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RESEARCH

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APPLICATION OF THE NURSING ACTIVITIES SCORE (NAS) IN AN INTENSIVE CARE UNIT (ICU)

Aplicação do Nursing Activities Score (NAS) em uma Unidade de Terapia Intensiva (UTI)

La aplicación del Nursing Activities Score (NAS) en una Unidad de Terapia Intensiva (UTI)

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ABSTRACT

Objectives: to describe the demographic profile of the patients, to measure the nursing workload through the application of the Nursing Activities Score (NAS) instrument and to present the recommended design for the nursing team. **Method**: a prospective and descriptive cross-sectional study developed in the intensive care unit with 10 beds, a university hospital in Rio de Janeiro between May and June 2017, with 138 evaluations in 12 patients for a total of 20 days. **Results**: there was a predominance of females (67%), with a median age of 60.5 years, and an average length of stay of 11.58 days, the percentage of mean NAS observed was 76.9%, corresponding to 18, 4 hours of nursing care in the 24 hours, with recommendation of at least 10 nursing professionals per shift, being 52% nurses. **Conclusion**: the application of NAS adjusted to the recommendations of the Federal Nursing Council contributes to the adequate dimensioning of nursing professionals.
Descriptors: Workload; Intensive therapy; Nursing care.

RESUMO

Objetivos: descrever o perfil demográfico dos pacientes, mensurar a carga de trabalho da enfermagem por meio da aplicação do instrumento Nursing Activities Score (NAS) e apresentar o dimensionamento recomendado para a equipe de enfermagem. **Método:**

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estudo transversal, prospectivo e descritivo, desenvolvido na unidade de terapia intensiva, com 10 leitos, de um hospital Universitário do Rio de Janeiro entre maio e junho de 2017, tendo 138 avaliações, em 12 pacientes, num total de 20 dias. **Resultados:** houve predominância do sexo feminino (67%), com idade mediana de 60,5 anos, e tempo de internação em média de 11,58 dias, o percentual do NAS médio observado foi de 76,9%, correspondendo a 18,4 horas de assistência de enfermagem nas 24 horas, com recomendação de no mínimo 10 profissionais de enfermagem por turno, sendo 52% enfermeiros. **Conclusão:** a aplicação do NAS ajustado às recomendações do Conselho Federal de Enfermagem contribui para o dimensionamento adequado dos profissionais de enfermagem.

Descritores: Carga de trabalho; Terapia intensiva; Cuidados de enfermagem.

RESUMEN

Objetivos: describirel perfil demográfico de los pacientes, medir la carga de trabajo de laenfermería a través de laaplicacióndel instrumento NursingActivities Score (NAS) y presentar eldimensionamiento recomendado para el equipo de enfermería. **Método**: estudio transversal, prospectivo y descriptivo, desarrollado en la unidad de terapia intensiva, con 10 camas, de un hospital Universitario de Río de Janeiro entre mayo y junio de 2017, con 138 evaluaciones, en 12 pacientes, enun total de 20 días. **Resultados**: hubopredominanciadel sexo femenino (67%), conedad mediana de 60,5 años, y tiempo de internaciónenpromedio de 11,58 días, elporcentajedel NAS promedio observado fuedel 76,9%, correspondiendo a 18, 4 horas de asistencia de enfermeríaenlas 24 horas, conrecomendación de por lo menos 10 profesionales de enfermería por turno, siendo 52% enfermeros. **Conclusión**: la aplicacióndel NAS ajustado a lasrecomendacionesdelConsejo Federal de Enfermeríacontribuye al dimensionamientoadecuado de losprofesionales de enfermería.

Descriptores: Carga de trabajo; Terapia intensiva; Cuidados de enfermería.

INTRODUCTION

This study addressed the Nursing Activities Score (NAS) applicability in an Intensive Care Unit (ICU) as a subject, with nursing workload as the object of study.

The ICUs are hospital admission units that are constantly suffering the impact of the new care technologies, since in them are concentrated technological resources and high cost, concentrating also specialized professionals to attend patients in serious condition.[1]

In the hospital environment, the nursing team usually consists of the largest number of professionals, when compared to the other teams, thus resulting in significant expenses. Given these costs, the cost evaluation with these professionals has been one of the focus of the managers of these units, and the measurement of the nursing workload is considered a parameter of paramount importance for the definition of the professional staff.[2]

Therefore, the characterization of the nursing workload in a ICU aims to obtain a quantitative of personnel that ensures quality and an adequate cost-benefit ratio of intensive care. Properly sized staff will not be overwhelmed, thus tending to perform their activities more effectively, offering better patient care and safety.[2]

The use of indicators that objectively assess the patient's clinical condition, as well as the need for care that they require, has become of paramount importance when seeking to improve health care. With regard to nursing, indicators of demands for care are increasingly needed as requirements to ensure the quality of care and to subsidize the quantification of staff in different hospital units, which also applies to ICU.[3]

In the literature, there are several instruments aimed at the measurement of the nursing workload, among them the NAS.[3]

The NAS presents itself as an interesting and valuable instrument for patient classification, which aims to measure the actual nursing workload and the nursing care time required by patients hospitalized in ICUs.[2,4]

So far, it is the most complete and validated instrument in Brazil[5] to measure the nursing workload in the ICU, since in addition to accounting for the time spent on procedures and direct therapeutic interventions to the patient, it also includes indirect activities, such as administrative tasks and support to the patients' family members.[6]

Nonetheless, there are still some shortcomings, since nursing workload includes other factors, not only those related to activities with the patient and their families, for instance, nursing education activities, such as student follow-up and training of employees, which are also part of the duties to be performed by the nurse during his or her work shift.[1]

Given this context, the following question was defined: What is the hourly nursing workload dedicated to patient care, through the application of NAS in an Adult Intensive Care Unit?

It is assumed that these units are characterized by a high workload, since they are intended to serve seriously ill patients, thus requiring advanced technological resources and specialized professionals.

The primary objective of this study was to evaluate the nursing workload dedicated to patient care through the use of the NAS in an adult ICU from a University Hospital.

The secondary objectives were, as follows: To describe the demographic profile of patients hospitalized in the unit; To measure the workload/percentage of nursing time by using the NAS instrument; To present the recommended design for the nursing team of the intensive care unit, according to the NAS.

Hence, the importance of studies of this nature is unquestionable, with the application of instruments translated and validated in Brazil, which aim to estimate nursing workload in the ICU, reason why this research is then justified.[7]

METHODS

In order to reach the proposed objectives, this study had an observational descriptive and equational approach, since it was the one that best suited the research question and the instrument that was used to collect data.

The study follow-up period was cross-sectional, and regarding the temporal direction, a prospective study was proposed.

Place of the study: It was developed in the ICU from a university hospital located in *Rio de Janeiro* city. This ICU has a total of 10 beds, 9 of them common and 1 of respiratory isolation. The sector has a multiprofessional team consisting of nursing, medicine, physiotherapy, nutrition, speech therapy, psychology, and social work. The fixed nursing team that

is directly in the care is composed of: 1 nurse and 5 nurse technicians in the Day Shift (DS) and 2 nurses and 5 nurse technicians in the Night Shift (NS). In the period of the DS the sector also has a floating team of nurses, who are the residents, a total of 15 residents, 8 of the first year and 7 of the second year.

Sample: During the study period the sector had a total of 21 hospitalized patients, where: 4 refused to sign the Informed Consent Form (ICF), 5 patients had no family members and were unable to sign the ICF, the final sample being used in the study. a study composed of 12 patients, with the consent of the ICF.

Data Collection: Data collection was performed through the application of a 2-part instrument, the first part to collect demographic and clinical data such as: age, sex, origin, diagnosis/reason for hospitalization, comorbidities and time and the second part was the Nursing Activities Score (NAS).

It is worth mentioning that, after the data collection instrument was elaborated, a pilot test was carried out with the purpose of evaluating its adequacy to the study objectives, being later discarded, since it was performed in a period prior to data collection.

The data collection was carried out over the period from May to June 2017, in a total of 20 days, with 10 days each month. Within those 10 days were five consecutive days, from Monday to Friday, excluding the weekends (Saturday and Sunday).

The data collection was performed through the records of professionals in the medical records, referring to the previous day and was performed between 7 and 8 AM of all collection days during the DS. In addition to the registration of professionals in the medical record, the collection was also performed through non-participant observation of patient care.

Inclusion criteria: The study had as inclusion criterion only the patients with hospitalization period longer than 24 hours, so that the data referring to the previous 24 hours could be collected.

Data Analysis: After data collection, they were coded and compiled in a computerized database in the Microsoft Office Excel 2007 program. Absolute and relative frequency measures were then used for categorical variables related to demographic and clinical characteristics. And for the continuous variables, the total score of the NAS, the descriptive statistic was used, considering the minimum and maximum variation; average, median and Standard Deviation (SD).

The nursing workload calculation was done by multiplying each point of the NAS by 14.4 minutes.[8]

In order to establish the ideal design of the nursing professionals according to the NAS, the calculation was described in the literature6, which uses the average number of workers estimated by the NAS and adjusts this number according to the Resolution No. 293/2004 from the *Conselho Federal de Enfermagem (COFEN)* [Federal Nursing Council].[9] with an increase in the Technical Security Index-TSI (refers to a percentage increase of 15% in the number of nursing staff to cover all types of absences), thus establishing the proportion of nurses and nurse technicians.

The mathematical formula is described below:

$$PE = (E \times (u\ NAS / 100)) + 15\%$$

Where:
- PE = number of needed nursing professionals.
- E = number of nursing teams.
- u NAS = NAS average scores.

After collecting and analyzing the data, the demographic profile of the patients admitted to the ICU was obtained, as well as the optimal dimensioning of the human resources within the ICU.

Ethical Aspects: The research complied with the norms of the Resolution No. 466/2012[10] and the Resolution No. 510/2016,[11] both from the National Commission of Ethics and Research, which guides research involving human beings. The research was referred to the Research Ethics Committee (REC) of the Hospital and approved by the Legal Opinion No.1.979.550.

A signed ICF was demanded to the patient or family if the patient was unable to sign. In the ICF the ethical principles of autonomy, beneficence, non-malice, and justice were all considered.

RESULTS AND DISCUSSIONW

Considering the final sample composed of 12 patients, 138 NAS assessments were obtained resulting from the evaluation of their daily records.

It should be noted that in the first 10 days of evaluation, the patients' range was higher, where we obtained an average of 7 daily evaluations. Over the next 10 days the range was lower, with an average of 6 daily evaluations.

As a response to the first objective, **Table 1** describes the demographic characteristics of the patients evaluated, as well as the description of particularities of the hospitalization under follow-up.

Table 1 - Demographic data of the population under study, Rio de Janeiro, 2017.

Characteristics	Value
Gender	
Male (%)	4 (33%)
Female (%)	8 (67%)
Age (median)	60.5
ICU staying days (average ± SD) (range)	11.58± 7.22 (2 – 20)

Source: PEREIRA, 2017.

Bearing in mind the patients studied, 8 were female (67%) and 4 were male (33%) and the median age was 60.5 years old, with a minimum age of 32 years old and a maximum of 84 years old. The hospital staying period observed during the data collection (20 days) ranged from 2 to 20 days, with an average of 11.58 days (SD ± 7.22), as shown in **Table 1**.

Regarding the reason for hospitalization, 9 (75%) were due to respiratory insufficiency, 2 (17%) for a postoperative period, and 1 (8%) for a preoperative period. Other causes (septic shock, lowering of consciousness level and diabetic ketoacidosis) were also observed, but all of them were associated with respiratory insufficiency as the primary cause of hospitalization.

Concerning the origin, there was a predominance in 8 (67%) patients from clinical units, followed by 2 (17%) from the surgical center for the postoperative period, 1 (8%) from general care (emergency unit for outpatient care and hospitalization in the various sectors of the hospital) and 1 (8%) of the Cardiac ICU.

With regards to comorbidities, most patients had more than one comorbidity. The most frequent were systemic arterial hypertension present in 7 (58%) patients, followed by diabetes *mellitus*, present in 3 (28%) patients and atrial fibrillation present in 2 (17%) patients. It is noteworthy that only 3 patients of the 12 observed had no comorbidity.

Considering the measurement of the workload/percentage of nursing time by means of the NAS instrument, **Table 2** describes the average score of the patients evaluated, for later analysis of the recommended design.

Table 2 - Mean NAS score from the evaluated patients, Rio de Janeiro, 2017.

Patient number	NAS average by patient	NAS average	Standard Deviation
1	71.43		
2	81.35		
3	77.6		
4	86.76		
5	72.90		
6	90.57	76.98	±10.34
7	87.37		
8	72.42		
9	59.20		
10	76.66		
11	87.60		
12	60.32		

Source: PEREIRA, 2017.

Table 2 shows the NAS average by patient and the NAS average, which in this study was 76.9 points (SD ± 10.34), with a minimum value of 54.2 points and a maximum of 109.2 points.

Evaluating the workload obtained by the NAS in hours, considering that each point corresponds to 14.4 minutes, (76.9 x 14.4 = 1,107.36 / 60 = 18.4h) it was reached a total of 18.4 hours nursing care in patient care.

Due to the fact that some patients presented variations in their nursing care, it was necessary to record the main activities performed during the study period, which can be observed in **Table 3**.

Table 3 - Frequency of the NAS score in the basic activities obtained by the patients, Rio de Janeiro, 2017.

Basic Activities	Frequency	%
1. Monitoring and controling		
1a. Vital time signs, calculation, and recording of the water balance (4.5).	60	43
1b. Presence at the bedside and observation or continuous activity for 2 hours or more at any shift for safety, seriousness or therapy reasons, such as: non-invasive mechanical ventilation, weaning, restlessness, mental confusion, prone position, organ donation procedures , preparation and administration of fluids or medication, aid in specific procedures (12.1).	62	45
1c. Presence at the bedside and continuous observation or activity for 4 hours or more on some shift for safety, seriousness, or therapy reasons, such as the examples above (19.6).	16	12
2. Laboratory investigations: biochemical and microbiological (4.3).	115	83
3. Medication, except vasoactive drugs (5.6).	138	100
4. Hygiene procedures		
4a. Performing hygiene procedures such as wound dressing and intravascular catheters, changing of bedding, patient hygiene in special situations (incontinence, vomiting, burns, secreted wounds, complex surgical dressings with irrigation), special procedures (ex. isolation), etc. (4.1).	128	93
4c. Carrying out hygiene procedures that last more than 4 hours at any shift (20.0).	08	6
4c. Realização de procedimentos de higiene que durem mais do que 4 horas em algum plantão (20,0).	02	1
5. Beware of drains - All (except gastric tube) (1.8).	36	26

Basic Activities	Frequency	%
6. Mobilization and positioning: including procedures such as: change of position, patient mobilization; transfer from bed to chair; mobilization of the patient in a team (e.g. immobile patient, traction, prone position).		
6a. Performing the procedure (s) up to 3 times in 24 hours (5.5).	04	3
6b. Performing the procedure (s) more than 3 times in 24 hours or with 2 nurses at any frequency (12.4).	134	97
6c. Performing the procedure(s) with 3 or more nurses at any frequency. (17.0).	-	-
7. Support and care for family members and patients: including procedures such as phone calls, interviews, counseling. Frequently, support and care, either to family members or patients, allows the team to continue with other nursing activities (e.g. communicating with the patient during hygiene procedures, communicating with family members while sitting at the bedside watching the patient).		
7a. Support and care for family members and patients who require exclusive dedication for about an hour on any shift, such as: explaining clinical conditions, coping with pain and distress, coping with difficult family circumstances (4.0).	07	5
7b. Support and care for family members and patients who require exclusive dedication for 3 hours or more on any shift, such as death, difficult circumstances (e.g. large numbers of family members, language problems, hostile relatives) (32.0).	-	-
8. Administrative and managerial tasks		
8a. Performing routine tasks such as: processing of clinical data, requesting exams, exchange of professional information (e.g. shift, clinical visits) (4.2)	-	-
8b. Performing administrative and managerial tasks that require full dedication for about 2 hours at any shift, such as: research activities, application of protocols, admission and discharge procedures (23,2).	138	100
8c. Performing administrative and managerial tasks that require full dedication for about 4 hours or more of time on any shift, such as: death and organ donation procedures, coordination with other disciplines (30.0).	-	-

Source: PEREIRA, 2017.

Table 3 shows that of the 138 measures performed, the highest percentages obtained in the basic activities referred to the items Monitoring and controls (100%), Laboratory investigations (83%), Medication (100%), Hygiene procedures, Mobilization and positioning (100%), Administrative and managerial tasks (100%).

Table 4 – Frequency of the NAS score in the support activities obtained by the patients, *Rio de Janeiro*, 2017.

Support Activities	Frequency	%
Ventilatory support		
9. Respiratory support: Any form of mechanical ventilation/assisted ventilation with or without positive final expiratory pressure, with or without muscle relaxants; spontaneous breathing with or without positive thin expiratory pressure (e.g. CPAP or BiPAP), with or without endotracheal tube; oxygen by any method (1.4).	130	94
10. Beware of artificial airways. Endotracheal tube or tracheostomy cannula. (1.8).	126	91
11. Treatment for improvement of lung function. Thoracic physiotherapy, stimulated spirometry, inhalation therapy, endotracheal aspiration (4.4).	126	91
Cardiovascular support		
12. Vessel-independent medication of type and dose (1.2).	55	40
13. Intravenous replacement of large fluid losses. Fluid administration >31/m/day, regardless of the type of fluid administered (2.5).	23	17
14. Monitoring of the left atrium. Pulmonary artery catheter with or without cardiac output measurement (1.7).	23	17
15. Cardiorespiratory resuscitation in the last 24 hours (excluding precordial punch) (7.1).	03	2
Renal support		
16. Hemofiltration techniques. Dialytic techniques (7.7).	20	14
17. Quantitative measurement of urine output (e.g. bladder catheter for delay) (7.0).	120	87
Neurological support		
18. Measurement of intracranial pressure (1.6).	-	-
Metabolic support		
19. Treatment of acidosis/complicated metabolic alkalosis. (1.3).	04	3
20. Intravenous hyperfeeding (2.8).	-	-
21. Enteral feeding. Through gastric tube or other gastrointestinal tract (e.g. jejunostomy) (1.3).	104	75

Support Activities	Frequency	%
Specific interventions		
22. Specific interventions in the intensive care unit. Endotracheal intubation, pacemaker insertion, cardioversion, endoscopy, emergency surgery in the last 24-hour period, gastric lavage. Routine interventions without direct consequences for the clinical conditions of the patient, such as: X-ray, ultrasound, electrocardiogram, dressings or insertion of venous or arterial catheters are not included (2.8).	69	50
23. Specific interventions outside the intensive care unit. Diagnostic or surgical procedures (1.9).	03	2

Source: PEREIRA, 2017

Table 4 shows that of the 138 measures performed, the highest percentages obtained in support activities were: Ventilatory support (94%), Renal support (87%) and Metabolic support (75%).

Specific interventions within the ICU scored in 50% of the patients, these interventions referred to the passage of bladder catheter, nasogastric catheter, endotracheal intubation, endoscopy and aid in the installation of central or arterial venous catheters. Of the cardiovascular support activities, referring to the use of vasoactive medications was present in 40% of the patients, care related to drains in 26% support and care to the relatives and patients appeared in 5% of the patients.

Among the demographic characteristics, there was a predominance of the male sex, which is probably justified because they used less primary and secondary healthcare services, thus presenting a greater possibility of more aggressive treatment.[12-3] Herein, there was a predominance of the female gender (67%), which contrasts the researched literature.

With the increase in life expectancy and the aging of the population, the trend is that the demand of the elderly for care in critical units increases.[13-4] In the studies, it was observed the prevalence of patients admitted to the age group above 60 years old.[12,15] Research shows that the hospitalization of the elderly in ICUs accounts for about 52% of admissions.[12] This is in agreement with the data found in the study, where 58% of the patients were older than 60 years old, with a median of 60.5 years old.

Regarding comorbidities, the findings of this study corroborate with the literature, which points out that patients older than 60 years old are more likely to have comorbidities, the most prevalent being systemic arterial hypertension and diabetes *mellitus*.[12,15]

The physical changes associated with the aging process combined with the current illness and the comorbidities point to an increase in notrating costs, the mean time of hospitalization and the recovery of the patient.[14] Advanced age interferes with the prognosis, presenting itself as an important independent factor mortality.[15]

It is desirable that the ICU staying time must be short.[14] The literature points to the average length of stay in the ICU of 5.9 days.[16] However, other factors contribute to an increase in ICU stay, such as the reason for hospitalization, therapeutic requirements, associated comorbidities, age, among others.[12]

This study showed an average of 11.6 days for the ICU staying time, which is considered long according to the literature, which establishes as long hospitalizations between 7-14 days, the high age and the presence of several comorbidities are directly related to the increased hospitalization time.[12]

According to the literature, the emergency units are the main sources of patients in the hospitals that have this service,[15] which differs from the data found in this study, since the hospital does not have an emergency service for external care, and the clinical units are responsible (67%) of ICU admissions, which corroborates with the literature that indicates in this scenario the clinical units as a service of greater origin.[17]

Here, 75% of the hospitalizations were for clinical (non-surgical) reasons, in agreement with a previous study that reports that admissions to ICUs are mostly for non-surgical clinical treatments, reaching 80% of admissions.[15,17]

Acute Respiratory Insufficiency (ARI) was the main reason patients were admitted in this study (75%), which confirms the results of other studies that bring ARI and hemodynamic instability as the most frequent causes of ICU admissions.[14-5]

Septic shock also appears in the literature studied as one of the main causes of hemodynamic instability that motivates hospitalization in the ICUs, which also meets the findings of this study that also brought septic shock as a reason for hospitalization.[14-5]

Concerning the NAS score, the mean was 76.9%, which is considered high when compared to other studies that show that the mean NAS varies between 60 and 70%.[8,18-9]

Observing the item Monitoring and controls, 83% of the scores were related to items 1a and 1b, including vital signs verification, oxygen saturation and water balance recording, vigilance due to agitation, mental confusion, mechanical ventilation and invasive devices.

Considering the laboratory investigations, the item received 83% of the score, then evidencing that the majority of ICU patients are submitted to the collection of laboratory tests. The medication item received 100% of the score, which was to be expected, since all patients admitted to the ICU needed some type of medication support.

In regards to the Hygiene Procedures item, 93% of the patients were scored in item 1a, which were related to normal hygiene procedures, such as changing dressings for vascular accesses, changing wound dressings, changing linen, in others. Regarding the mobilization and positioning, 97% of the scores were referring to item 6b, since 2 nursing professionals were used in their accomplishment, which is a common characteristic of intensive care patients.

In the item Administrative and managerial tasks, we obtained 100% of the score in sub-item 8b, evidencing that the workload is beyond the direct assistance to the patient, since it is also related to the procedures of admission, discharge, application of protocols, and, what was more recurrent in this research, the conference of medications from the pharmacy.

Regarding the items of ventilatory support, renal support and metabolic support, we found, respectively, 94% in item 9, which shows that most of the patients needed some ventilatory support, whether it was invasive or not what was expected, since the majority of admissions had respiratory insufficiency as a reason for hospitalization; 87% in item 17, which was related to measures of quantification of urine output, such as bladder catheterization for relief or delay, which is common in severe patients because they require a strict control of the water balance; and 75% in item 21, related to enteral feeding through a nasogastric or orogastric catheter.

The item specific interventions within the ICU received 50% of the scores and were related to endotracheal intubation, aid in the installation of central venous catheters, bladder catheters passage, nasogastric or orogastric catheters and endoscopies, common procedures in intensive care. The cardiovascular support, related to the use of vasoactive medications, was not one of the most punctuated, appearing in only 40% of the evaluated patients, which was possibly a characteristic of the sample.

Comparing the items and subitems most punctuated in the present research, with the results presented in studies performed in intensive care units,[8,17] we verified that the most punctuated procedures are in agreement with the literature, except for the items of ventilatory support, renal and metabolic, which in the other studies were scored, but in a smaller proportion than the present study.

In order to determine the nursing workload, in hours, we performed the calculation described in the literature,[8] which says that each point of the NAS is equivalent to 14.4 minutes, which gives us a total of 18.4 hours of nursing care to the patient. This time exceeds the hours of nursing care recommended by the *COFEN's* Resolution No. 543/2017[20] that brings that the patients classified as needing intensive care may require 18 hours of nursing care.

This same resolution brings the percentage distribution of nursing professionals that should be 52% of nurses and the other, nurse technicians. Nursing Activities Score was lower than the actual number of professionals present in the ICU, who has 01 registered nurse in the DS and 02 in the NS, and is recommended by the current legislation, which has 04 registered nurses.

There is also the Resolution No. 07/2010[21] from *Agência Nacional de Vigilância Sanitária (Anvisa)* [Brazilian National Health Surveillance Agency], which says that it is necessary at least 01 nurse technician for every 10 (ten) beds or fraction, in each shift and at least 01 nurse technician for every 2 beds in each shift, of effective professionals in the sector to carry out the study adequate to this resolution, however, the NAS is the ideal for quantitative and qualitative evaluation of the professional staff since it is the most complete and validated workload assessment tool in Brazil to date, contemplating 80.8% of nursing activities.[3,5]

In order to establish the ideal design of the nursing professionals according to the NAS, the calculation was described in the literature,6 which uses the average number of workers estimated by the NAS and adjusts this number according to the Resolution No. 293/2004 from the *COFEN*,[9] with an increase in the Technical Security Index-TSI.

Carrying out this calculation with the data obtained here, we have the following:

PE= (6 x (923.74 / 100)) + 15%
PE= (6 x 9.23) + 15%
PE= 55.38 + 15%
PE= 63.68

Hence, a total of 63.68 nursing professionals are required to compose the total picture, of which 10 professionals per team, estimated by the NAS and the recommendations established by both Resolution No. 293/2004[9] and Resolution No. 543/2017 from the *COFEN*.[20] Observing the proportion of 52% of nurses over the total number of nursing professionals, the sector should have at least 33 registered nurses.

The chart below shows the number of effective professionals and residents according to the current and recommended quantitative.

Chart 1 - Quantitative of effective and resident professionals per shift according to current quantitative and recommended by the NAS, *Rio de Janeiro*, 2017

Professional category	Shift	Effective	Residents	Recommended by the NAS + Resolution No. 293/2004
Registered Nurses	SD	1	12*	5.2
	SN	2	0	5.2
Nurse Technicians	SD	5	-	4.8
	SN	5		4.8
Total		13	12	20

Source: PEREIRA, 2017.

*15 residents, 8 of the first year and 7 of the second year, and 3 of the second year were set in sectors outside the ICU during the collection period.

The data show that, in this service, there is a deficit in the cadre of nursing professionals, mainly nurses, which makes possible the existence of work overload for professionals, being a risk factor for patient safety, due to inadequate professional staff is a factor that compromises the quality of care, especially in intensive care patients requiring more attention.[22]

It is worth mentioning that if we include nursing residents in the DS professionals, the sector would be within the criteria established by all the aforesaid resolutions, since it would have 13 nurses (1 nurse in the effective staff, 4 residents in the second year and 8 first-year residents). Nonetheless, residents cannot be counted within the effective team of professionals, as they are floating professionals and have other teaching activities outside the sector.

CONCLUSIONS

Throgh this study, it was possible to describe the demographic profile of patients hospitalized at the unit, to measure the percentage of nursing time by applying the NAS instrument, which was of 18.4 hours in the 24 hours with an average NAS of 76.9% and presented the recommended size for the nursing team of the intensive care unit, which was at least 10 nurses per shift, with 52% nurses and the other nursing technicians in accordance with both Resolution No. 293/2004 and Resolution No. 543/2017 from the *COFEN*.

It is important to note that the NAS was applied retrospectively based on the care of the previous 24 hours and this may have interfered in the score because the care that could be performed according to the availability of personnel was recorded, necessarily, according to the demand of care that the patients demanded. The records by the nursing professionals were also a point that made the data collection difficult for the researcher, since many records were incomplete.

Another limitation of the study was the ICF, because the sample was reduced due to the absence of relatives for the consent of the same and the refusal of consent by some relatives.

Nevertheless, despite the limitations, it was possible to meet the research objectives and to conclude that the NAS use, adjusted to the recommendations of both Resolution No. 293/2004 and Resolution No. 543/2017 from the *COFEN*, contributes to the adequate dimensioning of nursing professionals in the ICU.

Given the aforementioned context, it is evident that the nursing quantitative, together with knowledge, cognitive skills and attitudes, are fundamental for nurses to make interpretations and clinical judgment, necessary for the quality and safety of bedside operational care.

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