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REVISIONES

Application of Nursing Activities Score (NAS) in different types of ICUs: an integrating review

Aplicação do Nursing Activities Score (NAS) em diferentes tipos de UTI´s: uma revisão integrativa

Aplicación del Nursing Activities Score (NAS) en diferentes tipos de UCI's: una revisión integrativa

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ABSTRACT:

Objective: To compare the nursing workload measured by the Nursing Activities Score (NAS), between intensive care unit general adult ICU, and specialized surgical, cardiologic and trauma type.
Methods: A literature review of the integrative type was carried out, searching the databases BDENF, LILACS, MEDLINE, and SCIELO, using the descriptors nursing, Intensive Care Unit, workload and Nursing Activities Score. They met the inclusion criteria 20 articles published in the period 2007 to 2017.
Results: They show a high workload in the ICU, both in general ICUs and in all of the cited specificities, the same with a NAS score> 50.00, especially the trauma ICU, which was characterized with higher scores 72.00 and 71.3.
Conclusion: In much of the research, the average number of nursing professionals calculated by the NAS is higher than the average number of professionals required by the legislation. It was observed that even in ICUs with the same specificity it was possible to perceive large differences in the mean of the NAS score, in this way, we understand that despite having the same specificity, the profile of the patient as well as that of the institution has its peculiarities requiring time to different assistance and consequently divergences in sizing.

Palavras-chave: nursing; Intensive care unit; work load; Nursing Activities Score

RESUMO:
Objetivo: Comparar a carga de trabalho de enfermagem medida pelo Nursing Activities Score (NAS), entre unidade de terapia intensiva UTI geral adulto, e especializadas do tipo cirúrgica, cardiológica e trauma.
Métodos: Foi realizada uma revisão de literatura do tipo integrativa, com busca nas bases de dados BDENF, LILACS, MEDLINE, e SCIELO, utilizando-se os descritores enfermagem, Unidade de Terapia Intensiva, carga de trabalho e Nursing Activities Score. Atenderam aos critérios de inclusão 20 artigos publicados no período de 2007 a 2017.
Resultados: Evidenciam elevada carga de trabalho em UTI, tanto em UTIs geral quanto em todas as especificidades citadas, as mesmas com pontuação NAS > 50,00, destacando-se a UTI de trauma o que caracterizou-se com maiores escores 72,00 e 71,3.
Conclusão: Em grande parte das pesquisas, a média de profissionais de enfermagem calculada pelo NAS é superior à média de profissionais requerida pela legislação. Observou-se que mesmo em UTIs com a mesma especificidade pôde-se perceber grandes diferenças na média do escore NAS, dessa forma, entendemos que apesar de possuir a mesma especificidade, o perfil do paciente assim como o da instituição tem suas particularidades demandando tempo de assistência diferente e consequentemente divergências no dimensionamento.

Palavras-chave: enfermagem; Unidade de Terapia Intensiva; carga de trabalho; Nursing Activities Score.

RESUMEN:
Objetivo: Comparar la carga de trabajo de enfermería medida por la Nursing Activities Score (NAS), entre la unidad de cuidados intensivos general de adultosy especializadas de quirúrgico, cardiología y trauma.
Métodos: Realización de una revisión de la literatura del tipo integrativa. Búsqueda en las bases de datos BDENF, LILACS, MEDLINE, SCIELO, utilizando los descriptores enfermería, Unidad de Cuidados Intensivos, Carga de trabajo y Nursing Activities Score. Atendieron a los criterios de inclusión 20 artículos publicados en el periodo de 2007 a 2017.
Resultados: Evidencian elevada carga de trabajo en UCI, tanto en UCIs general como en todas las especificidades citadas, las mismas con puntuación NAS > 50,00, destacando la UCI de trauma lo que se caracterizó con mayores marcadores 72,00 y 71,3.
Conclusión: En gran parte de las investigaciones, la media de profesionales de enfermería calculada por la NAS es superior a la media de profesionales requerida por la legislación. Se observó que incluso en UCIs con la misma especificidad se perciben grandes diferencias en la media de la puntuación NAS, de esta forma, entendemos que a pesar de tener la misma especificidad, el perfil del paciente así como el de la institución tienen sus particularidades demandando tiempo de asistencia diferente y consecuentemente divergencias en el dimensionamiento

Palabras clave: enfermería; Unidad de Cuidados Intensivos; carga de trabajo; Nursing Activities Score.

INTRODUCTION

The Intensive Care Units (ICUs) arose from the need to offer a differentiated care to the critical patients in an uninterrupted manner. This intensive and specialized care requires technological resources, and that all professionals involved have a high standard of knowledge, as well as specific competencies to work in the area. With the evolution of this practice, the units were segregated in clinical, surgical, cardiological ICU, among other specialties, to attend adults, children and newborns [(1)]

The determination of the quantity and the qualification of the nursing team are indispensable to ensure quality nursing care, especially in relation to the critically ill patient due to hemodynamic instability and service complexity. As the nurse is the member of the nursing team with greater technical and scientific preparation, an inadequate dimensioning of this professional can bring losses in the quality of care and the health of the worker, as a consequence of the work overload [(2)].

Currently, to offer subsidies to nurses in the dimensioning of nursing personnel, the Federal Nursing Council (COFEN) through the new resolution (COFEN) n. 543/2017 [3], resolution No. 293/04, establishes and establishes parameters for sizing the minimum amount of the professional staff for health care coverage.

The Resolution of the Collegiate Board of Directors (CBD) n. 26 of May 11, 2012 can also be found which provides the minimum requirements for the operation of ICU`s, including human resources, in which it provides that the team must be quantified quantitatively according to the care profile, sector demand and current legislation [4].

The assistance to critically ill patients is a difficult task, since the service dynamics itself precludes moments of reflection on care, therapeutic behaviors among health professionals working in the sector, among other competencies. Therefore, the use of instruments capable of correctly dimensioning the professionals, provides better working conditions, consequently a more humanized and safe nursing care, both for the patient and for the nursing professional [5].

Given the need to take into account patients' individuality and differentiated time demands, some tools emerged with the objective of characterizing the nursing workload in the ICU, in order to show in a real way the nursing hours spent directly and indirectly in patient care [6].

The Nursing Activities Score (NAS) is currently one of the most important tools as an instrument for measuring the workload of nursing staff in the ICU and aims to measure the number of hours spent by the professional in the care of patients, not only tasks, but also managerial activities of nursing, as well as the time of care spent supporting the patient's family. Thus, helping in the best dimensioning of nursing professionals in the Intensive Care Unit [7].

The NAS consists of 23 items of therapeutic interventions, subdivided into seven categories: basic activities, ventilator support, cardiovascular support, renal support, neurological support, metabolic support and specific interventions. The category of basic activities includes support and care for family members, administrative activities, and other activities related to care, such as monitoring and control, hygiene procedures, mobilization and positioning[8].

Each item that composes the mentioned activities is assigned a score, in which the final score represents the percentage of time spent by the nursing professional in the patient care in the last 24 hours, that is, a score of 100 means that the patient needed 100% of the work time of the nursing professional to perform their care. Turning to the assistance time provided, each NAS point equals 14.4 minutes. The total score obtained by the sum of the points is directly related to the percentage of time spent by a team professional in patient care, which can reach up to 176.8%, so a nurse or nursing technician can take care of a shift, of up to two patients whose achieved NAS was 50% [8,9].

Taking into account the information mentioned above, based on the idea that a group of patients with distinct characteristics require demands for care, planning and human resource sizing according to their specific needs, the present study aims to compare the workload of nursing measured by NAS, between general adult ICU, specialized surgical, cardiologic and trauma type. The same is justified due to the limitation of

publications that carried out research on the measurement of workload of Nursing staff from the NAS, above all, comparing general and specific ICU.

METHOD

It is an integrative review in which studies related to the subject have been condensed, allowing the achievement of general conclusions.

According to Brevidelli and Sortório [10], the following steps are necessary to construct an integrative review: Identification of the theme, selection of the research guiding question, establishment of inclusion and exclusion criteria, identification and characterization of selected studies, analysis and interpretation results and presentation of the review.

For the present study, the following guiding question was elaborated: There is a difference between the nursing workload required for the care of patients in different types of ICUs from the use of NAS?

The search for literature occurred in July 2018 in the following databases: Latin American and Caribbean Literature in Health Sciences (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Scientific Electronic Library Online (SCIELO) and Database of Nursing (BDENF), through an online consultation to the Virtual Health Library (VHL). The descriptors used by the classification of Descriptors in Health Science (DeCS) were: Nursing, Intensive Care Unit; Workload and Nursing Activities Score. They were used in association using the Boolean operator AND.

Original articles were available online and in full that included the proposed theme and works in which the NAS was used exclusively in ICUs, regardless of language, year of publication of the journal, and methodologies used, except for integrative reviews, filtered by title and summary, followed by careful reading and analysis of the selected studies.

RESULTS

Initially, 344 studies were found that after reading the titles and abstracts, analysis of the inclusion and exclusion criteria and duplicate articles, 110 articles were left. From these, after the thorough and thorough reading of the works, 20 publications were obtained that answered the guiding question proposed.

The selected studies are distributed in the tables below, considering information such as authors, year, country, type of study, objectives, number of participants, ICU specificity, NAS score and results. The characterization of the works, summarized in table 2, are distributed in order to provide a better reading of the results.

The selected publications occurred between 2007 and 2017, an average of 1 article per year was published, the years 2014 and 2015 presented more publications, with 6 and 3 articles respectively.

The countries where the surveys took place were Brazil, Greece, Italy, Norway, the Netherlands, Spain, Poland and Egypt. The largest number of studies was found in

Brazil (17), followed by Greece (3), this number took into account the publication of Padilha [11] performed in 7 ICUs from different countries.

Regarding the specificities of the ICUs, 4 publications carried out the study in more than 1UTI with different specificities, in view of the purpose of this work, for the purpose of calculation, the results of each ICU will be analyzed in a segregated way, in this way, 14 investigations were performed in General ICU, 7 in Surgical ICU, 3 in cardiology ICU and 2 in ICU of trauma.

The publication with the largest number of participants was the Lucchini study (12), which obtained the largest sample in the general ICU (2,308), surgical ICU (1960), and cardiology ICU (1588), representing a total of 5,856 participants. In the others there was variation between 23 and 758 participants.

Among the 20 articles selected, in 17 (80%) there was a predominance of males, and three of them did not present sex as a variable in the study, ten were published in Portuguese and ten in English. It was observed that the type of research was predominant in the Cohort (9), followed by transverse (6) and observational (5) types, of which eight were prospective and 4 retrospective studies.

Table 1. Distribution of selected publications according to database.

Data bases	BDENF	LILACS	MEDLINE	SCIELO	TOTAL
Publications found	16	34	40	20	110
Excluded for not having free access	00	00	06	00	06
Excluded for not being in full	01	00	04	00	05
Deleted due to being repeated in other databases	14	27	18	17	76
Total of selected publications	02	07	08	03	20

Soure:(Research data, 2018)

Table 2. Summary table with general and specialized ICU articles according to authorship, year, country, type of study, objective, number of participants, NAS score and search results.

Author, Year, Country	Type of study	Objectives	Number of participants	Specificity of the ICU	NAS points	Results
Conishi; Gaidzinski 2007, Brasil	Cross-sectional	To evaluate the applicability of the NAS as an instrument of measurement of the workload of the nursing team in General-adult ICU.	33	General	65.5	The NAS as an interesting and valuable instrument for classification assessment and assessment of workload for use of intensive care nursing
Gerasimou-Angelidi 2014, Grécia	Observational	To study family satisfaction with ICU care and its association with nursing workload estimated by the NAS	106	General	36,1	Total family satisfaction was high
Siqueira *et al* 2015, Brasil	Prospective Cohort	Correlate patient severity and nursing team workload, using the indexes (SAPS3) (NAS) and compare them among three subgroups: cardiologic, neurological and general	120	General	67.94	There was a moderate correlation between the severity of the neurological patient and the nursing workload, using the NAS and SAPS3 indices. In the subgroup of general patients, severity and workload were higher when compared to subgroups, neurological and cardiologic.
Cremasco *et al* 2009, Brasil	Cross-sectional Prospective	Verify association between occurrence of PU in critically ill patients with Braden scale scores, NAS, and patient severity.	74	General	63.4	The workload was not associated to the occurrence of PU, but as a predictor of risk
Ducci; Padilha 2008, Brasil	Observational Retrospective	Analyze NAS performance for prospective workload measurement and compare prospective and retrospective NAS data.	104	General	59.8	The prospective NAS presented good performance for the measurement of nursing workload in the ICU
Lucchini *et al* 2014, Itália	Observational Retrospective	To retrospectively analyze the application of NAS in ICU.	2308	General	72.55	The NAS can determine the adequacy of the nursing team in all ICU settings

Author, Year, Country	Type of study	Objectives	Number of participants	Specificity of the ICU	NAS points	Results
Coelho *et al* 2017, Brasil	Retrospective cohort	To evaluate the nursing workload in intensive care patients with (AKI).	190	General	43.7	Patients who developed AKI (44.2%) had superior NAS when compared to those without AKI (43.7% vs. 40.7%).
Padilha *et al* 2015,Norueg, Holanda, Espanha, Polônia, Egito. Brasil, Grécia	Cross-sectional	Describe the NAS scores in different countries and check the agreement between the countries on the interpretation of the NAS guidelines.	758	General	General average (72.8) Norway(101.8) Holland (51.0) Spain (44.5) Poland(83.0) Egypt (57.1) Brazil (54.0) Greece (64.6)	The nursing workload observed in the ICUs of the seven countries presented a great degree of variation of the NAS.
Silva *et al* 2010, Brasil	Prospective Cohort	To characterize the patients hospitalized in ICUs of hospitals with intermediate units, regarding the demographic and clinical data, and to identify the factors related to discharge for this unit.	600	General	61.92	Factors associated with discharge to the intermediate unit were: age ≥60 years, antecedents related to the nervous, circulatory or respiratory system, origin of the intermediate unit.
Cremasco *et al* 2012, Brasil	Prospective Cohort	To verify the association between the development of PU with the nursing workload and the severity of the disease and the relation of the workload and severity of the disease with Braden scale score	160	General	62.9	Nursing workload, disease severity, sex and length of stay in the ICU were identified as risk factors associated with the development of PU. Workload revealed as a protection factor for PL development.
Daud- Galloti *et al* 2012, Brasil	Prospective Cohort	To evaluate the role of the nursing workload in the occurrence of HRI using the NAS.	195	General	51	The burden of excessive nursing work was the main risk factor for the development of infections associated with health care.
Nogueira *et al* 2015, Brasil	Retrospective Cohort	To analyze the influence of the nursing workload on the occurrence of HRI in hospitalized patients	530	General	71.3	The nursing workload had no influence on the occurrence of HRI
Padilha *et al* 2008, Brasil	Observational	Describe the nursing workload using the NAS, and association between the NAS and patient variables.	200	General	67.2	Therapeutic interventions, rather than disease severity, played a preponderant role in determining the nursing workload in ICUs.

Author, Year, Country	Type of study	Objectives	Number of participants	Specificity of the ICU	NAS points	Results
Padilha *et al,* 2010, Brasil	Observational	Identify the daily workload of nursing	68	General	63.7	The number of nursing staff was overestimated, indicating that costs could be reduced without implications.
Giakoumidakis *et al* 2011, Grécia	Prospective cohort	To identify the factors that can affect the length of stay in the ICU among cardiac surgery patients.	313	Surgical	>61.6	Increased levels of nursing workload and high perioperative risk are factors strongly associated with longer ICU stay.
Nogueira *et al* 2015, Brasil	Retrospective cohort	To analyze the influence of the nursing workload on the occurrence of HRI in hospitalized patients.	305	Surgical	71.6	The nursing workload had no influence on the occurrence of HRI.
Lucchini *et al* 2014, Itália	Observational Retrospective	To retrospectively analyze the application of NAS in the ICU.	1960	Surgical	59.33	The NAS can determine the adequacy of the nursing team in all ICU settings.
Altafin *et al* 2014, Brasil	Prospective cohort	To evaluate the nursing workload in an adult intensive care unit.	437	Surgical	74.47	High nursing workload in the study.
Coelho *et al* 2011, Brasil	Cross-sectional	Identify the nursing workload in the ICU of Cardiology and verify the association of this variable with demographic and clinical characteristics of patients.	77	Surgical	66.36	Patients admitted to the cardiology ICU required a high workload.
Oliveira *et al* 2015, Brasil	Prospective cohort	Identify factors associated with the nursing workload of patients the postoperative of cardiac surgery.	187	Surgical	58.1	Factors associated with the increase in NAS were: length of stay of the patient in the ICU and the presence of complications.

Author, Year, Country	Type of study	Objectives	Number of participants	Specificity of the ICU	NAS points	Results
Siqueira *et al* 2015, Brasil	Prospective cohort	Correlate patient severity and nursing team workload, using the indexes (SAPS3) (NAS) and compare them among three subgroups: cardiologic, neurological and general.	29	Surgical	62.97	There was a moderate correlation between the severity of the neurological patient and the nursing workload, using the NAS and SAPS3 indices. In the subgroup of general patients, severity and workload were higher when compared to subgroups, neurological and cardiologic.
Siqueira *et al* 2015, Brasil	Prospective cohort	Correlate patient severity and nursing team workload, using the indexes (SAPS3) (NAS) and compare them among three subgroups: cardiological, neurological and general.	46	Cardiologic	58.88	There was a moderate correlation between the severity of the neurological patient and the nursing workload, using the NAS and SAPS3 indices. In the subgroup of general patients, severity and workload were higher when compared to subgroups, neurological and cardiologic.
Coelho *et al* 2011, Brasil	Cross-sectional	Identify the nursing workload in the ICU of Cardiology and verify the association of this variable with demographic and clinical characteristics of patients.	23	Cardiologic	67.65	Patients admitted to the cardiology ICU required a high workload.
Lucchini *et al* 2014, Itália	Observational Retrospective	To retrospectively analyze the application of NAS in ICU.	1588	Cardiologic	63.51	The NAS can determine the adequacy of the nursing team in all ICU settings.
Nogueira *et al* 2014, Brasil	Cross-sectional	Identify factors related to high nursing workload for victims of trauma.	200	Trauma	71.3	The demand for workload was higher in male patients with physiological instability and multiple severe traumatic injuries.
Goulart *et al* 2014, Brasil	Cross-sectional	Assess the workload of nursing and verify the correlation between the load and the severity index APACHE II.	32	Trauma	72	The data showed moderate correlation between workload and patient severity

DISCUSSION

For purposes of analysis and discussion, the selected articles were segregated into four groups, each group represented by a specificity of ICU, so the studies were separated into: general ICU, surgical ICU, cardiac ICU, and trauma ICU.

Of the 20 selected studies 14 were carried out in General ICU, of these 14 surveys, Padilha's article [11] carried out the research in seven different ICUs, establishing a total of 20 general ICUs. It was observed that among the 20 ICUs studied, the majority (17) had a NAS score greater than 50%, with a maximum score of 101.8, a minimum of 36.1 and an overall mean of 62.6. NAS results higher than 50% show a high nursing workload and express that the professional is able to take care of only one patient per shift, especially in situations in which the leak exceeds 70% represented in the publications of Padilha, Lucchini , and Nogueira [11-13].

The exposed values reveal an excess of workload in the nursing professionals, especially in the nurses, since, because they are patients in critical condition, a large part of the procedures performed is exclusive to the professional nurse, not the technician. Because it is endowed with scientific knowledge, nurses have the ability to make quick decisions in the face of intercurrences, besides being responsible for all administrative matters [11-13].

The Gerasimou-Angelidi study [14], differed from the majority of articles performed in general ICU, was performed in Greece and presented a lower NAS score (36.1) when compared to the other studies. This was a retrospective study in which the NAS was calculated in the three shifts, obtaining morning NAS scores of 42.5, late 36.6 and night 29.1, with a mean load of 36.1, and the NAS score the reduction of the number of nurses in this shift in relation to the workload.

In all the studies, the NAS is portrayed as an important instrument for the measurement of nursing workload in the ICU, and in only two studies the NAS score was lower compared to the actual number of professionals present, evidencing a number of professionals overestimated, both in private institutions [15-16], in the others, the number of professionals present was lower than the needs proposed by the NAS. Some studies performed the prospective and retrospective application showing homogeneity in both, but the prospective NAS showed an advantage over the retrospective regarding its use for personnel sizing, since it always considers the scheduling of nursing activities [17].

Seven studies were performed in surgical ICUs in three different countries, Brazil [13,18-21], Greece[22] and Italy[12], only the Altafin study [19] in a private institution, three specifically in cardiac surgical ICU, two in neurological surgical ICU, and two in general surgical ICU, when we compared the NAS score we noticed a high workload in all studies, with a NAS score> 61.6 in 71% of the studies selected, presenting a minimum average of 58.1, maximum of 74.47 and a general average of 64.9.

The publication of Lucchini [12] performed in 3 different types of ICUs presented a lower NAS score (59.33) due to a progressive decrease in the number of patients attended, and reported an increase in adverse events when there was a negative difference between the available nursing team and the necessary staff according to the number stipulated by the NAS. The study by Novaretti [23] corroborates this result, since it points out the influence of the nursing workload demanded by ICU patients as

a risk factor for the occurrence of adverse events and consequently exerts a negative influence on patient safety and length of stay. Only 1 publication did not demonstrate a correlation between an increase in workload and length of stay in the sector [13].

The three studies performed in cardiac ICUs [12,18,21] obtained NAS score 66.00, 58.88 and 63.51 respectively, with a general mean of 62.7, the same ones performed in ICUs of private institutions. It was possible to verify a high workload in all publications, but in a lower score when compared to other specificities, since in all the works related to the cardiology ICU, the nursing workload was measured concomitantly with other specificities of ICUs with objective of comparison. Another factor common to the studies is the male predominance, reduced hospitalization time and low mortality rate, the latter being common to the private institutions of this study. Only one publication [18] shows correlation between NAS score and residence time.

Despite the high NAS scores (63.51 and 67.65), Lucchini [12] and Coelho [18] reported adequate human resources, the studies showed a lower number of mortality than projected by mortality rates, in addition to the reduction of the time of permanence, being able to be associated to a quality nursing assistance consequence of a correct dimensioning of professionals.

Only two studies [24,25] referred to trauma ICU, with NAS scores 72.0 and 71.3 respectively, and overall mean 72.55, they showed a correlation between patient severity and workload, and higher NAS scores at the time of admission, as well as a higher incidence of patients diagnosed with multiple traumas.

Currently in Brazil, DRC n. 26 and the COFEN resolution govern the minimum quantification in the nursing team dimension [3,4]. Although this study included studies carried out in other countries in which the legislation regarding nursing team size may differ, a large part of the studies carried out in Brazil have shown an overload of nursing staff due to under-dimensioning.

When comparing the number of professionals required by the NAS with that stipulated by the legislation, we noticed a very large professional gap, both in DRC No. 26 and in the COFEN Resolution, however, the latter is the one that best suits the Brazilian reality, with numbers closer to the stipulated by the NAS, besides taking into account the complexity of the patient, determining that 50% of the team is made up of nurses, since most of the procedures in critical patient care are exclusive [15-17-18-19-21-24-25].

CONCLUSION

The results of this integrative review show a high workload in the ICU, both in general ICUs and in all of the cited specificities, the same with a NAS score> 50.00, especially the trauma ICU, the type that characterized the highest scores 72.00 and 71.3, thus a greater workload. It can be seen that private institutions have adequate nursing staff size, unlike public institutions, which directly reflects the patient's time of permanence and the clinical outcome of the patient, evidenced by the reduction in the mortality rate.

It was observed that in a large part of the research, the average number of nursing professionals calculated by the NAS is higher than the average number of professionals required by the legislation. Even in ICUs with the same specificity, it was possible to perceive large differences in the mean of the NAS score, in this way, we

understand that despite having the same specificity, the profile of the patient as well as that of the institution has its peculiarities, requiring different assistance time and consequently divergences in sizing, showing that standard numbers provide inadequate sizing.

The main limitation of this study was due to the few publications on nursing workload in specialized ICUs, both in the national and international settings, which restricts the comparisons and findings presented.

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