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Original Article

Development and validation of flight nurse competencies in the Brazilian aeromedical context

Construção e validação de competências do enfermeiro de voo no contexto aeromédico brasileiro

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ABSTRACT

Objective: to develop and validate professional competencies for flight nurses in aeromedical services, grounded in Brazilian regulations and legislation. **Methods**: this methodological study was conducted in two stages: 1) a documentary review of Brazilian regulations and legislation, which identified 176 documents, of which nine were selected to support the development of the competency framework; 2) content validation by experts using the e-Delphi technique. Fifteen evaluators participated in the first round and eleven in the second. The Content Validity Index was calculated, with a minimum agreement threshold of 80%. **Results**: the final framework comprised 37 competencies distributed across four categories: technical care delivery, professional and regulatory responsibility, operational management and planning, and flight safety, organized into the pre-flight, in-flight, post-flight, and operational cycle phases. The overall content validity index was 0.91, confirming the consistency and relevance of the validated competencies. **Conclusion**: the competency framework developed and validated in this study strengthens alignment among training, professional regulation, and operational safety, promoting greater clarity in role expectations and standardization of care practices. **Contributions to practice**: organizing competencies by flight phases and work processes facilitates the standardization of care practices aligned with Brazilian regulations and contributes to safety in aeromedical services.
Descriptors: Nursing; Prehospital Care; Air Ambulances; Professional Competence; Validation Study.

RESUMO

Objetivo: construir e validar competências profissionais para enfermeiros de voo no serviço aeromédico, fundamentadas em normas e legislações brasileiras. **Métodos:** estudo metodológico desenvolvido em duas etapas: 1) pesquisa documental em normativas e legislações brasileiras identificando-se 176 documentos, dos quais nove foram selecionados e subsidiaram a elaboração do painel de competências; 2) validação de conteúdo por especialistas, utilizando a técnica e-Delphi. Participaram 15 avaliadores na primeira etapa e 11 na segunda. Calculou-se o Índice de Validade de Conteúdo, considerando concordância mínima de 80%. **Resultados:** o painel final apresentou 37 competências distribuídas em quatro categorias: cuidado técnico-assistencial, responsabilidade profissional e normativa, gestão e planejamento operacional, e segurança de voo, organizadas nas fases pré-voo, voo, pós-voo e ciclo operacional. O índice geral de validade de conteúdo foi de 0,91, confirmando consistência e pertinência das competências validadas. **Conclusão:** o painel de competências construído e validado fortalece a articulação entre formação, regulação profissional e segurança operacional, promovendo maior clareza nas atribuições e padronização das práticas assistenciais. **Contribuições para a prática:** a organização das competências por fases do voo e processos de trabalho facilita a padronização das práticas assistenciais, alinhadas às regulamentações brasileiras, e contribui para a segurança no atendimento aeromédico.
Descritores: Enfermagem; Assistência Pré-Hospitalar; Resgate Aéreo; Competência Profissional; Estudo de Validação.

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Introduction

Aeromedical services are a component of prehospital care, providing timely and qualified access in emergency situations and in hard-to-reach locations[1]. Comprising fixed-wing and rotary-wing aircraft, these services are part of the Emergency Care Network by offering rapid and effective alternatives in scenarios where ground transport is limited, such as remote areas or regions with heavy traffic in large urban centers[2]. Rapid transport and the capacity for immediate intervention are fundamental to the survival of critically ill patients[1]. The importance of this service is heightened by the need for qualified teams who not only understand the technical aspects of care but also possess knowledge related to flight physiology and aeronautical safety protocols[2-3].

In this context, the flight nurse plays a key role, assuming responsibilities that go beyond conventional care and requiring advanced technical skills, rapid decision-making, and physical preparedness to work in highly unpredictable scenarios[4]. Working under adverse conditions and in a restricted environment, these professionals are responsible for ensuring comprehensive and safe patient care, often in situations of high complexity[5-6]. The flight nurse's practice also involves the ability to operate in complex scenarios, such as rescues in hard-to-reach locations or in adverse weather conditions, highlighting the need for targeted and continuously updated training[5]. These demands underscore the importance of competencies that ensure patient safety and effectiveness in aeromedical services.

In Brazil, the flight nurse's role is regulated by standards that establish technical, ethical, and operational parameters for mobile prehospital care in fixed-wing and rotary-wing aircraft[7]. These standards define specific knowledge and skills for professional practice in aeromedical services, including criteria related to operational safety, management of onboard medical equipment, and the effects of flight physiology[8]. Compliance with these standards is essential to ensure the safety of patients and crew, reinforcing the importance of standardizing and validating professional competencies in line with regulatory guidelines[2,9]. Such standardization directly contributes to improving care and ensuring uniformity in applied protocols.

However, despite advances in regulation, the education and qualification of flight nurses still face challenges due to the lack of a systematized definition of the technical and nontechnical competencies required for aeromedical practice. Professional competencies are continually demanded in the labor market because of technological innovations and service reorganization[10]. The aeromedical environment, with its operational particularities, requires a set of skills that is not widely addressed in educational guidelines[2,5]. Producing studies that offer solid foundations for training and ongoing qualification of these professionals is indispensable, strengthening practice and contributing to the effectiveness of aeromedical services in Brazil.

Given these challenges and regulatory demands, the development and validation of specific competencies for flight nurses in aeromedical services emerge as a necessity[6,10]. This initiative seeks to align professional practices with Brazilian regulations, promoting safety for patients and crew, along with efficiency in care delivery. In addition, validating competencies provides an essential technical-scientific framework both for the training of new professionals and for the qualification of those already in practice, contributing to the standardization and continuous improvement of the services provided[11].

The scientific and social relevance of this study lies in its contribution to consolidating a competency framework that can be used by educational institutions, professional councils, and aeromedical services as a guiding instrument for teaching, supervision, and performance evaluation. In this way, the material produced has direct applicability to the training and professional development of flight nurses, promoting standardization and strengthening safe practice. Therefore, this study aimed to develop and validate professional competencies for flight nurses in aeromedical services, grounded in Brazilian regulations and legislation.

Methods

Type of study

This methodological study was developed in two stages: 1) documentary research of Brazilian regulations and legislation to develop the competency framework for flight nurses in aeromedical services; and 2) content validation of the competencies by experts. The documentary research was conducted in 2023, and the validation in 2024.

Development of competencies

For this stage, a documentary review was conducted based on Brazilian regulations and legislation available in the official government repositories of the Ministry of Health, the Federal Nursing Council (COFEN in Portuguese), and the National Civil Aviation Agency (ANAC in Portuguese). The inclusion criteria were current documents, such as resolutions, technical opinions, and regulations, available in full with free access, that addressed aspects of nurses' professional practice in aeromedical care and transport. Documents that had been revoked or were outside the scope of the study were excluded.

Document analysis was conducted using a study-specific instrument, structured as a table in Microsoft Word®, to systematize data extraction. The instrument included variables related to the nature of the document, year of publication, issuing body, regulatory scope, and explicitly stated professional competencies. Normative elements[12] were identified, understood as terms and expressions that describe nurses' duties and responsibilities in health-related activities within the analyzed resolutions, enabling the extraction of competencies aligned with current legislation.

A total of 176 official documents published between 1978 and 2023 were identified, of which eight met the established inclusion criteria (Figure 1).

Regulatory Body	Resolution	Description
Ministry of Health	Ordinance No. 2048/2002[13]	Technical regulation for state emergency and urgent care systems.
	Ordinance No. 529/2013[14]	Establishes the National Patient Safety Program.
Federal Nursing Council (COFEN)	Ordinance No. 551/2017[7]	Nurses' role in mobile and inter-hospital prehospital care in aircraft.
	Ordinance No. 660/2021[15]	Nurses' role in direct care and in the management of mobile and inter-hospital prehospital care in aircraft.
	Ordinance No. 641/2020[16]	Use of extraglottic devices and other airway access procedures in urgent and emergency situations.
National Civil Aviation Agency (ANAC)	Brazilian Civil Aviation Regulation (RBAC) No. 90/2019[8]	Requirements for special air operations conducted by public security agencies.
	RBAC No. 91/2021[17]	General operating requirements for civil aircraft.
	RBAC No. 135-005/2022[18]	Aeromedical operations conducted by air operators regulated under RBAC No. 135.

Figure 1 – Documents included in the documentary analysis to form the basis for the competencies. Florianópolis, SC, Brazil, 2024

The selected resolutions constituted the normative basis for constructing the competencies, which were grouped into four domains: technical care delivery; professional and regulatory responsibility; operational management and planning; and flight safety, which were subsequently submitted to the validation stage.

Content validation

For content validation, expert judges were purposively selected through an advanced search on the Lattes Platform of the National Council for Scientific and Technological Development (CNPq in Portugue-

se). Eligibility criteria included: being a nurse; having at least one year of experience in fixed-wing and/or rotary-wing aeromedical services; and holding a specialization in related areas, such as aviation or emergency care. This minimum period was considered necessary for professionals to be adequately adapted to service routines and the team, enabling them to contribute more effectively to the study. Judges who did not confirm participation or did not return the validation questionnaire within the established period were excluded. This was a nonprobability convenience sample, with an estimated participation of seven to 20 specialists, in accordance with recommendations for content validation studies[19].

In total, 53 professionals were contacted electronically and received an invitation letter by email or messaging app, containing information about the study, instructions for completing the questionnaire, the competencies to be evaluated, and the access link to the Google Forms® platform. Access to the platform was contingent on reading and accepting the Informed Consent Form (ICF).

The material intended for the judges consisted of two parts. The first addressed the judges' characteristics, with questions about age, sex, qualifications, and professional experience. The second provided instructions for analyzing the content of the competencies, which were evaluated using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree." After the assessment of each item, space was provided to record comments and suggestions. The entire process was conducted based on the e-Delphi technique, a variation of the traditional Delphi method adapted for an electronic environment[19].

Data analysis

Data were organized in an Excel spreadsheet to calculate the frequency of agreement (absolute and percentage values), mean, standard deviation, and the Content Validity Index (CVI). The sum of agreements for items rated 4 or 5 by the judges was used to calculate the individual CVI for each item by dividing the total by the number of judges. The mean of the indices was calculated to obtain the overall Content Validity Index (S-CVI/Ave). A consensus of 80% (≥0.8) or higher among evaluations was considered valid[12]. Items with lower indices were revised based on the judges' suggestions and submitted to a new validation round.

Ethical aspects

Informed consent was obtained through the ICF, ensuring anonymity and confidentiality of personal data. The project was submitted to and approved by the Research Ethics Committee of the Federal University of Santa Catarina, Certificate of Presentation for Ethical Consideration No. 60653822.4.0000.0121, opinion No. 5,560,783/2022.

Results

The competency development stage resulted in an initial framework consisting of 41 competencies distributed across four categories of work processes, according to the documentary analysis of Brazilian regulations. This framework served as the basis for the content validation stage conducted with specialists.

In the first validation round, 15 specialists participated, 11 (73.3%) female and four (26.7%) male. The participants' mean age was 40 years (±6.66 years), and the mean length of experience in aeromedical services was 8.6 years. Regarding institutional affiliation, 12 (80.0%) were linked to the public health network, while three (20.0%) worked in the private sector. In terms of geographic distribution, four (26.66%) worked in the South, four (26.66%) in the Southeast, three (20.0%) in the Central-West, three (20.2%) in the Northeast, and one (6.66%) in the North of the country. In the second e-Delphi round, the revised protocol was sent to the same specialists, of whom 11 returned the evaluation.

The competency items were evaluated individually by the specialists considering the individual CVI, after two e-Delphi rounds, as presented in Table 1.

Table 1 – Content Validity Index distributed by competencies across work process domains in the two Delphi rounds. Florianópolis, SC, Brazil, 2024

Competency	CVI 1 (n=15)	CVI 2 (n=11)
Technical/care delivery		
1. Provides care to adults and children according to patient priorities and current recommendations	0.93	0.91
2. Performs nursing care in all phases of flight*	0.67	–
3. Applies biosafety actions, including prevention and control of infectious diseases*	0.67	–
4. Performs biosafety actions, biological-risk and infection control, including prevention and control of infectious diseases	0.60	1.00
5. Prepares and participates in checking equipment, materials, medications, and medical gases during pre-flight and post-flight according to type of care	0.93	1.00
6. Ensures care related to the physiological effects and flight stressors on the crew in a hypobaric environment	0.93	1.00
7. Plans care according to the expected flight time and conditions	0.93	0.91
8. Considers and ensures care related to the patient's condition and the physiological effects and flight stressors based on clinical history	0.80	0.91
9. Performs ventilatory and circulatory practices, including extraglottic devices and peripheral or intraosseous intravascular devices, when trained	0.80	0.91
10. Administers prescribed medications or those indicated by institutional protocols	0.87	1.00
11. Performs land, high-angle, and water rescue provided it is an operational feature, the nurse is trained, and using appropriate personal protective equipment	0.67	0.82
12. Completes nursing documentation needed for continuity of care	0.93	0.91
Professional and regulatory responsibility		
13. Complies with the Professional Practice Law and the Nursing Code of Ethics	0.93	0.91
14. Acts as liaison between institution's aerospace nursing service and Regional Nursing Council	0.67	0.82
15. Posts the technical-responsibility statement of the nurse visibly as required	0.80	0.91
16. Identifies any situation compromising flight safety and reports it through a Prevention Report	0.73	0.82
17. Participates in training and development programs for medical support operators	1.00	1.00
Operational management and planning		
18. Plans, organizes, coordinates, performs, and/or evaluates the aerospace nursing service under technical responsibility	0.93	1.00
19. Manages equipment and supplies of the aerospace nursing service	0.93	0.91
20. Keeps nursing staff information updated: flight hours, incidents, training	0.80	0.82
21. Organizes service using administrative instruments such as protocols, and standard operating procedures	0.73	0.82
22. Participates in flight safety programs, identifying risks and mitigating harm	0.73	0.82
23. Contributes to protocol development with multiprofessional team	1.00	1.00
24. Participates in standardizing materials and equipment according to aeromedical recommendations	0.93	1.00
25. Participates in monthly schedule development ensuring safe care	0.80	0.82
26. Monitors and evaluates nurses in adaptation or readaptation	0.60	0.82
27. Provides care to staff injured by sharps or biological substances	0.87	0.91
Flight safety		
28. Is familiar with aircraft model and normal/emergency procedures	0.87	0.91
29. Prepares aircraft according to care type and checks/tests equipment*	0.73	-
30. Understands aircraft performance, weight/balance, engine start safety, refueling, and loose-object risks	0.87	0.82
31. Uses aircraft intercom and understands sterile cockpit procedures	0.93	0.91
32. Communicates with crew using standard flight phraseology	0.80	0.91
33. Performs special care for patient boarding/disembarking	0.80	0.91
34. Uses aviation personal protective equipment such as flame-resistant suits, hearing protection, goggles, helmets, gloves	0.73	0.91
35. Knows and uses crew restraint systems safely	0.87	0.82
36. Performs procedures for restricted-area landings or those with limitations	0.93	0.91
37. Recognizes safety criteria inside and around the aircraft	0.87	1.00
38. Performs or evaluates aircraft cleaning procedures	0.80	0.91
39. Provides care related to principles of flight physiology*	0.60	–
40. Understands and performs emergency procedures such as wire avoidance and water landings	0.73	0.82
41. Manages onboard medical equipment as applicable	0.87	1.00
Overall Content Validity Index	0.82	0.91

*Item removed after the first e-Delphi round according to the judges' evaluation; CVI: Content Validity Index

After the first e-Delphi round, the CVI scores ranged from 0.60 to 1.00, with an S-CVI/Ave of 0.82 for the competencies overall. Of the 41 competencies, 28 achieved satisfactory content validation. Although the 80% consensus threshold was reached in the first round, items with a CVI below 0.80 were adjusted according to the relevance of the judges' suggestions. Modifications included reorganizing competencies by flight phases and work processes, as well as revising and merging redundant items to improve clarity and precision.

Accordingly, four items were regrouped: items 1 and 2 were consolidated into a single competency to avoid redundancy; items 5 and 29 were merged, eliminating identified duplication; competency 3 was removed because it was already encompassed by competency 4; and items 6 and 39, related to flight physiology, were integrated. Nine items were reformulated to eliminate ambiguities and align with regulations, including items 14, 16, 21, and 22. Item 11, although it had a CVI <0.8 in the first e-Delphi round, was retained because it was related to flight safety and aligned with the reorganization of domains by flight phases and work processes. Competency 26 was maintained due to its relevance to the ongoing development of the aerospace nursing team. Items 34 and 40 were kept with wording adjustments for clarity (item 40) and regulatory adequacy (item 34). Five items received semantic adjustments without changing their technical content. In addition, the reorganization of competencies by flight phases was incorporated into the framework.

In the second round, the revised framework was resent to the judges, achieving CVI values above 0.8 (0.82–1.00) and an S-CVI/Ave of 0.91, corresponding to an overall validation of 91%. These results support the proposed competencies, with no need for further adjustments. Figure 2 presents the final version of the competency framework, consisting of 37 items organized by phase of care and work processes, grounded in Brazilian legislation and validated with contributions from the specialists.

Work process	**Competency description**
Pre-flight	
Management	Participates in the standardization of materials and equipment necessary for nursing care, according to recommendations for aeromedical services.
	Contributes to the development of institutional flight safety programs, focusing on risk prevention and harm mitigation.
	Understands the principles of flight physiology and ensures care related to the physiological effects and flight stressors on the crew in the hypobaric environment.
Educational/instructional	Understands basic concepts of aircraft performance, weight and balance; aircraft safety during engine start; aircraft (re)fueling; and risks associated with loose objects in the cabin.
	Knows and uses aviation personal protective equipment such as flame-resistant flight suits, hearing protection, safety goggles, safety helmets, and special gloves when applicable.
	Recognizes safety criteria inside and around the aircraft.
Technical care delivery	Obtains information on the expected flight time to plan care appropriately.
	Prepares the aircraft according to the type of service: checks/tests equipment functionality and medical gas systems and installs materials and equipment inside the aircraft.
In-flight – Safety and quality of patient care	
Educational/instructional	Communicates with the crew using standard flight phraseology.
	Knows procedures and special care for landing in restricted areas or aerodromes with restrictions.
	Understands emergency procedures such as avoiding wire collisions, water landings, and use of flotation equipment.
	Knows the aircraft's internal communication system and recognizes sterile cockpit procedures.
Technical care delivery	Provides aerospace nursing care prioritizing safety, quality, humanized care, and effective communication.
	Considers and provides care related to the patient's condition and physiological effects and flight stressors.
	Performs ventilatory and circulatory practices including advanced devices when trained.
	Prepares and administers medications as prescribed or per protocols.
	Performs land, high-angle, and water rescue actions when trained and equipped.
	Knows and performs boarding and disembarking care.
	Performs biosafety actions and infection control.
	Manages onboard medical equipment as applicable.

(the Figure 2 continue in the next page...)

Work process	Competency description
Post-flight – Documentation and evaluation	
Technical care delivery	Completes nursing documentation clearly and accurately.
	Performs or evaluates aircraft cleaning and disinfection procedures.
Operational management	Identifies situations compromising flight safety and reports them via Prevention Report (RELPREV).
	Manages service equipment and supplies, including expenditure reports.
Operational cycle	
Technical care delivery	Is familiar with the aircraft model and its normal/emergency procedures.
	Participates in training and development programs for medical support operators.
Operational management	Maintains updated staff records including flight hours, incidents, and training.
	Monitors and evaluates nurses in adaptation or readaptation.
	Participates in developing monthly schedules ensuring safe care.
	Provides care to staff injured by sharps or biological materials.
	Participates in creating protocols, standards, routines, and administrative processes.
	Plans, organizes, coordinates, performs, and/or evaluates the aerospace nursing service.
	Complies with the Professional Practice Law and Nursing Code of Ethics.
	Communicates with the Regional Nursing Council ensuring regulatory compliance.
	Posts the nurse's technical-responsibility statement and develops service bylaws.
	Implements administrative instruments such as bylaws, standards, routines, and protocols.

Figure 2 – Final version of the competencies for nurses in aeromedical services, grounded in Brazilian legislation and validated by specialists. Florianópolis, SC, Brazil, 2024

Discussion

The assessment and validation of professional nursing competencies are recognized as fundamental strategies to ensure quality of care, patient safety, and ethical, regulatory, and normative compliance, especially in high-complexity settings[9-11] such as aeromedical services.

The results of this study, reflected in high levels of agreement among the judges, reinforce the consistency and credibility of the validation process, indicating that the proposed competency framework for aeromedical nurses is valid and aligned with Brazilian regulations and legislation. Similar findings have been reported in other competency-validation contexts, supporting the applicability of the e-Delphi method in nursing[20-21]. Validation of competencies for nurses working in hemodynamics[20], which yielded CVI values ranging from 0.88 to 0.99, and a study of competencies for airway care in adult patients[21], with CVI≥0.85, demonstrate consistent competency validation across different settings. However, it is important to note that although the CVI is a widely used indicator, its interpretation should account for judges' subjectivity and the need to triangulate findings with empirical evidence in real-world scenarios; otherwise, there is a risk of overestimating the framework's validity[22].

The judges in this study recommended reorganizing the competencies according to flight phases and work processes, reflecting an expanded understanding of aeromedical practice and a trend toward integrating care planning with the operational milestones of air transport. This recommendation facilitates structuring competencies according to different operational demands, contributing to more targeted practice. The organization of competencies into categories such as health care, communication, and management[9], and the distribution of aerospace nursing competencies in disaster situations into three categories, pre-flight, in-flight, and post-flight[23], reinforce the importance of clear categorizations for the continuous improvement of professional practice.

In the pre-flight domain, competencies related to resource management, aircraft preparation,

and planning of care before takeoff stand out. This organization underscores the importance of anticipating risks and appropriately configuring onboard materials as key determinants of flight safety[2]. These findings align with evidence linking standardized preparatory steps and strengthened leadership skills in prehospital teams to reduced incidents and improved operational efficiency in critical services[24]. In addition, this phase requires nurses to have an in-depth understanding of flight physiology and aeronautical protocols[1], emphasizing the interdependence between technical preparation and operational knowledge specific to the aeromedical environment.

During the in-flight phase, competencies emphasize clinical and operational safety, focusing on effective communication with the crew, emergency procedures, and patient safety, as well as the application of care practices such as medication administration, use of advanced devices, and performance in rescue situations. These competencies are essential not only to ensure patient safety but also to enable nurses to act proactively and assertively in a dynamic and challenging environment[6,9]. A recent study indicates that adopting evidence-based guidelines for airway management in prehospital care strengthens the standardization of ventilatory practices and the safe use of advanced devices in aeromedical settings[25], supporting ventilatory approaches that use extraglottic devices by trained nurses.

Clinical expertise in this context must be integrated with skills in coordinating care with the multidisciplinary team, rapid decision-making, and the application of emergency protocols[3]. Safe performance in high-complexity environments depends on integrating nontechnical competencies such as communication, situational awareness, leadership, and teamwork, which support effective cabin environment management and failure prevention[26]. Thus, competencies such as situational awareness, team coordination, and cabin environment management are equally decisive for mitigating errors and incidents in aeromedical contexts during flight[22,26-27]. The integration of technical competence with behavioral and leadership skills aligned with flight safety highlights the complexity of nursing practice in aeromedical settings, which can directly affect clinical and operational outcomes.

In the post-flight phase, competencies such as detailed documentation of care, aircraft cleaning and disinfection, and resource reorganization are essential to ensure team readiness for new activations and to maintain operational safety. The ability to identify and report risk situations during flight, as well as effective management of materials and equipment, reflects the need for organization and documentation to ensure the quality and safety of care provided[6-7,22]. These findings align with the concept of practical drift, in which the absence of continuous reinforcement of post-mission competencies and protocols promotes a gradual departure from operational standards, compromising aeromedical service safety[4]. Structured debriefing programs conducted immediately after missions support the consolidation of learning, reduce practice variability, and strengthen engagement and retention of qualified professionals in aeromedical teams[28]. Therefore, feedback protocols and structured debriefing are indispensable to sustain a culture of safety in aeromedical operations, consolidate learning, and reduce variability in practice[28-29].

Competencies associated with the operational cycle were grouped into actions related to supervision, continuing education, and regulatory compliance. This component integrates managerial and educational competencies that support the organizational culture of safety and continuous professional development. The development of formal protocols and the implementation of supervision mechanisms represent indicators of institutional maturity in aeromedical services[6]. From this perspective, interprofessional simulation programs for aeromedical teams, by integrating technical training with nontechnical skills, improve coordination, communication, and collective performance, strengthening the culture of safety and

continuous learning in aeromedical operations[30]. In addition, nurses' participation in safety committees and in processes for onboarding new professionals consolidates the link between care practice, professional regulation, and continuing education, which are further strengthened when supported by an active safety culture and reflective post-mission practices.

Study limitations

One limitation relates to the use of the e-Delphi technique in an electronic environment, which, although it supports geographically distributed data collection, reduces interaction among specialists. In addition, validation of the competencies was based on current regulations, which may not reflect all variability and challenges encountered in aeromedical practice.

Contributions to practice

This study provides a competency framework that was developed, validated, and aligned with Brazilian regulations and organized by flight phases, which facilitates its application in air operations. Organization into areas such as operational management, technical care delivery, and educational/training activities allows for more precise and specific guidance of actions, making them clearer and more efficient.

Conclusion

This study developed and validated a competency framework for flight nurses in aeromedical services based on Brazilian regulations. Validation by specialists confirmed the framework's consistency. The competencies were organized by flight phases and work processes, providing greater clarity in role expectations and standardization of care practices in this context. The framework can be used for training, supervision, and regulation of professional practice in aeromedical services.

Authors' contributions

Study conception and design or data analysis and interpretation: **Nascimento KC, Moreira AR, Sousa LS**. Manuscript drafting or critical revision of relevant intellectual content and final approval of the version to be published: **Nascimento KC, Moreira AR, Malfussi LBH, Raulino AR, Mendes NA, Sousa LS**. Accountability for all aspects of the manuscript, ensuring that questions regarding the accuracy or integrity of any part of the work are appropriately investigated and resolved: **Nascimento KC, Moreira AR, Malfussi LBH**.

Data availability

The authors declare that the full dataset and supplementary materials supporting the results of this study are available upon request from the corresponding author.

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