



Analysis of the graduate-level scientific production targeted at Intensive Care Nursing in Brazil

Análise da produção científica de pós-graduação voltada à Enfermagem em Terapia Intensiva no Brasil

Análisis de la producción científica de posgrado orientada a la Enfermería en Cuidados Intensivos en Brasil

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ABSTRACT

Objective: To analyze the technical and scientific production on Intensive and Critical Care Nursing for adults generated by Graduate Nursing Programs in Brazil between 2020 and 2024. **Methods:** A documentary, descriptive and retrospective study was conducted using public national repositories of theses and dissertations. Documents related to Intensive and Critical Care Nursing for adults were selected according to predefined criteria. **Results:** A total of 378 documents were included. Five main thematic areas were identified: Nursing care and patient safety; Professionals' health and well-being; Management and organizational processes; Technology, digital health and educational innovation; and Research related to the coronavirus disease pandemic. The scientific production was concentrated in the Southeast region (43.39%), with greater output from highly rated graduate programs. An increase in production was observed between 2021 and 2023, followed by a decline in 2024. **Conclusion:** The technical and scientific production demonstrated thematic diversity and expansion over the period analyzed, although marked by regional and institutional concentration, indicating challenges for the equitable development of research capacity in Critical Care Nursing.

DESCRIPTORS:

Nursing; Intensive Care Units; Scientific Output; Graduate Education; Bibliometrics.

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RESUMO

Objetivo: Analisar a produção técnico-científica da enfermagem em terapia intensiva e cuidados críticos de adultos gerada por Programas de Pós-Graduação em Enfermagem no Brasil, no período de 2020 a 2024. **Metodologia:** Estudo documental, descritivo e retrospectivo, realizado a partir de repositórios públicos nacionais de teses e dissertações. Foram incluídos documentos relacionados à enfermagem em cuidados intensivos de adultos, selecionados segundo critérios predefinidos. **Resultados:** Foram incluídos 378 documentos. Identificaram-se cinco áreas temáticas predominantes: cuidado de enfermagem e segurança do paciente; saúde e bem-estar dos profissionais; gestão e processos organizacionais; tecnologias, saúde digital e inovação educacional; e pesquisas relacionadas à pandemia de doença por coronavírus. A produção científica concentrou-se na região Sudeste (43,39%), com maior participação de programas com melhor avaliação nacional. Observou-se o aumento da produção entre 2021 e 2023, seguido de redução em 2024. **Conclusão:** A produção técnico-científica apresentou crescimento e diversidade temática, porém manteve a concentração regional e institucional, evidenciando a necessidade de estratégias para ampliar e equilibrar a pesquisa em enfermagem em cuidados intensivos.

DESCRITORES:

Enfermagem; Unidades de Terapia Intensiva; Produção Científica; Educação de Pós-Graduação; Bibliometria.

RESUMEN

Objetivo: Analizar la producción técnico-científica orientada a la enfermería en cuidados intensivos y críticos de adultos generada por Programas de Posgrado en Enfermería en Brasil entre 2020 y 2024. **Metodología:** Estudio documental, descriptivo y retrospectivo, realizado a partir de repositorios públicos nacionales de tesis y disertaciones. Se incluyeron documentos relacionados con la enfermería en cuidados intensivos de adultos, seleccionados según criterios predefinidos. **Resultados:** Se incluyeron 378 documentos. Se identificaron cinco áreas temáticas principales: cuidado de enfermería y seguridad del paciente; salud y bienestar de los profesionales; gestión y procesos organizativos; tecnologías, salud digital e innovación educativa; e investigaciones relacionadas con la pandemia de la enfermedad por coronavirus. La producción científica se concentró en la región Sudeste (43,39%), con mayor participación de programas mejor evaluados. La producción aumentó entre 2021 y 2023, con reducción en 2024. **Conclusión:** La producción técnico-científica mostró crecimiento y diversidad temática, aunque persistieron desigualdades regionales e institucionales que limitan el desarrollo equitativo de la investigación en enfermería en cuidados críticos.

DESCRIPTORES:

Enfermería; Unidades de Cuidados Intensivos; Producción Científica; Educación de Posgrado; Bibliometría.

INTRODUCTION

Health systems have undergone profound transformations driven by demographic changes, increasing clinical complexity, technological advances, and growing demands related to the quality and safety of healthcare delivery⁽¹⁻²⁾. In this context, intensive care represents one of the most complex and resource-intensive areas of healthcare, requiring highly qualified professionals, continuous monitoring, rapid clinical decision-making, and integration of advanced technologies⁽³⁾.

Critical care nursing plays a central role in this setting, as nurses are directly involved in patient surveillance, implementation of complex therapeutic interventions, coordination of care processes, and

collaboration with multidisciplinary teams ⁽⁴⁾. Scientific and technological advances have transformed Intensive Care Units (ICUs) into highly specialized environments characterized by sophisticated monitoring systems, life-support technologies, and increasingly complex clinical protocols⁽⁵⁾. As a result, nursing practice in critical care requires not only technical competence but also leadership skills, clinical reasoning, effective communication, and the ability to manage high-risk situations while ensuring patient safety⁽⁶⁾.

The COVID-19 pandemic significantly intensified these demands, placing unprecedented pressure on ICUs worldwide and exposing structural, organizational, and workforce-related vulnerabilities. During this period, nursing professionals faced increased workloads, emotional distress, and the need to rapidly adapt to continuously evolving clinical guidelines, while simultaneously assuming a strategic role in responding to the global health emergency⁽⁷⁻⁸⁾. At the same time, there has been a notable expansion in scientific production in the field of critical care, including studies on care technologies, infection prevention, mechanical ventilation, organizational strategies, and innovative models of healthcare delivery⁽⁹⁾.

In this scenario, Graduate Programs in Nursing (PPGEnfs) constitute an essential component of national research systems, being responsible for the training of researchers, the production of scientific knowledge, and the strengthening of evidence-based practice in healthcare. Scientific output originating from these programs reflects the priorities, capacities, and challenges of health systems, contributing to technological innovation, improvement of care quality, and the development of professional leadership in intensive care nursing⁽¹⁰⁻¹¹⁾.

In recent years, qualitative approaches and studies focusing on work processes, professional well-being, and humanized care have gained prominence, complementing traditional clinical and technological investigations. Concurrently, the increasing incorporation of digital health tools, artificial intelligence, big data analytics, and automated clinical systems has reshaped healthcare processes, reinforcing the need for research aligned with patient safety and health system performance^(1,5,12).

Despite the expansion of scientific activity and the strengthening of graduate education in recent years, systematic knowledge about technical-scientific production related to intensive care nursing in Latin America remains limited, particularly during the period marked by the COVID-19 pandemic and its aftermath. In the Brazilian context, available studies tend to focus on specific themes, isolated institutions, or limited timeframes, which hinders the understanding of broader trends, regional inequalities, institutional contributions, and temporal patterns in research over time. Furthermore, the heterogeneity of methodological approaches and data sources restricts the identification of consistent research priorities in the field, highlighting the need for comprehensive analyses to support scientific planning, resource allocation, and decision-making within health systems.

OBJECTIVE

To analyze the technical-scientific production in intensive care and adult critical care nursing originating from PPGEnfs in Brazil.

METHODOLOGY

Study design

This is a descriptive and exploratory study with a quantitative and qualitative approach, of a documentary and retrospective nature. The study was conducted and reported in accordance with the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.

Study setting and period

The study was carried out through the analysis of academic documents available in national public repositories, with emphasis on the Catalog of Theses and Dissertations from the Coordination for the Improvement of Higher Education Personnel (CAPES). Documents defended between 2020 and 2024 were included, corresponding to the period marked by the COVID-19 pandemic and its subsequent phase.

Population and sample

The study population consisted of doctoral theses and master's dissertations linked to PPGEnfs recognized by CAPES. The sample included all documents that met the inclusion criteria, totaling 378 academic works.

Inclusion and exclusion criteria

Theses and dissertations defended in Brazil between 2020 and 2024, linked to PPGEnfs, whose focus was related to intensive care nursing or adult critical care were included, provided that the documents were available in full in public repositories. Studies focused exclusively on neonatal or pediatric intensive care, research conducted with animals, investigations developed in non-hospital settings, and studies whose themes were not directly related to nursing in intensive care were excluded.

Data collection

Data collection was performed through a systematized search in the CAPES Catalog of Theses and Dissertations, complemented by searches in the Domínio Público Repository and institutional repositories of higher education institutions. Descriptors and keywords related to nursing, intensive care, and critical care were used, adapted to the specific interfaces of each database. The information extracted from the documents included: year of defense, geographic region, higher education institution, and graduate program. These data were organized into electronic spreadsheets for subsequent

analysis.

Data analysis

Quantitative data were analyzed using descriptive statistics, with calculation of absolute and relative frequencies, allowing the characterization of the temporal, regional, and institutional distribution of scientific production.

Subsequently, thematic content analysis was conducted based on the reading of the full texts, with the inductive construction of analytical categories, enabling the organization of studies into thematic axes representative of the scientific production in intensive care nursing.

The thematic analysis was conducted in systematized stages. Initially, the 378 included works were fully read by two researchers independently, aiming to identify recording units related to the object of the study.

No statistical calculation of inter-rater agreement was performed, as the analysis followed an interpretative qualitative approach, prioritizing reflective consensus between the researchers.

The identified units of meaning were coded and grouped into preliminary categories constructed inductively based on the thematic recurrence observed in the texts. After the independent coding stage, the researchers met to compare the proposed categories, and disagreements were discussed until consensus was reached. When necessary, a third researcher was consulted to mediate and validate analytical decisions.

The categorization process occurred iteratively, with continuous revision of categories as new data were analyzed until thematic stability and the absence of new categories were observed, characterizing theoretical saturation. The final categories were defined after consensus among the researchers, aiming to ensure methodological rigor, reliability, and interpretative coherence in the organization of the findings.

Ethical considerations

The study was conducted exclusively using publicly available documents and did not involve human subjects or identifiable personal data. Therefore, in accordance with Brazilian National Health Council Resolutions No. 466/2012 and No. 510/2016, submission to a Research Ethics Committee was not required.

RESULTS

A total of 378 theses and dissertations related to intensive care and adult critical care nursing produced by PPGEnfs in Brazil between 2020 and 2024 were identified. Annual variation in scientific production was observed, with progressive growth starting in 2020 ($n = 48$), reaching a peak in 2023 ($n = 111$), followed by a marked reduction in 2024 ($n = 18$).

Thematic distribution

The analysis of titles and full texts allowed the identification of five main thematic categories. The most frequent category included studies focused on nursing care for critically ill patients and patient safety. This was followed by research related to the health and well-being of ICU workers. The third category comprised studies on management and organizational processes in intensive care units, while the fourth included investigations related to technologies, innovation, digital health, and communication and education strategies in intensive care. Finally, a considerable number of studies addressed aspects related to the COVID-19 pandemic in the context of intensive care.

The definition of these categories resulted from an in-depth thematic analysis of the full texts, according to the methodological protocol described. The classification was not limited to the lexical frequency of terms in titles but was based on the contextual interpretation of the content produced.

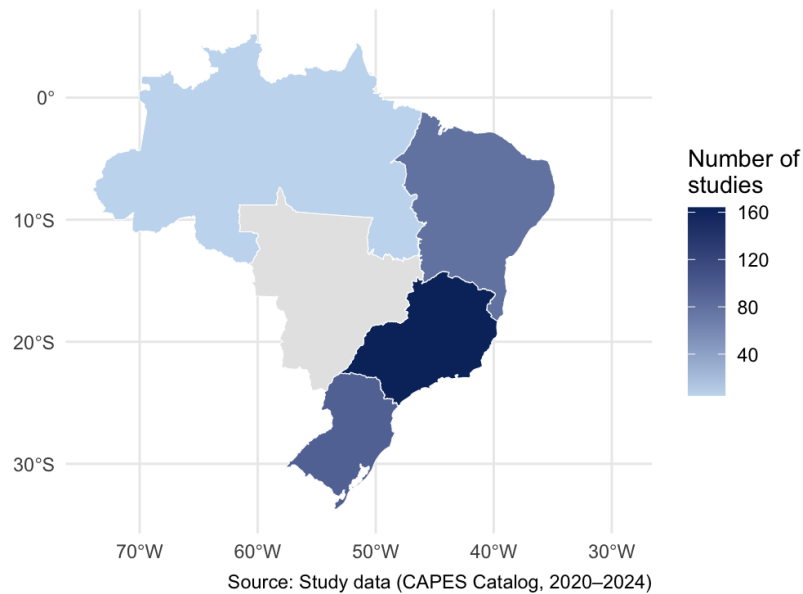
Geographic distribution

Scientific production showed uneven distribution across Brazilian regions. The Southeast region accounted for 43.39% of the studies (n = 164), followed by the South (25.13%; n = 95) and Northeast (20.90%; n = 79) regions. The Central-West and North regions showed lower participation, representing 9.26% (n = 35) and 1.32% (n = 5) of the productions, respectively. This regional distribution is presented in Figure 1.

Institutional performance

A concentration of scientific production was observed in programs located in the Southeast region, particularly in institutions with a well-established tradition in graduate nursing education. The analysis focused on the regional distribution of production, and no quantitative stratification by individual institution was performed. However, it was observed that a significant proportion of the studies are linked to public universities with consolidated graduate programs and strong national academic presence. The predominance of these institutions may be related to the historical consolidation of their graduate programs, structured research infrastructure, and national and international academic engagement.

Figure 1. Geographic distribution of scientific production in Intensive Care and Critical Care Nursing across regions of Brazil (2020–2024).



Temporal trends

The temporal analysis revealed a significant increase in scientific production after the first year of the COVID-19 pandemic, particularly in 2021 ($n = 103$) and 2023 ($n = 111$). The annual distribution of production by academic level is presented in Table 1.

Table 1. Annual distribution of theses and dissertations on intensive care and adult critical care nursing (2020–2024).

| Year | Dissertations (n) | Theses (n) | Total (n) |
|--------------|-------------------|------------|------------|
| 2020 | 40 | 8 | 48 |
| 2021 | 90 | 13 | 103 |
| 2022 | 81 | 17 | 98 |
| 2023 | 91 | 20 | 111 |
| 2024 | 13 | 5 | 18 |
| Total | 315 | 63 | 378 |

Master’s dissertations predominated in all analyzed years. However, there was an absolute increase in the number of doctoral theses over the period, with the highest number observed in 2023 ($n = 20$). In proportional terms, the participation of theses ranged from 16.7% (2020) to 27.8% (2024), indicating a gradual expansion of doctoral-level training in the field throughout the historical series. The reduction observed in 2024 likely reflects delays in academic timelines and structural reorganizations during the post-pandemic period, which affected the pace of thesis defenses and the completion of research projects.

DISCUSSION

The present study highlights the relevance and breadth of the scientific production generated by PPGEnfs in the field of intensive care and adult critical care nursing in Brazil between 2020 and 2024. The analysis of 378 theses and dissertations reveals a scenario of significant expansion in scientific activity during the COVID-19 pandemic, followed by a period of decline, reflecting both the responsiveness and the vulnerability of graduate-level research systems in times of crisis.

The predominance of studies focused on nursing care for critically ill adults and patient safety is consistent with international research agendas in intensive care, in which clinical monitoring, prevention of adverse events, and quality of care remain central priorities⁽¹³⁾. This finding reinforces the strategic role of nursing in ensuring safe and effective care in highly complex environments and indicates consistent alignment with the principles of evidence-based practice.

Similarly, the considerable volume of research addressing the health and well-being of ICU workers reflects concerns widely documented in the international literature, particularly related to burnout, psychological distress, and workforce sustainability, which were intensified during the pandemic ^(14–16). Global evidence indicates that intensive care nursing professionals were disproportionately affected by emotional and occupational overload during this period, and Brazilian academic production mirrors this pattern, highlighting the need for institutional and systemic strategies aimed at protecting and retaining these professionals⁽¹⁶⁻¹⁷⁾.

Although less frequent, studies addressing management and organizational processes in intensive care represent an emerging and relevant field. International literature has emphasized the influence of nursing leadership, staffing models, resource allocation, and interprofessional collaboration on care outcomes and service performance^(18–20). The presence of these themes in the production of Brazilian programs suggests growing recognition of the managerial and systemic role of nursing in building more resilient and efficient intensive care services.

The growing interest in digital technologies, innovation, and educational strategies accompanies the acceleration in the incorporation of technological tools following the pandemic. This movement aligns with global trends related to tele-ICU models, simulation-based training, remote monitoring, and data-driven clinical decision support⁽²¹⁻²²⁾. The emergence of these themes in research conducted within PPGEnfs indicates the field's capacity to adapt to technological transformations and its potential contribution to innovation in intensive care.

The temporal analysis of the data helps contextualize these findings. The sharp increase in scientific production observed between 2021 and 2023 suggests that the pandemic acted as a catalyst for research activity, driven by urgent clinical demands and specific funding opportunities. Conversely, the significant reduction recorded in 2024 may be associated with delays in academic timelines,

interruptions in clinical research settings, and prolonged completion times for academic work—phenomena also reported in other national and international contexts⁽²³⁻²⁴⁾.

Another relevant finding concerns the persistence of geographical inequalities in scientific production. The concentration of most studies in the Southeast and South regions reproduces widely observed patterns in which scientific activity tends to cluster in areas with greater institutional density, more consolidated graduate programs, and broader access to funding. In the Brazilian context, this unequal distribution raises concerns regarding the ability of less represented regions to generate contextualized evidence to guide intensive care practice⁽²⁵⁻²⁷⁾.

The historical consolidation of graduate education in Nursing in Brazil and its expansion in recent decades have been widely analyzed in national literature, which highlights significant advances in *stricto sensu* training, the qualification of scientific production, and the international visibility of the field⁽²⁸⁻²⁹⁾. However, these advances have occurred asymmetrically, with greater concentration of consolidated programs and structured research networks in the Southeast and South regions, maintaining challenges related to regional equity and the decentralization of scientific production.

From a broader perspective, quantitative and bibliometric studies indicate that Latin American scientific production in health represents a modest share of the global literature, with predominant concentration in Brazil, Mexico, Colombia, and Chile, revealing significant gaps across several countries in the region⁽³⁰⁾. In the specific field of critical care, Latin American collaborative initiatives have sought to map research priorities and strengthen regional networks involving multiple countries⁽³¹⁾. Nevertheless, structured and sustained production remains lower than that observed in regions with longer scientific traditions, highlighting common challenges related to funding, infrastructure, and the consolidation of doctoral programs.

Within this scenario, the Brazilian case presents a dual dimension: on the one hand, it stands out as the main regional hub of scientific production in nursing; on the other hand, it reproduces internal structural inequalities. The regional concentration associated with the consolidation of graduate programs reinforces the need for public policies aimed at equity⁽³²⁾. Generic strengthening strategies are insufficient without clear operational mechanisms. Potentially feasible measures include: (1) funding calls with regional induction criteria directed at programs located in the North and Central-West regions; (2) structured funding for interinstitutional research networks linking consolidated and emerging programs; (3) academic mobility programs for faculty and students; (4) incentives for the creation of interinstitutional doctoral programs focused on critical care; and (5) Latin American scientific and technical cooperation aimed at multicenter research production. Such strategies may expand the reach of research, reduce geographic concentration, and strengthen the regional integration of intensive care nursing.

Overall, the findings indicate that PPGEnfs were able to generate relevant and thematically convergent scientific knowledge during a period marked by intense pressure on health systems. The alignment of investigated topics with international priorities, such as patient safety, worker health, technological innovation, and organizational management, demonstrates the significant contribution of nursing research to addressing contemporary challenges in intensive care.

Study limitations

Among the limitations of this study are the regional concentration of PPGEnfs, which may influence the distribution of scientific production, the variability in completeness and accessibility of the public repositories used as data sources, and the possibility of underrepresentation of studies that were not properly indexed. Additionally, the methodological heterogeneity of the included studies limits more in-depth comparisons between different research approaches and study designs.

Contributions to nursing, health, or public policy

This study contributes by providing a comprehensive overview of the technical-scientific production in intensive care and adult critical care nursing in Brazil, supporting the planning of research agendas, the development of funding policies, and the strengthening of graduate-level education. The findings may assist academic and healthcare managers in identifying regional gaps, priority thematic areas, and strategies to improve the quality of research and clinical practice in highly complex care settings.

CONCLUSION

The scientific production generated by PPGEnfs in Brazil between 2020 and 2024 proved to be substantial and aligned with central themes in intensive care and adult critical care nursing. The predominance of research focused on patient safety, professional well-being, technological innovation, and service management highlights the strategic contribution of graduate education to the improvement of intensive care.

The temporal fluctuations observed throughout the analyzed period indicate the sensitivity of academic production to contexts of crisis and institutional reorganization. Strengthening research infrastructure, reducing regional inequalities, and maintaining continuous investments in graduate education are essential to ensure the sustainability and expansion of scientific production in nursing, contributing to the consolidation of qualified and evidence-based care practices for critically ill adult patient.

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