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Carga de trabalho de enfermagem em UTI neonatal: aplicação da ferramenta *nursing activities score*

Nursing workload in neonatal ICU: application of the nursing activities score tool

La carga de trabajo de enfermería en la UCI neonatal: aplicación de la herramienta *nursing activities score*

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ABSTRACT

Objective: To identify the actual nursing workload, applying the Nursing Activities Score tool (NAS) in a neonatal unit of a reference hospital for prematurity and surgical pathologies of the Federal District, and propose the adequate downsizing of professionals for the neonatology unit. **Methods:** A quantitative and exploratory study, with a sample of 98 patients, the inclusion criteria were all patients hospitalized in the sector. The data were collected through a built instrument and the NAS tool, and then organized in spreadsheets of the Microsoft Excel[®] 2010. At last, a descriptive statistics was performed with the software SPSS[®] version 21. Research Ethics Committee of FEPECS, CAAE 37164714.5.0000.5553. **Results:** The NAS average showed a variation between 48.5% to 50% with complexity classified as semi-intensive. The Blue Ward showed the highest inadequacy rate of the professionals, averaging 51%. **Conclusion:** There was dissociation between clinical workload and the patient's clinical condition.

Descriptors: Neonatal nursing, Neonatal Intensive Care Units, Personnel sizing, Hospital administration.

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RESUMO

Objetivo: Identificar a real carga de trabalho de enfermagem, aplicando-se a ferramenta *Nursing Activities Score* (NAS), em uma unidade de neonatologia de um hospital referência para prematuridade e patologias cirúrgicas do Distrito Federal e propor o dimensionamento de profissionais adequado para a unidade de neonatologia. **Métodos:** Estudo exploratório quantitativo, amostra de 98 pacientes, critérios de inclusão todos os pacientes internados no setor, os dados foram coletados através de instrumento construído e pela ferramenta NAS, os dados foram tabulados no *Excel* 2010 e realizada estatística descritiva no programa *SPSS* versão 21, Comitê de Ética e Pesquisa da FEPECS, CAAE 37164714.5.0000.5553. **Resultados:** A média do NAS houve variação entre 48,5% a 50% com complexidade classificada como semi-intensiva. A Ala Azul foi a que apresentou maior índice de inadequação de profissionais, com média de 51%. **Conclusão:** Foi observado dissociação entre carga de trabalho e complexidade clínica do paciente.

Descritores: Enfermagem neonatal, Unidade de Terapia Intensiva Neonatal, Dimensionamento de pessoal, Administração hospitalar.

RESUMEN

Objetivo: Identificar la carga real de trabajo de enfermería, aplicando la herramienta *Nursing Activities Score* (NAS) en una unidad neonatal de un hospital de referencia de la prematuridad y las patologías quirúrgicas del Distrito Federal y proponer el diseño de los profesionales adecuados para la unidad neonatología. **Métodos:** Una muestra del estudio exploratorio cuantitativo de 98 pacientes, criterios de inclusión a todos los pacientes ingresados en el sector, los datos fueron recolectados a través de un instrumento construído y el dispositivo NAS, los datos fueron tabulados en *Excel* 2010 y realizaron estadísticas descriptivas sobre el programa *SPSS* versión 21, el Comité de Investigación y Ética de FEPECS, CAAE 37164714.5.0000.5553. **Resultados:** La media NAS hubo variación entre 48,5% a 50% con la complejidad clasificada como semi-intensivo. El Ala Azul mostró la mayor insuficiencia de contenido profesional, con un promedio del 51%. **Conclusión:** Se encontró disociación entre la carga de trabajo y la complejidad clínica del paciente.

Descritores: Enfermería neonatal, Unidades de Cuidado Intensivo Neonatal, Dimensionamiento de personal, Administración hospitalaria.

INTRODUCTION

New technologies are increasing the feasibility of very premature fetuses or Newborn (NB) with pathologies developed and/or acquired in the peripartum period. The Neonatal Intensive Care Unit (NICU) is considered a great scenario for applying these technologies.¹ The nursing staff stands out as the main actor in the management of these technologies and the assistance provided to these young patients. It is explained by their effective and constant workload, in addition to different individual and collective knowledge in the fields of knowledge, experience and expertise.

In addition to providing an evidence-based nursing care sustained by technology, it is necessary to provide a quality care. Thus, contemporaneously, the assistance free of damage is a major concern of health institutions, no longer tolerated saving a life at any cost.

Recent studies relate the poor sizing of nursing professionals to care errors, increased hospitalization time and costs.² Therefore, the amount of care errors attributed to the nursing professional is high for he/she is the one at the end of all the care process and, the more patients he/she attends in the period, the greater the likelihood of making a mistake.³

Among the possibilities to avoid damages to the assistance, there has to be, primarily, human resources in adequate quantity. This need for adequacy of staff dimensioning has the objective to ensure quality nursing care, damage free and with lower rates of adverse events.

The nursing staff represents, significantly, the largest quantity of a professional category in hospitals, and an adequate sizing is extremely important. A sub or hyper-sizing can be disastrous in economic and/or quality terms, even influencing in the increase of mortality of critical care sectors, as well as increasing the effective cost of hospitalization.⁴

However, one of the most common problems in the management's routine is the ability to measure the workload and identify if the minimum number of nursing professionals is proportional to the service's demand. In addition to this, there is evidence of how much the adequacy of human resources can financially impact in a health institution.⁵

The workload, in turn, can be defined as the final product of the individual's work activity, in certain time period, and under specific conditions, whose evaluation will allow perceiving the qualitative and quantitative effort based on specific functions of his/her job.⁶ The nursing workload is multiplying the daily average of patients treated according to their degree of dependence on nursing care and the actual average time of nursing care.⁷ One way of doing this it is classifying the patients according to their clinical demand, resulting in a better scheduling of human resources and the maintenance of quality of care.⁸

Some created rules, laws, ordinances and resolutions have, as one of their goals, the determination of the complexity of the patient in need of human resources. The Federal Nursing Council, in its Resolution Number 293/2004, fixes and establishes parameters for the sizing of nursing professionals in medical clinics of health institutions. Furthermore, this resolution decrees the minimum quantity of nursing professionals according to the degree of the patient's dependence on nursing care provided in 24 hours: minimum service or self-care, with 3.8 hours; intermediate care, with 5.6 hours; semi-intensive care, with 9.4 hours; and intensive care, with 17.9 nursing hours per patient.⁹

Nevertheless, the Ministerial Decree number 93.10 states that, for the operation of a type III NICUs (classification of the study scenario), the minimum number of nursing professionals is one nurse coordinator and one nurse on duty for every five beds, and one nursing technician for every two beds.

However, it is known that a sizing based on these minimum standards is highly likely of not offering quality care.

The calculation of the quantity of the nursing staff personnel, through hours of the standardized provided care, seems inappropriate, since each unit of a health institution has certain workload, which can be higher or lower than the one established by legislation.^{3,7}

One highlights, as possibility of existing instrument to measure nursing workload, the Nursing Activities Score (NAS). This English instrument has been adapted and validated¹¹, and had its evaluation in neonatology studied⁵, in which the profile of nursing care provided to newborns could be identified. It comprises 23 items of the patients' evaluation, in 30 sub-items, with variable weights, measured from 1.2 to 32.0. Its categories are evaluated by monitoring and controlling, hygiene procedures, mobilization and positioning, support and care to families and patients and administrative tasks.

The origin of NAS given by the Therapeutic Intervention Scoring System (TISS), which covers 80.8% of the nursing activities and consists of a daily individual evaluation of the patients, assigning points corresponding to the care provided by nurses in direct patient care, in the last 24 hours. The maximum total to be reached is 176.8%, and when 100 points are reached, it means the patient needs 100% of the nursing professional's time in 24 hours.

The NAS instrument covers not only direct patient care, but also managerial and administrative activities that are carried out by all categories of nursing staff, in addition to providing an individualized assessment of the scenario in which it is applied. And in the NICU, guidance to families commonly occurs, at many moments, especially the actions of encouragement and maintenance of exclusive breastfeeding. Such action, particularly in Neonatal Intermediate Care Unit (NICU), demands excessive nursing time, because relaxation and the parents' re-empowerment over their children are slow and continuous processes.

Given this situation, it seems that the sizing of nurses in neonatology is empirically performed, based only on what is provided by the institution's personnel department or inappropriate models for the sector. Therefore, the study's object is the complexity of nursing care conducted in the Neonatology sector.

Thus, the objectives of the study are: to identify the actual nursing workload, applying the Nursing Activities Score (NAS) tool, in a neonatal unit of a reference hospital for prematurity and surgical pathologies of the Federal District, and propose adequate sizing of professionals for the neonatology unit.

METHODS

This is an exploratory study with a quantitative approach, conducted in the Intensive and Intermediate Care Units of a public teaching hospital in the Federal District, which serves primary, secondary and tertiary care. This hospital

is considered a benchmark of the Unified Health System (SUS), serving patients of low, medium and high complexity for diagnostic tests, medical, surgical and rehabilitation treatments, with emphasis on the assistance to high-risk pregnancy, prematurity and pediatric surgery.

The surveyed NICU of the mentioned hospital has 45 beds, being 30 for intensive, surgical and extreme prematurity care, and 16 for semi-intensive care. Health care, in this unit, operates 24 hours with nursing, medicine and intensive care services, but discontinued in physiotherapy, speech therapy, psychology and nutrition. This unit is structurally and culturally divided into: Green Ward (occupied by critically ill patients requiring surgical and clinical care), Blue Ward (designated for extreme prematurity and/or chronic patients, and/or in contact isolation) and Yellow Ward (for patients who require semi-intensive/intermediate care).

The nursing team, at the time of the research, was formed by one coordinator, 23 assistant nurses, 87 nursing technicians, two residents from the second year and six residents from the first year of Nursing Residency Program in Neonatology. The residents are placed in all similar sectors of the hospital, periodically.

The sample included the retrospective data collecting in two stages: the first one, from 10/31/2014 to 11/09/2014, and the second moment, from 11/30/2014 to 12/19/2014. This cutoff was used to avoid biased sample both because of long-stay patients, as to cover a larger sample of nursing staff. In these patients, the NAS instrument was applied during the morning period, based on the data collected in the medical record, the description of nursing procedures and change of shift reports.

As inclusion criteria for the study, all patients hospitalized in the sector were considered.

The daily scale of the nursing work was also collected during the evaluation period, adding the absolute total of active workers in nursing care and the tasks that indirectly influence in assistance (technician responsible for cleaning incubators and cradles and responsible for supplying materials and referring tests). For this data production a collection instrument was built.

The data were tabulated and organized in a spreadsheet in Excel® 2010 and, next, a descriptive statistics was performed using the program SPSS® version 21.

It is important to mention that the data were collected after the evaluation and approval by the Research Ethics Committee of FEPECS, under Decision Number 943.157 of 02/02/2015, and in accordance with Resolution Number 4666/2012, which deals with researches involving human beings.

RESULTS AND DISCUSSION

During the observation period, 112 patients/bed were analyzed in the two periods. However, the number of patients corresponded to 98 because 14 of them appeared in both collecting periods, totaling 1,103 observations.

From the collected data, it was possible to identify that the study sample had the averages for gestational age and weight, respectively, of 33.02 weeks and 1,868 kilos. This result is similar to other groups previously studied.¹²

For characterizing the sample, gender, diagnosis at admission and occupied ward were described, as shown in Table 1. The diagnoses at admission were listed into five major groups, especially of preterm neonates (PTN), similar to the results of other study.³ Following PTN are patients with surgical diagnoses. These findings may be due to the characteristic of the study scenario, a reference hospital for prematurity and surgical pathologies.

Table 1 - Sample profile

Features	n = 98 (100%)
Gender	
Female	45 (45.9%)
Male	53 (54.1%)
Diagnosis	
RNPT	59 (60.2%)
Cardiopathy	12 (12.2%)
Neurological	3 (3.1%)
Clinical	5 (5.1%)
Surgical	19 (19.4%)
Ward	
Green	38 (38.8%)
Yellow	44 (44.9%)
Blue	16 (16.3%)

Source: Brasília, 2014.

With the objective of identifying the average of the daily NAS, the scores corresponding to the NICU sector were grouped. The samples' averages of the analyzed periods were similar, with homogeneous results (Table 2).

Table 2 - Daily average of NAS by period at the Neonatology Unit

DAYS	NAS NOVEMBER	NAS DECEMBER
1	47.9	45.7
2	50.3	43.7
3	50.2	43.2
4	52.1	47.0
5	53.2	46.9
6	50.0	48.5
7	49.9	48.7
8	49.9	48.0
9	48.4	46.0
10	47.9	48.0
11	-	49.9
12	-	49.3
13	-	50.0
14	-	51.2
15	-	50.3
16	-	51.2
17	-	51.8
18	-	50.9
19	-	50.7
20	-	49.9
Average of the period	50.0	48.5

Source: Brasília, 2014.

Considering the average of the NAS of consecutive days, the average of the NAS of the periods was calculated, obtaining the value of 50.0 for November and 48.5 for December, being both complexities classified as semi-intensive, based on the determination of COFEN Resolution Number 293/04. However, if considering the provided nursing care as high dependency, where the patient is unable to perform any self-care at any level, the overall average found in the unit equates to another study, whose average of NAS was 51.47% in a high dependency adult ICU.¹³

It is noteworthy that, for confirming the complexity, a calculation was necessary, in which the average of the daily NAS shall be multiplied by a constant with a value of 14.4, resulting in the value in minutes. This product must be divided by 60, in order to yield a final result with the value in hours.¹¹

From this analysis, the NAS averages were dismembered by existing wards of the studied scenario, respecting the green, yellow and blue colors that characterize the different profiles of patients. This distribution is presented in Table 3.

Tabela 3 - Distribution of the NAS averages by wards of the Neonatology Unit.

Days	November			December		
	Green Ward	Yellow Ward	Blue Ward	Green Ward	Yellow Ward	Blue Ward
1	51.8	39.6	51.7	43.6	46.8	47.3
2	51.0	46.7	53.7	44.7	41.0	46.1
3	50.5	47.4	53.1	46.4	39.8	45.4
4	54.5	46.4	55.2	51.2	42.4	46.7
5	54.1	50.4	55.3	47.4	45.7	49.4
6	51.6	44.9	54.9	51.1	44.2	50.7
7	49.8	46.8	54.4	49.7	46.0	54.2
8	51.8	44.7	54.8	51.8	40.9	53.1
9	49.3	44.1	54.0	51.4	39.8	49.6
10	49.7	40.4	57.3	50.9	41.7	59.9
11	-	-	-	58.4	42.1	48.9
12	-	-	-	60.2	42.2	45.0
13	-	-	-	55.0	48.3	44.3
14	-	-	-	58.4	43.8	56.2
15	-	-	-	57.1	44.4	46.6
16	-	-	-	60.8	44.5	42.8
17	-	-	-	63.1	43.9	48.3
18	-	-	-	59.5	44.8	52.0
19	-	-	-	57.3	46.5	50.8
20	-	-	-	56.1	45.0	50.8
Average	51.4	45.1	54.4	53.7	43.7	49.4

Source: Brasília, 2014.

In addition to the averages shown in Table 3, in November, the Green Ward has a median of 51.3 and a standard deviation of 1.8; Yellow Ward, a median of 45.6 and a standard deviation of 3.2; and Blue Ward, a median of 54.6 and a standard deviation of 1.8. In December, the Green Ward has a median of 53.4 and a standard deviation of 5.7; Yellow Ward, a median of 44.1 and a standard deviation of 2.4; and Blue Ward, a median of 49.2 and a standard deviation of 4.2.

It is noteworthy that the Blue and Green wards are intensive care units, classified as level III NICUs, and the first one has four contact isolation beds. However, according to the workload scores found, these wards obtained a care level considered semi-intensive. Interestingly, the Yellow Ward, equally considered semi-intensive, kept scores equivalent to its classifying profile. Regarding the nursing workload, and not the complexity classification, the three units have very similar service demands. Converging to this finding, another study confirms that there are no studies that correlate severe patients to more demand for labor and vice versa,¹⁴ that is, the patient's clinical status is not always responsible for the nursing workload.

From the results obtained in the wards and based on a study,¹⁵ the ideal nursing sizing was calculated for each sector for a period of six hours with the purpose of comparing the actual nursing downsizing found on the day of the data production. The personnel sizing calculation (Q) is achieved by the equation in which the average daily NAS of the unit (Σ NASi) is divided by the product of the nursing work time

$$(t) \text{ and the productivity of that time } (p) - Q = \frac{\Sigma \text{NAS}}{tp}$$

For t , we consider the period of six hours, and for p , the average of 80% productivity, calculation performed by the average of the effective team availability, discounting the time of legal resting in the period of six hours.¹⁵

From this calculation, the ideal amount of nursing human resources were tabulated from the workload generated by the patients' demand for care and, then, the average daily amount per ward. In the three wards, in all collecting days, discrepancy between the ideal and the real amounts was observed. These results are projected in Table 4.

Table 4 - Ideal and real downsizing of nursing staff, divided by wards of the Neonatology Unit.

Period	Days	Green Ward		Yellow Ward		Blue Ward	
		Ideal	Real	Ideal	Real	Ideal	Real
NOV	1	10.8	9.0	8.2	6.0	10.8	6.3
	2	10.6	8.3	9.7	5.7	11.2	6.0
	3	10.5	8.9	9.9	6.2	11.1	5.9
	4	11.3	8.0	9.7	7.0	11.5	6.7
	5	11.3	9.2	10.5	7.6	11.5	7.6
	6	10.7	9.8	9.4	6.8	11.4	7.1
	7	10.4	9.4	9.8	6.1	11.3	7.1
	8	10.8	9.4	9.3	6.4	11.4	6.1
	9	10.3	7.4	9.2	5.8	11.3	5.8
	10	10.4	7.9	8.4	5.9	11.9	5.9
DEC	11	9.1	8.7	9.7	6.3	9.9	5.0
	12	9.3	8.3	8.5	7.7	9.6	6.0
	13	9.7	8.0	8.3	7.7	9.5	6.0
	14	10.7	8.3	8.8	7.3	9.7	6.0
	15	9.9	8.0	9.5	7.7	10.3	6.0
	16	10.6	8.9	9.2	8.2	10.6	5.9
	17	10.4	7.2	9.6	6.6	11.3	4.2
	18	10.8	7.3	8.5	7.0	11.1	4.0
	19	10.7	7.8	8.3	7.8	10.3	4.8
	20	10.6	9.1	8.7	7.8	12.5	4.4
	21	12.2	8.6	8.8	7.9	10.2	4.2
	22	12.6	8.7	8.8	6.3	9.4	4.7
	23	11.4	9.4	10.1	6.8	9.2	4.8
	24	12.2	9.0	9.1	5.3	11.7	4.0
	25	11.9	9.7	9.3	6.3	9.7	3.7
	26	12.7	9.2	9.3	6.2	8.9	4.2
	27	13.1	8.9	9.1	5.9	10.1	3.6
	28	12.4	9.2	9.3	7.2	10.8	3.6
	29	11.9	9.9	9.7	5.9	10.6	3.2
	30	11.7	8.7	9.4	5.7	10.6	3.7

Source: Brasília, 2014.

The Green Ward had the highest average and absolute index in the quantitative adequacy of nursing staff, with 79% and 95%, respectively. Next, Yellow Ward had an average adequacy of 73% and 94% for absolute adequacy. In turn, the Blue Ward showed the highest rates of average and absolute inadequacy: 51% and 70%. It is believed that the data found by a similar study¹⁶ can justify this workload increase in the Blue Ward due to contact precautionary use in some of the hospitalized patients present.

Consonant with these data and considering the minimum standards of human resources in the RDC 930 of ANVISA for the operation of a NICU Type III (the Green and Blue wards), every day, there is inadequate number of nursing professionals with higher education per bed, and only a period with inadequate number of mid-level professionals.

However, in all periods of observation, the proportion of nursing technician x patients showed a borderline distribution with fractions tending more to inadequacy than to adequacy.¹⁰

However, in one important respect, the results found and verified in Table 4 differ from another study,³ in which the units with profiles of semi-intensive/intermediate care patients usually have the highest rates of inadequate nursing human resource. This result would be expected in the Yellow Ward, with such features, which did not occur.³

It is noteworthy that, regarding the distribution of the daily schedule of the unit carried out by the Nursing team with higher education, it is not based on any scientific or legal parameter, but on the available amount of human resources in the day. The schedule is performed by the nurse present

in the previous period, i.e., the nurse from the morning shift prepares the schedule of the evening period, and so on.⁷

The NAS tool, although valuable and with comprehensive application, does not consider a Brazilian feature, which is the separation of the working process according to the nursing professional educational attainment.¹⁷ In the observation, the highest inadequacy index of schedule were found in higher education, in which the relation patient versus nurse was inadequate in 41.65% in the Yellow Ward (semi-intensive care) and 65.5% of the days in Green and Blue wards (intensive care). When there is an increase of 0.1% in the ratio nurse/patient, there is an increase of 28% in the adverse events rate.¹⁸

CONCLUSION

At the end of the observation of 98 patients, it was observed that the studied unit presented profile of hospitalized patients appropriate to its proposed service (PTN, surgical pathologies). And observing the averages of NAS, gestational age and weight at birth, it appears they accompany the standards found in other studies.

With 1,103 observations and application of calculations for personnel downsizing, it was concluded that there was a lag of nursing staff in the three wards of the sector, with the highest inadequacy index in the Blue Ward. The inadequacy general average was 32.33%, considering this value as a minimum basis for increasing the nursing personnel in hours.

It is important to mention that the NAS tool, despite having good rates of assessment of nursing workload, for being developed in a different culture, does not address our diversity in the work process, which includes medium and higher educational attainments. Thereby, all assistance is grouped and measured in the same way, without considering the skills of each professional. By evidence from other studies, it is necessary to prioritize the increase in the schedule of nursing professionals with higher education and redistribution of services in the unity, respecting the competencies of each type of knowledge.

It is believed that the sample time used was not optimal for proper analysis. Other studies indicate long fraction of data collection for higher reliability, including more comprehensive analysis of the socio-demographic profile of patients, profile of nursing professionals and their workload in hours in the sector.

It is noteworthy that the study had quantitative character. Therefore, a research discussing the quality of the provided nursing care must be developed, by qualitative measures, including service quality indicators in nursing.

A curious feature observed was the dissociation between clinical complexity and nursing workload. Despite having pathological profiles, complexity indexes and different clinical severity, patients of the three wards presented very close nursing workload, which does not justify different parameters between the three wards at the time of beds

division versus professionals or laws/decrees to legitimize this process of distribution of beds for each professional.

Sticking to generalized schedule parameters can generate a care equally without customization, with increased risk to patients, different from the current policies of humanization and holistic care. The presented results intend to provide the basis for future studies that will break these paradigms.

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