







Neonatal nursing team workload and its relationship with patient characteristics

Carga de trabalho da equipe de enfermagem neonatal e sua relação com características da clientela

Carga de trabajo del equipo de enfermería neonatal y su relación con las características del cliente

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ABSTRACT

Objective: to evaluate the nursing workload at a neonatal unit and to correlate it to patient clinical characteristics. **Method:** this descriptive, cross-sectional study applied the Nursing Activities Score to assess nursing workload at a neonatal unit of a public teaching hospital. Patients included were those hospitalized for at least 24 hours over 60-day period. Data were analyzed using descriptive and inferential statistics. **Results:** the sample comprised 115 patients, yielding a total of 1944 measurements. The average Nursing Activities Score at the unit was 73%, an average of 74% for intensive care beds and 64% for semi-intensive ones. **Conclusion:** high workload was identified at the unit, averaging 17.5 hours of care every 24 hours for each newborn, which can impact the safety of care. Birth weight and gestational age may entail increased workload for nursing staff.

Descriptors: Neonatal Nursing; Infant, Newborn; Nursing Staff; Workload.

RESUMO

Objetivo: avaliar a carga de trabalho de enfermagem em uma unidade de internação neonatal e correlacionar com características clínicas dos pacientes. **Método:** estudo descritivo e transversal, com o *Nursing Activities Score* em uma unidade neonatal de hospital público de ensino. Foram incluídos pacientes hospitalizados por no mínimo 24 horas, no período de 60 dias. Os dados foram analisados segundo estatística descritiva e inferencial. **Resultados:** a amostra foi composta por 115 pacientes, com total de 1944 medidas. A média do *Nursing Activities Score* foi de 73%, obtendo-se média de 74% em leitos de cuidados intensivos e 64% em cuidados semi-intensivos. **Conclusão:** identificou-se uma alta carga de trabalho, com média de 17,5 horas de assistência a cada recém-nascido nas 24 horas, o que pode ter impacto na segurança da assistência. Peso de nascimento e idade gestacional podem representar incremento à carga de trabalho dos profissionais.

Descritores: Enfermagem Neonatal; Recém-Nascido; Recursos humanos de enfermagem; Carga de Trabalho.

RESUMEN

Objetivo: evaluar la carga de trabajo de enfermería en una unidad de hospitalización neonatal y relacionarla con las características clínicas de los pacientes. **Método:** se trata de un estudio descriptivo y transversal, utilizando el *Nursing Activities Score* en una unidad neonatal, en un hospital universitario público. Se incluyeron pacientes hospitalizados durante al menos 24 horas, dentro del período de 60 días. Se analizaron los datos según estadística descriptiva e inferencial. **Resultados:** la muestra se compuso de 115 pacientes, totalizando 1944 mediciones. El puntaje promedio del *Nursing Activities Score* fue del 73%, siendo el promedio para la unidad de cuidados intensivos del 74% y para los cuidados semi intensivos del 64%. **Conclusión:** se identificó una alta carga de trabajo en la unidad, con un promedio de 17.5 horas de atención a cada neonato en 24 horas, lo que puede impactar la seguridad de la atención. El peso al nacer y la edad gestacional pueden representar un aumento en la carga de trabajo de los profesionales.

Descriptor: Enfermería Neonatal; Recién Nacido; Personal de Enfermería; Carga de Trabajo.

INTRODUCTION

The role of neonatal unit nursing professionals is highlighted in managing various technologies, in the need for scientific mastery, experiences and knowledge which are configured to provide peculiar and highly complex care for preterm or term babies who require hospitalization, as well as their family¹.

In view of technological innovations, nurses have incorporated the use of tools into management activities to measure the risks and care complexity of patients in order to identify needs and promote patient safety². Among the management instruments available to assess the workload of the nursing team is the Nursing Activities Score (NAS)³, translated and validated for Brazil⁴.

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The NAS is divided into seven intervention categories with 23 items, with scores ranging from 1.2 to 32 points. The final score, obtained through the sum of its items, represents the amount of nursing work time, expressed as a percentage, which can reach a maximum of 176.8%³. When the resulting score is greater than 100%, it means that more than one professional was needed to provide care⁵. Each NAS point can be converted into 0.24 hours, thus providing information on how many working hours of the nursing team were dedicated to each patient⁶.

The nursing workload is understood as the amount of time dedicated to the patient (directly and indirectly) and to professional development⁷. Factors such as the increased incidence of nosocomial infection, the occurrence of pressure injuries and errors related to healthcare have been described as being related to the increased workload⁸. These factors can lead to prolonged hospitalization, increased institutional and public costs, in addition to putting the lives of patients at risk and increasing morbidity and mortality rates².

Previous studies on applying the NAS⁹⁻¹¹ have shown that this instrument is efficient to estimate the number of nursing professionals. In addition, they also pointed out gaps in the literature, suggesting the need for further studies, especially in the specific scope of neonatal units, given that it is often applied in the Intensive Care Unit (ICU) with adult patients.

Considering that the use of workload assessment instruments enables directing the work process, this study aimed to analyze the nursing workload in a neonatal inpatient unit and correlate it with patients' clinical characteristics.

METHOD

This is a descriptive and cross-sectional study carried out in a neonatal referral unit of a public teaching hospital at the tertiary level of care in the State of São Paulo, Brazil, which covers intensive and intermediate care. This unit has 30 beds, 15 for intensive care and 15 for intermediate, with an average occupancy rate of 108%.

The sample was non-probabilistic by convenience. For staff sizing purposes, it is recommended that patients are monitored for a minimum period of 30 days, with NAS application once a day so that the sample can reflect the profile of the patients attended¹². In the present study, it was decided to include all patients in the unit who remained hospitalized for at least 24 hours over a period of 60 days in 2017. An instrument for collecting patient characterization information was developed for the present study, considering the following variables: gender, number of days of life, days of hospitalization, birth weight, gestational age at birth, classification regarding gestational age, classification regarding intrauterine growth, Apgar score, reason for hospitalization, origin (obstetric center, rooming-in and emergency care) and outcome of hospitalization on the day of collection (discharge, transfer, death, or if he/she was still hospitalized). The NAS was applied to assess the nursing workload over the period studied, always considering the last 24 hours of the day prior to data collection.

Data collection was performed by one of the authors and two research assistants who were previously prepared for collection through training lasting four hours. Before starting, data collection instruments were applied for three consecutive days in the same patient to ensure assessment uniformity. NAS updated content¹³ was also used, which standardized the meaning of each of its items.

The data were tabulated in an electronic spreadsheet and submitted to descriptive and inferential analysis. Distribution regarding normality was assessed using the Kolmogorov-Smirnov test. The correlation between workload (NAS score) and variables such as days of life, birth weight and gestational age was investigated. These correlations were tested using Spearman's correlation coefficient, a non-parametric coefficient ranging from -1 to 1. In order to interpret the findings, 0.1 to 0.29 was considered weak correlation, 0.30 to 0.49 moderate, and greater than or equal to 0.50 as strong correlation¹⁴.

The non-parametric Mann-Whitney test or the unpaired Student's t-test was applied for comparisons involving a qualitative variable with two categories and a quantitative variable. The NAS score variation over the assessment days was calculated, in addition to the average NAS score to identify newborns who maintained a stable score, meaning those who did not present a relevant variation in workload. The Statistical Analysis System (SAS) version 9.4 and the Statistical Package for Social Sciences (SPSS) version 22 software programs were used for the analysis. The study was approved by the Research Ethics Committee, protocol number 2.238328/2017 (CAAE 73058317800005404).

RESULTS AND DISCUSSION

The sample was 115 patients and most patients were male, corroborating other studies^{1,10,11}. A total of 72.2% were premature regarding gestational age, with an average of 35 weeks and ranging from 24 to 41 weeks. This profile is related to the study setting: a tertiary unit with regionalized care, which differs from the profile of newborns in a previous study, with a higher frequency of babies born at term². Preterm infants are those with greater chances of clinical instability and consequently a greater number of therapeutic interventions.

There was a higher frequency of discharge considering patient outcomes (n=61, 53%), followed by those who remained hospitalized until the end of data collection (n=32, 27.8%). The average NAS score was high (73%), with 74% in the intensive care unit and 64% in the semi-intensive care unit, constituting higher values than those identified in a previous study¹¹. In another recent study¹⁰, the mean NAS score was 48.5 to 50% for patients whose care complexity was semi-intensive, meaning that they had lower values when compared to the present study. It is noteworthy that the average NAS score ranged from 41 to 87% in studies that addressed other specialties^{5,6,15-17}.

High NAS scores are considered to be values higher than 50%: in this context, a nursing professional would be available to fully care for only one patient per work shift⁹, and the proportion recommended by the legislation of one nursing technician for every two patients is unfeasible¹⁸. Therefore, it was identified need of reviewing of the legislation regarding recommendation of the proportion values of the number of professionals per bed.

The workload was inversely proportional when analyzing the correlations between the variation in the NAS score and the birth weight ($p < 0.001$) and gestational age ($p < 0.001$) variables. Thus, the higher the gestational age and weight, the smaller the variation in the NAS score, which corroborates a finding in the literature¹⁶, meaning that newborns with higher gestational age require a lower nursing workload. Although a weak correlation was identified, it was also found that the greater the number of days of life or days of hospitalization, the higher the mean NAS¹⁶ score, which may be related to chronic and palliative care patients. Thus, managers of neonatal units must know the profile of the patients in order to properly size the nursing staff and thereby provide safe care.

Table 1 shows the frequency of nursing activities. A total of 1944 NAS applications were performed. The sum of the scores was performed to obtain the unit's daily NAS score. The lowest average NAS score per day was 58% and the highest 98%, while the overall average for the daily unit was 73%. Therefore, it was found that newborns needed an average of 17.5 hours of nursing care, with a minimum of 14 hours and a maximum of 23.5 hours, within 24 hours of the day.

The workload in the semi-intensive care unit had an average score of 64%, while this load was 74% in the intensive care unit. There was a higher frequency of applications in the semi-intensive care unit (57.71%), however the intensive unit had the highest score.

In descending order, the most frequent therapeutic items in the applications were: 1b (presence at the bedside for two hours or more in some shift); 3 (medication, except vasoactive drugs); 21 (enteral feeding – nasoenteral tube, jejunostomy); and 7a (support and care for the family and patient that require exclusive dedication for one hour in any shift). These results are justified by patients and/or family members profile, who fully depend on nursing to provide care. There was a high frequency of items related to family support and care activities, with a percentage of 8.2% for three hours or more and 64% for at least one hour, showing that significant time is spent on these activities.

It is interesting to note that the item related to mobilization and positioning more than three times in 24 hours or with two nurses was mentioned by 100% of the nursing professionals in the team. Other activities that were reported more frequently by professionals were the items of monitoring and controls at the bedside for two hours or more, medication and enteral feeding (nasoenteral tube, jejunostomy).

Item 15 of the NAS, which concerns care in cardiac arrest, had a lower frequency of scores, possibly because it is a high-tech unit that has professional training to recognize signs of deterioration in the newborn's clinical condition, and therefore they can anticipate measures to prevent the occurrence of this event. In addition, there is the peculiarity of these patients of recovering more readily to events that trigger cardiorespiratory arrest¹⁹.

TABLE 1: Frequency of therapeutic items on the Nursing Activities Score (n=1944 measures). Campinas, SP, Brazil, 2017.

Nursing Activities Score	n	%
1. Monitoring and controls		
1a. Vital signs and fluid balance	260	13.37
1b. Present at bedside for two hours or more	1682	86.52
1c. Present at bedside for four hours or more	0	0
2. Laboratory investigations	978	50.30
3. Medication, except vasoactive drugs	1600	82.30
4. Hygiene procedures		
4a. Hygiene procedures (description of usual, normal frequency)	956	49.17
4b. Hygiene procedures for more than two hours	985	50.66
4c. Hygiene procedures for more than four hours	0	0
5. Care of drains (except gastric tube)	10	0.51
6. Mobilization and positioning		
6a. Up to three times in 24 hours	0	0
6b. Performing more than three times in 24 hours or with two nurses	1944	100
6c. Performing with three nurses or more	0	0
7. Support and care for the family and patient		
7a. support and care for the family and patient for one hour	1244	63.99
7b. support and care for the family and patient for three hours or more	160	8.23
8. Administrative and managerial tasks		
8a. Performing routine tasks	1156	59.46
8b. Performing administrative and managerial tasks for two hours	127	6.53
8c. Performing administrative and managerial tasks for four hours or more	0	0
9. Respiratory support	796	40.94
10. Care of artificial airways, orotracheal tube or tracheostomy	267	13.73
11. Treatment for improving lung function	1087	56.00
12. Vasoactive medication	55	2.82
13. Intravenous replacement of large fluid loss, more than 3l/m ² /day	25	1.28
14. Left atrium monitoring, pulmonary artery catheter	0	0
15. Cardiorespiratory resuscitation, except precordial punch	4	0.20
16. Hemofiltration, dialysis techniques	0	0
17. Quantitative measurement of urinary output	922	47.42
18. Measurement of intracranial pressure	0	0
19. Complicated metabolic acidosis/alkalosis treatment	10	0.51
20. Intravenous hyperfeeding	342	17.59
21. Enteral feeding (nasoenteral tube, jejunostomy)	1518	78.08
22. Specific interventions in the intensive care unit	304	15.63
23. Specific interventions outside the unit	23	1.18

As shown in Table 1, some items were not scored for not being commonly observed in the neonatal unit, as well as some specific procedures during the data collection period in the study, such as the use of dialysis techniques.

Table 2 presents Spearman's correlation test results for correlations between quantitative variables (days of life, days of hospitalization, birth weight, gestational age) and NAS score, considering the mean NAS score and the NAS score variation.

Although there is a physical structure organization with a specific number of beds for Semi-Intensive Care and for Intensive Care at the studied unit, there are three beds in the Semi-Intensive area which are always occupied by intensive patients. It happens when the number of intensive patients is higher than the current number of beds in the ICU. It is relevant to highlight that the number of neonatal patients generally classified as intensive and allocated to the Semi-Intensive Unit exceeds these three foreseen beds. This context justifies the fact that 21% of the 1122 measurements performed in the Semi-Intensive Care Unit were considered intensive patients, which exceeds the expected values for the three estimated beds by 5%. It was found that there was no wide variation in the mean NAS score of patients under semi-intensive care compared to intensive care.

It is essential to consider that work overload is the main cause of Burnout syndrome in the nursing team^{20,21}, being associated with increased absenteeism, greater chances of abandoning the nursing area, high staff turnover, reduced quality of care, increased patients length of stay, as well as increased errors related to care, and therefore harm to patient safety²².

Table 2: Correlation between clinical-demographic characteristics and workload (n= 115). Campinas, SP, Brazil, 2017.

Clinical-demographic characteristics	NAS - mean	NAS – variation
Days of life	0.2014*	0.0926*
	0.0309**	0.3274**
Days of hospitalization	0.2057*	0.1326*
	0.0274**	0.1595**
Birth weight	-0.1767*	-0.4236*
	0.0589**	< 0.0001**
Gestational weight	-0.2580*	-0.4500*
	0.0054**	< 0.0001**
	115	114†

* Spearman's correlation coefficient

** p-value

† The mean NAS score showed different number of cases from the instrument score variation due to missing data for one of the patients

The results obtained in the present study with the NAS were consistent with the reality faced in relation to the workload of the nursing team; in addition, it is recommended for future studies to evaluate its correlation with the indicators related to patient safety. The adaptation of NAS items is also suggested so that they can be more reliable for patients in neonatal inpatient units.

Study limitations

The impossibility of measuring specific aspects of the workload in the context of a teaching hospital institution is a limitation of this study. There are particularities considering the presence, in the care activities, of undergraduate and graduate students in the areas of nursing, medicine, physiotherapy and speech therapy: a characteristic which differs from other hospitals and may represent an increase in the professional workload. Especially when dealing with a unit with high workload, according to a study carried out with the application of the NAS²³.

CONCLUSION

A high nursing workload was identified in the studied neonatal unit, with a NAS score of 73%, which is an average of 17.5 hours of direct care being dedicated to each patient in the 24 hours of care in this unit.

It is important to know the profile of the patients in order to properly size the nursing team. It was found herein that the lower the gestational age and weight in the studied sample, the greater the workload. The greater number of days of life for the newborn and days of hospitalization in the unit can also mean an increase in the workload of professionals. The investigation on the workload aims to manage factors which promote safety for the patient and their families cared for, as well as offer data for adequate sizing of nursing staff in neonatal units, which will favor good working conditions and satisfaction.

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