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Review Article

Workloads of neonatal intensive care nursing professionals: integrative review

Cargas de trabalho de profissionais de enfermagem de terapia intensiva neonatal: revisão integrativa

Francisco Jandson de Albuquerque[1], Viviane Nayara de Oliveira Lima[2], Andresa de Araújo Sales[3], Marlene da Silva Miranda[4], Francisco Anderson Abreu do Nascimento[5], Ana Luiza Gonçalves da Silva[6], Nanielle Silva Barbosa[7]

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ABSTRACT: Objective: to analyze the evidence related to the workloads of neonatal intensive care nursing professionals. **Methods:** this is an integrative review conducted in March 2023 using the BDENF, LILACS, MEDLINE, Web Of Science and Scopus databases. Primary studies in Portuguese, English and/or Spanish, with no specific time frame were included. The Level of Evidence classification and descriptive methods were used for analysis and synthesis. Nine studies were included the review sample. **Results:** it was noted that understaffing is associated with heightened workloads, which impact the care provided to newborns, elevate the likelihood of adverse events, and contribute to the risk of infections, morbidity and mortality. **Conclusion:** the condition identified and associated with nursing work demonstrates the need to adjust staffing in critical care sectors, which calls for increased supervision and monitoring by entities representing the category, as well as dialogue with the management of health services.

KEYWORDS: Nurse Practitioners; Workload; Neonatal Intensive Care.

RESUMO: Objetivo: analisar as evidências relacionadas às cargas de trabalho de profissionais de enfermagem de terapia intensiva neonatal. **Métodos:** trata-se de uma revisão integrativa, realizada em março de 2023, na Base de Dados de Enfermagem (BDENF), Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), via Biblioteca Virtual em Saúde (BVS), *Medical Literature Analysis and Retrievel System Online* (MEDLINE), via PubMED, *Web Of Science* e *Scopus*. Foram incluídos estudos primários, em português, inglês e ou espanhol, sem delimitação temporal. Para análise e síntese, utilizou-se a classificação do Nível de Evidência e os métodos descritivos. Foram selecionados nove estudos para compor a amostra da revisão. **Resultados:** evidenciou-se que o quadro insuficiente de profissionais está relacionado ao aumento das Cargas de Trabalho, o que interfere nos cuidados ofertados ao neonato, aumenta a probabilidade de eventos adversos e favorece o risco de infecções e morbimortalidade. **Conclusão:** a condição identificada e relacionada ao trabalho de enfermagem demonstra a necessidade de adequações no dimensionamento de profissionais atuantes em setores de cuidados críticos.

DESCRITORES: Profissionais de Enfermagem; Carga de Trabalho; Terapia Intensiva Neonatal.

[1] Universidade Estadual Vale do Acaraú. Sobral, Ceará, Brazil. ORCID: https://orcid.org/0000-0002-8003-7705, e-mail: jandsondealbuquerque@hotmail.com
[2] Faculdade de Teologia, Filosofia e Ciências Humanas Gamaliel. Tucuruí, Pará, Brazil. ORCID: https://orcid.org/0000-0001-9651-6455, e-mail: enfvivianenayara@gmail.com
[3] Faculdade Estácio CEUT. Teresina, Piauí, Brazil. ORCID: https://orcid.org/0000-0003-4992-3108, e-mail: andresadearaujosales@gmail.com
[4] Universidade Paulista. São Paulo, São Paulo, Brazil. ORCID: https://orcid.org/0000-0002-0596-0663, e-mail: marlene.tefe@gmail.com
[5] Faculdade Rodolfo Teófilo. Fortaleza, Ceará, Brazil. ORCID: https://orcid.org/0000-0002-4472-4890, e-mail: contatoabreu@outlook.com
[6] Universidade Paulista. Brasília, Distrito Federal, Brazil. ORCID: https://orcid.org/0000-0002-6889-6726, e-mail: geral.analuiza@gmail.com
[7] Universidade Federal do Piauí. Teresina, Piauí, Brazil. ORCID: https://orcid.org/0000-0001-5758-2011 , e-mail: naniellesilvabarbosa@hotmail.com
Correspondence: Nanielle Silva Barbosa. Departamento de Pós-Graduação em Enfermagem. Universidade Federal do Piauí. Campus Universitário Ministro Petrônio Portella. Bairro Ininga. CEP: 64049-550. Teresina, Piauí, Brazil. Email: naniellesilvabarbosa@hotmail.com

INTRODUCTION

Nursing practice is influenced by the specific working conditions and relationships within work settings and involves daily exposure to workloads. In nursing, these workloads are associated with excessive demands, inadequate physical structures, prolonged working hours, and a shortage of human resources. These circumstances adversely affect the health of workers and create difficulties in patient care[1-2].

Different authors define nursing workload as tasks directly associated with the patient or administrative work. This workload is assessed by factoring in the time required for nursing duties in a specific timeframe and the average number of patients treated according to level of dependency and type of care, multiplied by the average time spent on care in hours[3].

Activities carried out in intensive care settings are marked by their high complexity and moments of dispersion that may occur during patient care. Several measures have been incorporated into these activities, such as operational checklists, double checks and assessments of professional stress and workload. The inclusion of these measures reflects a growing trend aimed at ensuring the safety and quality of the work carried out by professionals and reducing the risk of errors and accidents[4-5].

One of the instruments used to measure workload is the Nursing Activities Score (NAS), designed according to the reality of nursing work in Intensive Care Units (ICUs). The NAS considers the complexity of care, the severity of illness of the patients, and the nursing activities performed, allowing the evaluation of the necessity for additional staff during periods of heightened work demand. This measure is essential for ensuring the quality of care and patient safety, while also contributing to the recognition of the team's work[6-8].

There is a clear need for investigating nursing workload in intensive care. On the other hand, scholars highlight limitations in studies assessing this phenomenon in the context of neonatal ICUs (NICUs). There is a significant association between nursing workload in these units and the notification of incidents related to inadequate staffing, which increases the probability of fatigue, distractions and errors during work, ultimately compromising patient safety and quality of care[9-11].

Based on the above, it is important to gather the knowledge available in the literature concerning nursing workload in NICUs in order to support decision-making and evidence-based practice. Furthermore, this effort will allow identifying scientific gaps and making recommendations for new studies that support the development of strategies to promote healthier work environments.

In this context, the objective of the study is to analyze the evidence related to the workloads of neonatal intensive care nursing professionals.

MATERIAL AND METHODS

The type of study selected to present this synthesis of knowledge is the Integrative Review. The theoretical framework adopted recommends six stages of investigation: formulating the review question; conducting a literature search for primary studies; determining the information to be extracted from selected studies; evaluating the included studies; analyzing the data; synthesizing and presenting the review[12].

The formulated review question was: What insights does the available evidence provide regarding the workloads of nursing professionals in neonatal intensive care? The PICo mnemonic[13] was used to structure the question, with the following specifications: Population- nursing professionals; Phenomena of Interest- workloads; Context- neonatal intensive care.

The literature search was conducted in March 2023 in freely available databases, which were accessed remotely through the journal portal of the Coordination for the Improvement of Higher Education Personnel (CAPES), via the Federated Academic Community (CAFe). The following databases were consulted: Nursing Database (BDENF); Latin American and Caribbean Health Sciences Literature (LILACS), via the Virtual Health Library (VHL); Medical Literature Analysis and Retrieval System Online (MEDLINE), via PubMED; Web Of Science; and Scopus.

The components associated with the PICo mnemonic directed the definition of controlled and uncontrolled terms, using the Health Sciences Descriptors for terms in Portuguese, and the Medical Subject Headings (MeSH) for terms in English. These terms were then combined using the Boolean operators AND and OR, leading to the formulation of search expressions for each database, as outlined in Table 1.

Table 1 - Search expressions used in the consulted databases. Teresina, PI, Brazil, 2023.

Database	Search expression
BDENF and LILACS, via BVS	((mh:(''Profissionais de Enfermagem'')) OR (''Profissionais de Enfermagem'')) AND ((mh:(''Carga de trabalho'')) OR (''Carga de trabalho'') OR (''Carga de trabalho do funcionário'')) AND ((mh:(''Terapia Intensiva Neonatal'')) OR (''Te-rapia Intensiva Neonatal'') OR (''Terapia Intensiva do Recém-Nascido''))
MEDLINE, via PubMED	(((“nursing staff”[MeSH Terms]) OR (“nursing staffs”[All Fields])) AND ((“workload”[MeSH Terms]) OR (“workloads”[All Fields]))) AND ((“intensive care, neonatal”[MeSH Terms]) OR (“intensive care neonatal”[All Fields]))
Web Of Sciencex	(ALL=(nursing staff) OR ALL=(nursing staffs)) AND (ALL=(workload) OR ALL=(workloads)) AND (ALL=(intensive care neonatal) OR ALL=(intensive care neonatal))
Scopus	((TITLE-ABS-KEY (nursing staff) OR TITLE-ABS-KEY (nursing staffs))) AND ((TITLE-ABS-KEY (workload) OR TITLE-ABS-KEY (workloads))) AND ((TITLE-ABS-KEY (intensive care neonatal) OR TITLE-ABS-KEY (in-tensive care neonatal)))

Source: elaborated by the authors, 2023.

After that, the references were exported to the Rayann[14] manager, where they were screened according to the inclusion criteria: primary studies related to the topic, published in Portuguese, Spanish and/or English. Publications such as editorials, letters to the editor, monographs, dissertations and theses were excluded. No specific time frame was applied and duplicate texts were considered only once.

The previous stage was conducted by two independent reviewers and divided into two phases. In the first step, the title and abstract of the publications were read and the eligibility criteria were applied. Afterwards, the potentially eligible studies underwent a full-text review. In cases of disagreement during the selection process, the opinion of a third reviewer was sought. The process was carried out according to the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[15].

An instrument developed in consensus by the authors was used to extract data from the studies included in the review. The instrument encompassed the variables: authors, year, study country, journal, methodological aspects, and main results.

The Level of Evidence (LE) was classified according to the model proposed by Melnyk and Fineout-Overholt (2005): level I – evidence from a systematic review or meta-analysis of all relevant randomized controlled trials or from clinical practice guidelines based on systematic reviews of randomized controlled trials; level II – evidence from at least one well-designed randomized controlled trial; level III – evidence from well-designed controlled trials without randomization; level IV – evidence from well-designed cohort and case-control studies; level V – evidence from systematic reviews of descriptive and qualitative studies; level VI – evidence from a single descriptive or qualitative study; and level VII – evidence from the opinion of authorities and/or reports of expert committees[16].

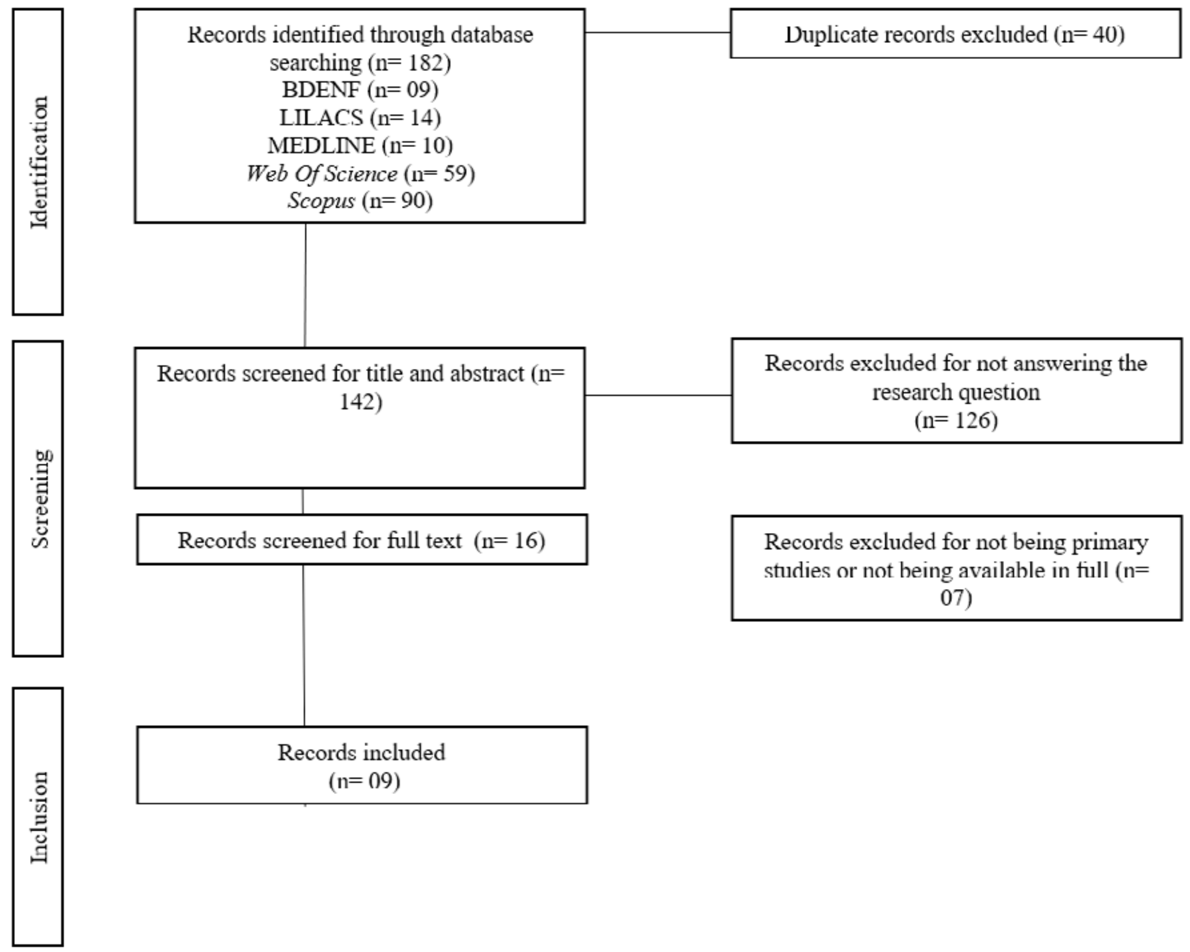
The data were analyzed and synthesized descriptively, and the results are presented in tables for better understanding.

Given the nature of this review study, in which data is collected from published articles available in the literature, approval from a Research Ethics Committee was not necessary.

RESULTS

The process of selection of primary studies for inclusion in the review is illustrated in Figure 1. Out of the 182 publications initially identified in the databases, nine primary studies met the eligibility criteria and were included in the review sample.

Figure 1 - Flowchart of the process of selection of primary studies included in the integrative review according to PRISMA. Teresina, PI, Brazil, 2023.



Source: elaborated by the authors, 2023.

Among the included studies, most were published in 2019 and five were published in Brazil. In terms of methodological design, six were cross-sectional studies, classified as level of evidence VI. As for the main results of the studies, it was noted that understaffing is associated with heightened workloads, which, in turn, impact the care provided to newborns, elevate the likelihood of adverse events, and contributes to the risk of infections, morbidity and mortality.

Table 2 - Descriptive summary of primary studies included in the integrative review. Teresina, PI, Brazil, 2023.

Authors	Year/country/journal	Methodological aspects	Level of Evidence	Main results
Franco APV, de Almeida Hamasaki BP, de Puiz LR, Dorigan GH, Dini AP, Carmona EV[17]	2021/Brazil/Revista de Enfermagem da UERJ	Descriptive and cross-sectional study	VI	A high workload was identified, which may have an impact on the safety of care. Birth weight and gestational age were found to be factors contributing to an increase in professionals' workload.
Azadi M, Azimian J, Mafi M, Rashvand F[18]	2020/ Iran/Journal of Clinical & Diagnostic Research	Cross-sectional analytical study	VI	Nurses working in NICUs experienced a higher level of workload compared to other professionals investigated
Grebinski ATKG, Biederman FA, Berte C, Barreto GMS, de Oliveira J LC, dos Santos EB[19]	2019/Brazil/Enfermagem em Foco	Cross-sectional documentary and quantitative study.	VI	There was a shortage in the number of professionals, resulting in understaffing of NICU nurses.
Küng E, Waldhör T, Rittenschober-Böhm J, Berger A, Wisgrill L[20]	2019/Austria/Scientific Reports	Retrospective cohort study	IV	A greater nursing workload is associated with a greater occurrence of bloodstream infections in newborns with very low birth weight.
Tubbs-Cooley HL, Mara CA, Carle AC, Mark BA, Pickler RH[21]	2019/USA/JAMA Pediatrics	Prospective descriptive study	VI	NICU nurse workload is significantly associated with missed nursing care.
Sassaki RL, Cucolo DF, Perroca MG[22]	2019/Brazil/Revista Brasileira de Enfermagem	Cross-sectional descriptive study	VI	Interruptions in the medication process are frequent, interfere with the nursing workload and can affect the safety of care.
Branco LLWV, Beleza LO, Luna AA[23]	2017/Brazil/Revista de Pesquisa Cuidado é Fundamental Online	Exploratory and quantitative study	VI	A dissociation between workload and the clinical complexity of the patient was observed.
Lamy Filho F, da Silva AA, Lopes J, Lamy ZC, Simões VM, Santos AMD[24]	2011/Brazil/Jornal de Pediatria	Prospective cohort study	IV	The workload of NICU professionals appears to impact the intermediate outcomes of neonatal care.
Tucker J, UK Neonatal Staffing Study Group[25]	2002/United Kingdom/ The Lancet	Quasi-experimental study	III	Neonatal mortality was raised with increasing workload.

Source: elaborated by the authors, 2023.

DISCUSSION

The nursing workload is associated with work processes, cultural aspects, the profile of professionals, the degree of patient dependence, the complexity of illness, and the availability of equipment and physical structure. Nevertheless, it should not be regarded as a standalone indicator when the objective is to assess the quality of nursing care[26].

Comprehensive transformations in processes that lead to ideal working conditions are challenging, as they require resources, interest from management, and oversight from competent bodies. This underscores the necessity of monitoring nursing activities in order to observe and comprehend the realities within the work environment, identifying workloads and understanding how they impact the worker's health and the care provided[27-28].

It has been demonstrated that high workloads have a negative effect on the activities performed by nursing workers, as they interfere with the health-disease process, increase the risk of occupational accidents, contribute to absenteeism, and cause physical, biological, chemical, physiological and psychological strain, which includes irritability, neoplasms, falls, sharps injuries, respiratory infections, dermatitis, stress, depression and anxiety[2,29].

Despite the availability of the NAS tool, it is designed for a culture and context different from the Brazilian reality. Therefore, it fails to account for the specificities of Brazilian workers, whose functions are determined according to their level of training (higher or technical). This represents a limitation of the instrument. Consequently, when making decisions, it is

essential to not only consider the results obtained with this scale, but also take into account and respect the competencies of each professional[4,23].

In critical care environments such as NICUs, the nursing team and other healthcare professionals encounter specific challenges in their daily routines, according to the characteristics of the patients. Newborns (NBs) have immature immune systems, undergo prolonged hospitalizations, engage in multiple nurse-patient interactions, experience invasive procedures, and receive visits from parents and siblings around the clock. Additionally, the absence of individual or isolation rooms leads to a higher susceptibility to infections[30].

The findings demonstrate that the workloads of nursing professionals in NICUs are notably higher when compared to other intensive care settings. Supporting this observation, a cross-sectional analytical study involving 214 professionals in the category revealed that the average workload score was significantly higher among professionals working in the NICU compared to those in adult and coronary ICUs[18].

A different study aimed at measuring the workload of the nursing team in a NICU and determining the staff needed to meet this demand found an average score of 749.9 points, a significantly high value. The authors reinforced the idea that the greater the patient's complexity, the higher the nursing workload[19].

Furthermore, the aforementioned study highlighted that the elevated workloads led to a substantial shortage of higher education professionals, failing to meet the staffing recommendations of professional representative bodies. Determining the appropriate nurse/patient ratio is essential for optimizing health-related outcomes and patient recovery and ensuring the effective functioning of the hospital, preventing the waste of economic resources[19,31].

A Brazilian study that assessed the workload of nursing professionals over two months found values of 50.0 for November and 48.5 for December. Based on these results, the optimal quantity of nursing human resources was tabulated. Discrepancies between the ideal and actual number of professionals were found on all days of data collection.[23].

In another study, an average workload of 73% was reported, with an average of 74% in intensive care beds and 64% in semi-intensive care within a NICU. Scores above 50% are considered high NAS scores, implying that a nursing professional would be able to fully care for only one patient per work shift[17].

Understaffing in nursing is a recurrent issue that is considered to contribute to the increase in workloads. Scholars argue that, in order to mitigate risks for critical patients, it is necessary not only to ensure adequate staffing, but also to qualify the nursing workforce in intensive care. However, this is not the reality in the majority of health services[32].

Because of the disparities observed in staffing levels, it is advisable to reevaluate the legislation concerning the appropriate staffing ratio per bed in order to adequately determine the number of professionals needed and provide safe assistance to newborns in critical care[33].

The complexity of caring for newborns adds to the challenges posed by inadequate staffing. The more critical the condition of one of the patients in the NICU, the higher the workload, resulting in a significant amount of missed nursing care. An American investigation identified that, during a shift, the amount of applicable care missed ranged from 9% to 100%, leading to the conclusion that there is an association between nurse workload and the odds of missed care for infants[21,34].

The omission of necessary care in the treatment and recovery of NICU patients can be considered a lapse on the part of the nursing team, eroding trust in professionals, and contributing to the occurrence of adverse events. In this context, the effects of nursing workloads on the incidence of adverse events have been an object of interest for researchers and, notably, for health managers[3,35].

A study observed Brazilian Neonatal Intensive Care Units over a six-month period. During this time, researchers monitored 136 newborns undergoing mechanical ventilation and identified the occurrence of 117 adverse events. They noted that the higher the number of newborns classified according to the care demand by nurses and nursing technicians, the greater the probability of intermediate adverse events related to invasive procedures. The researchers concluded that the nursing workloads influenced the intermediate outcomes of neonatal care[24].

In addition to the risks associated with procedures such as mechanical ventilation, newborns are also vulnerable to medication errors. A study aimed at investigating sources and causes of interruptions in the medication administration process carried out by the nursing team, as well as measuring their frequency, duration and impact on workload, found 63 interruptions in the 121 medication rounds observed[22].

Still in the topic of interruptions and their impact on nursing workload, it was observed that professionals spent more time preparing medications. An increase in time also occurred in the administration and documentation stages. The findings suggest that interruptions in clinical nursing practice, particularly during medication administration, have implications for patient safety, quality of care and the nursing team's workload[22].

Considering the risks discussed, another issue that must be emphasized is the association between high workloads and the incidence of infection and neonatal mortality. Scholars associate heavy workloads to the occurrence of bloodstream infections in newborns with very low birth weight. Furthermore, understaffing and unit overcrowding have been linked to recurrent outbreaks of *Staphylococcus aureus*. A shortage of human resources can be associated with poor hygiene practices, a combination proven to exacerbate pathogen outbreaks in NICUs[20,25,36-37].

The evidence demonstrates the impact of workloads on patient care and safety. However, none of the authors explored the relationship between workloads and the physical and mental health of nursing professionals. It is crucial to consider that overworked employees are susceptible to job burnout and other manifestations of physical and mental illness. These conditions lead to absenteeism, high staff turnover, reduced quality of care, prolonged hospital stays, and errors in healthcare[2].

One of the limitations of this review was the level of evidence of the included studies, which failed to establish a cause-effect relationship between the investigated variables. Nevertheless, the findings led to critical reflection on factors

associated with the workload of the NICU nursing team. In this context, it is recommended to invest in robust research that not only delves more deeply into the implications of workload for the quality of care, but also investigates its effects on occupational health.

CONCLUSION

The study revealed that the workloads of nursing professionals are elevated and have a direct impact on the quality of the care provided to patients in the NICU, as they are related to inadequate staffing, leading to delays and omissions in activities within the team's responsibilities. This factor hampers comprehensive care and can contribute to adverse events.

The condition identified and associated with nursing work demonstrates the need to adjust staffing in critical care sectors. This calls for increased supervision and monitoring by entities representing the category, as well as dialogue with the management of health services.

The knowledge gathered here has allowed the identification of a gap in the discussions concerning the relationship between workloads and worker health. Therefore, studies should identify the factors related to nursing professional's health issues that are linked to workloads. This will enable the development of strategies that promote health in the work environment, fostering improvements in the quality of care and patient recovery.

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