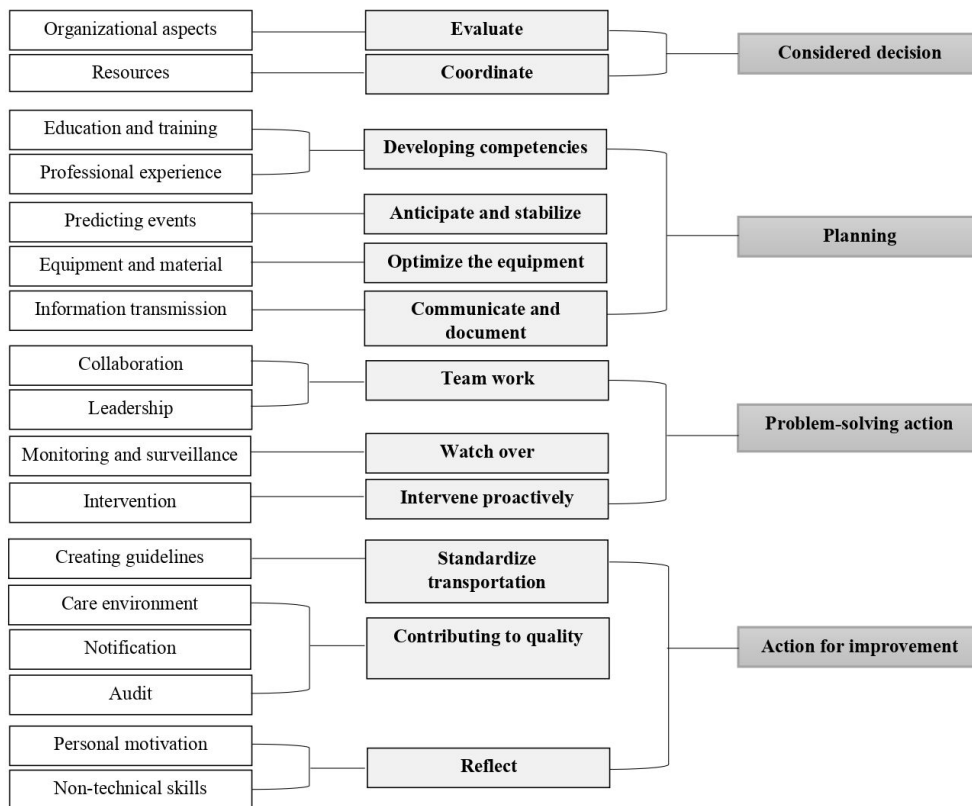


Figure 2. Summary of the main interventions of the multiprofessional team.
 Source: Prepared by the authors.

Table 1. Identification of the included studies and summary of the extracted data.

Identification	Method		Objective(s)	Results	
	Design	Inclusion criteria			
		P			I
<i>Allen et al.</i> ²² Year: 2020 MMAT: 80%.	Quantitative non-randomized	20 transports	IET	- To analyze the transport of patients with ARDS due to SARS-CoV2 - Providing solutions for TEH during the pandemic. Skills training, experience, continuous vigilance, and the ability to intervene to solve problems, when associated with infection prevention and control measures, ensure staff safety and continuity of operations.	
<i>Bergman et al.</i> ²³ Year: 2020 MMAT: 100%.	Qualitative	20 interviews with physicians and nurses	IHT	Explore staff practices and experiences associated with critical incidents. Critical incidents are influenced by organizational requirements (coordination of resources and equipment), professional skills and attributes (knowledge, experience and technical competence) and actions/behaviors (situational awareness, planning, communication, cooperation, leadership, and teamwork).	
<i>Bérubé et al.</i> ²⁴ Year: 2013 MMAT: 80%.	Quantitative non-randomized	180 transports in P1 and 187 transports in P2	IHT and IET	Determine the outcome of the interdisciplinary transportation program in preventing adverse events. Planning, surveillance, and monitoring strategies reduce the incidence of adverse events.	
<i>Burrel et al.</i> ²⁵ Year: 2017 MMAT: 100%.	Quantitative non-randomized	198 patients, of which 62 transports	IET	Compare the results/complications of transporting the patient undergoing ECMO. Trained and specialized teams reduce the incidence of adverse events.	
<i>Comeau et al.</i> ²⁶ Year: 2015 MMAT: 100%.	Qualitative	2506 transports	IHT	Develop an effective checklist in preparing the patient for transport. Standardizing transportation reduces the incidence of adverse events, optimizes resources, and strengthens interdisciplinarity and communication among the team.	
<i>Doucet and Rhéaume</i> ²⁷ Year: 2020 MMAT: 80%.	Quantitative non-randomized	19 nurses	IET	Assess the impact of the online training module on the preparedness of nurses. The training strengthens competence, communication, transport coordination, and patient preparation.	
<i>Eiding et al.</i> ²⁸ Year: 2019 MMAT: 100%.	Qualitative	20 interviews with physicians, nurses, and technicians	IET	Analyze how transportation is performed, challenges, and aspects for improvement. Professional experience, systematized training, standardization of transport, increased awareness of documentation, and adverse event reporting.	

Source: Prepared by the authors.

* ARDS = acute respiratory distress syndrome; ECMO = extracorporeal membrane oxygenation; P1 = pre-intervention phase; P2 = post-intervention phase; SARS-CoV2 = novel coronavirus infection; IHT = in-hospital transport; IET = inter-hospital transport; ICU = intensive care unit.

Table 1. Continued...

Identification	Method		Objective(s)	Results	
	Design	Inclusion criteria			
		P			I
<i>Gillman et al.</i> ²⁹ Year: 2014 MMAT: 80%.	Quantitative non-randomized	229 transports	IET	Describe the organizational requirements of the team in organizing transportation. - Coordination, teamwork, and communication efficiency (use of tools/mnemonics). - Problem-solving requires negotiation skills, interpersonal relationships, and clinical experience.	
<i>Gimenez et al.</i> ³⁰ Year: 2017 MMAT: 100%.	Quantitative non-randomized	143 transports	IHT	- Describe adverse events that occur during transport to/from the ICU; - Compare the incidence of adverse events with morbidity and mortality rates. The creation of transport protocols, adequate equipment, and trained teams decrease the incidence of adverse events.	
<i>Habibzadeh et al.</i> ³¹ Year: 2017 MMAT: 80%.	Quantitative non-randomized	50 transports in P1 and 50 transports in P2	IHT	Analyze the impact of training nurses through a workshop. Formative interventions, such as training and skill development, improve transportation.	
<i>Hui et al.</i> ³² Year: 2012 MMAT: 80%.	Quantitative non-randomized	73 transports	IHT	Evaluate the transportation during the night period. Planning, communication, and setting up the transportation team and equipment.	
<i>Jones et al.</i> ³³ Year: 2016 MMAT: 80%.	Mixed methods	502 transports	IHT	Evaluate the implementation of the evaluation plan for transport from/to ICU. Dedicated and trained staff and the existence of institutional transportation policies improve transportation.	
<i>Kwack et al.</i> ³⁴ Year: 2018 MMAT: 80%.	Quantitative non-randomized	184 transports	IHT	Elucidate the effectiveness of the rapid response team in transportation safety. Careful monitoring of the patient and ability to resolve adverse events.	
<i>Maddry et al.</i> ³⁵ Year: 2017 MMAT: 80%.	Quantitative descriptive	672 transports	IET	Characterize the air transport of the patient with non-traumatic medical illness. Education, intensive training in the area, and developing clinical protocols are need in air transport.	
<i>Petry et al.</i> ³⁶ Year: 2020 MMAT: 100%.	Qualitative	18 interviews	IHT	Understand the team's communication process during the transfer of care. Teamwork, effective communication, and appropriate transfer of responsibilities by implementing information transmission protocols.	

Source: Prepared by the authors.

* ARDS = acute respiratory distress syndrome; ECMO = extracorporeal membrane oxygenation; P1 = pre-intervention phase; P2 = post-intervention phase; SARS-CoV2 = novel coronavirus infection; IHT = in-hospital transport; IET = inter-hospital transport; ICU = intensive care unit.

Transport planning also concerns preparing and optimizing monitoring equipment (i.e., checking that it is suitable for the patient's needs and correctly used by the staff).^{23,30,32} The same importance is assumed regarding the use of personal protective equipment to prevent and control infection, specifically in the current COVID-19 pandemic.²²

Lastly, a safe transition of care is also part of proper planning. It occurs through effective communication^{23,26,27,29,32,33,36} using communication aids (e.g., mnemonics),²⁹ which translates into an appropriate handover of responsibilities,^{23,29,36} and correct documentation.^{28,29}

In light of this, transport planning focuses on coordination, communication, patient stabilization, preparation (of staff, equipment, and type of transport), and documentation.

Problem-solving action

Problem-solving action focuses on teamwork, continuous patient surveillance, and preventing and resolving adverse events. Promoting safety in the transport of critically ill patients requires collaboration and a sense of leadership to understand the patient's health needs.^{23,27,29} Teamwork and interdisciplinarity^{23,24,26,29,33,36} are associated with reduced incidence of adverse events and must be recognized as strategies in care settings,²⁴ in which each team member adheres to their assigned role,²³ providing care according to their level of responsibility and professional deontology.²⁷

In the same perspective, the level of monitoring according to the patient's needs^{33,34} and their continuous surveillance during transportation²²⁻²⁴ prevent or reduce the incidence of adverse events. When it is still not possible to prevent their occurrence, the team must be able to intervene proactively and early in resolving adverse events, avoiding irreversible damage to the patient.^{22,23,25,34,35}

Because of this, the transport of critically ill patients must be considered an extension of the care environment, valuing continuity of approach to the patient, with a level of monitoring, treatment, and action appropriate to their clinical condition.

Action for improvement

Action for improvement is transversal to the entire transport process and responsible for increasing the quality of care environments. It is essential to standardize the transport by creating, implementing, and reviewing specific transport protocols and procedures,^{23,24,28,30,33,35,36} such as a checklist.^{26,28} Such measures should value the context of the critically ill patient and articulate evidence and experience with the care environment.^{27,28}

In view of this, it is pivotal to strengthen the non-technical skills of the team that allow a meditative posture in the care environment, improving and promoting the safety of all stakeholders. Personal attitudes — such as personal motivation to participate in transport²⁸ and confidence in oneself and the team —,^{27,28,36} associated with situational awareness and professional responsibility to protect the patient, are essential to ensure that risks are anticipated and/or corrected before causing harm.²³

Finally, the team must systematically intervene in preventing and reducing adverse events, starting with an increase in awareness about patient safety,²⁸ reporting adverse events, collectively seeking solutions, and creating and implementing auditing instruments that evaluate health care. These processes help increase patient satisfaction and the safety and quality of care environments.³³

Therefore, one can assume that safety in the transport of critically ill patients is influenced by the characteristics of the environment in which such transport occurs, which is why care systems must be designed to support team performance.

DISCUSSION

This mixed-methods systematic review presents a quantitative synthesis of multiprofessional team interventions that promote safety in the transport of critically ill patients. However, the predominance of quantitative research (10 studies) conditioned subjective data analysis about the lived and real-life experiences and the team's feelings regarding this theme.

Personal attitudes (situational awareness, motivation, posture in care, and adherence to the assigned role), associated feelings (fear, concern, or confidence), and perceptions (insecure and demanding care, leadership and teamwork) when faced with patient transport are described and analyzed in some studies.^{23,27,28,36} However, the personal, collective, and organizational demands associated with this transport continue to be predominantly studied from a quantitative point of view, with gaps, for instance, at the level of validated scales that assess the difficulty felt by the team throughout the transport process.²⁹ Thus, understanding the interventions of the team promoting safe transport must explore both technical and non-technical skills in preventing, managing, and resolving adverse events^{13,21,37} by producing more qualitative studies.

Of the 15 studies selected for analysis, 7 address in-hospital transport,^{23,26,30,31,33,34,36} 7 address inter-hospital transport,^{22,25,27-29,32,35} and 1 addresses both types of transport;²⁴ therefore, it is not possible to make a relationship between the incidence of adverse events and one of these particular types. Nevertheless, this review has reinforced some verified findings, including the importance of adequate planning and responsible and properly articulated action.^{12-16,37,38} The transport decision, despite being addressed in the selected studies, is not always valued as preponderant in patient safety and as the aspects related to quality contribution.^{15,16}

Such transport is often perceived as challenging and unsafe care.^{12,13,23} The critically ill patient is more vulnerable to adverse events due to the severity and/or instability of their clinical condition, the administration of high-risk medications, and the performance of complex procedures.¹⁰ What is more, the incidence of adverse events is proportional to the duration of transport, the severity of the illness prior to transport, and the inexperience of the multiprofessional teams.¹²⁻¹⁴

Therefore, the analysis of the selected studies allows one to determine strategies for the safety of critically ill patients during

transport, fostering a culture of safety that is transversal to the care environments and involving the multiprofessional team.^{7,8}

This safety culture is fostered by standardizing the transport of critically ill patients, allowing this entire process to be articulated and systematized. Such standardization occurs by developing specific protocols and procedures that organize the decision, coordination, communication, stabilization, preparation (of the team, equipment, and type of transport), and documentation, following the recommendations of scientific evidence, the consensus of experts in the field, and the existing resources in each health care entity or in the country itself.^{11,14-16,32}

Regarding checklists, they have been developed to guarantee the necessary resources for patient safety, minimizing the incidence of adverse events, and²⁶ their use reduces the length of stay and morbidity and mortality rates of critically ill patients, promoting their safety during transport.³⁸ However, they are not always valued in this sense, being their use influenced by cultural and leadership factors of the teams and being seen as an addition to the workload.^{26,38}

Regarding material resources, the importance of adequate and correctly used monitoring equipment in patient transport is recognized.^{12,15,16,22,23,30,32} In this area, it is important to highlight that the COVID-19 pandemic has reinforced the challenges to health professionals, such as new strategies for preventing and controlling the infection.^{3,8,22} Given this context, investing in adequate personal protective equipment, its correct application, and the decontamination of the transport after use foster the safety of the patient, the staff, and the environment, enabling the continuity of operations.^{3,8,22}

Another strategy for patient safety is developing the competence of the multiprofessional team. This is one of the interventions most reported in the studies, showing that the team must have experience, education, and training before taking responsibility for care in transport.¹²⁻¹⁶ In view of this, some studies have evaluated the importance of simulation models and the training of technical and non-technical competencies of the teams in transporting critically ill patients,³⁷ highlighting the importance of developing educational programs in training the multiprofessional team.

On the other hand, the contribution to quality through monitoring and auditing programs is the least mentioned aspect, thereby demonstrating the need for greater awareness of a safety culture,^{7,8} with the construction of care environments that promote an adequate performance by their professionals.^{15,16,28,33} It is important to understand the level of satisfaction of the teams and their motivation in creating and implementing guidelines for increasingly safe transport.³⁰

Contrary to what was expected, the results of this review do not focus on the family members of the critically ill patient,³⁹ which can be considered a limitation of this study. If on the one hand, it should be considered that the situation of critical illness suddenly appears in the daily life of the family, making them more vulnerable and underlining the importance of an intervention focused on this nucleus,³⁹ on the other hand, the good practices of their inclusion in the transport process are recognized.^{15,16}

Lastly, according to the Portuguese legislation, patient safety is a team responsibility, mobilizing the individual skills of each of its elements and implying the systemic management of all activities.⁸ Nevertheless, nurses' preponderant role in transporting critically ill patients cannot be underestimated; based on their know-how,^{9,10} the nurse ensures, continuously and holistically, the care centered on the patient and family, including assessing health needs, adequate preparation and stabilization, continuous surveillance, early intervention in problem-solving, and concern with the patient's dignity and respect^{12-16,23} according to their responsibility and professional deontology.

CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

Patient safety is a challenge to care settings and a public health criterion. The selected studies addressed the possibility of compromising patient safety throughout the transport process. The analysis allowed us to answer the guiding question of this review and conclude that the thoughtful decision about the patient's health needs and existing resources, adequate planning of transport, early action in preventing and resolving adverse events, and continuous action to improve the quality of care environments decrease the incidence of adverse events and promote a culture of safety that prevents harm to the patient.

We highlight the standardization of the transport of critically ill patients (by creating institutional protocols, specific procedures, checklists, and adequacy of equipment), permanent education and skills training for the multi-professional teams responsible for transport, and the fostering of a safety culture in which all players take responsibility for their safety, the safety of their peers and non-peers, patients, and families.

This mixed-methods systematic review demonstrated the need for a multiprofessional and multifaceted approach in transporting critically ill patients, ensuring that the continuity of care occurs at a level of quality and safety and never below the level of the service of origin. Given this context, we consider that this review answers the objective and the question of the study in that it identifies, describes, and analyzes the interventions of the multiprofessional team that promote safety in the transport of critically ill patients.

Nonetheless, the predominance of quantitative research and devaluation of the role of family members in care settings are limitations of this review. The analysis of the multiprofessional team interventions in the transportation of critically ill patients was conditioned to objective and measurable situations of the care environments. Thus, the feelings and lived and real-life experiences of the team during this process were devalued, as well as the importance of the family as a target and resource of care.

In conclusion, further research is suggested to address the subjective dimension of care in the transport of critically ill patients and the inclusion of the family in this process to better understand all the variants that promote patient safety.

AUTHOR'S CONTRIBUTIONS

Review study design. Ana Raquel Carreira Matias. Florinda Laura Ferreira Rodrigues Galinha de Sá.

Data selection and extraction. Ana Raquel Carreira Matias. Florinda Laura Ferreira Rodrigues Galinha de Sá.

Critical appraisal. Ana Raquel Carreira Matias. Florinda Laura Ferreira Rodrigues Galinha de Sá.

Interpretation of results. Ana Raquel Carreira Matias. Florinda Laura Ferreira Rodrigues Galinha de Sá.

Writing and critical revision of the manuscript. Ana Raquel Carreira Matias. Florinda Laura Ferreira Rodrigues Galinha de Sá.

Approval of the final version of the article. Ana Raquel Carreira Matias. Florinda Laura Ferreira Rodrigues Galinha de Sá.

Responsibility for all aspects of the content and integrity of the published article. Ana Raquel Carreira Matias. Florinda Laura Ferreira Rodrigues Galinha de Sá.

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Ivone Evangelista Cabral 

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