Original Article

Nursing Activities Score and demand of nursing work in intensive care*

Nursing Activities Score *e demanda de trabalho de enfermagem em terapia intensiva*

Nursing Activities Score *y demanda de trabajo de enfermería em cuidados intensivos*

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ABSTRACT

Objective: To measure and characterize the workload of nurses in the Intensive Care Unit (ICU) by applying the *Nursing Activities Score* (NAS). **Methods:** A descriptive, quantitative, retrospective study, conducted in one ICU of a Philanthropic Hospital in Teresina – PI (Brazil), from September to October 2010, with a sample of 66 patients. There were 285 measurements of the NAS performed. **Results:** With regards to nursing workload, there was a mean total score of 68.1% for the NAS (51.5% and 108.3%), corresponding to the percentage of time spent by nursing professionals in direct assistance to the patient within 24 hours. A statistical correlation was found between NAS and clinical outcome ($p = 0.001$). Among NAS and length of hospitalization ($p = 0.073$), and NAS and age ($p = 0.952$), there was no statistical significance. **Conclusion:** The results showed that patients had high care needs, reflected by the high mean of the NAS.

Keywords: Workload; Work hours; Intensive Care Units

RESUMO

Objetivo: Medir e caracterizar a carga de trabalho de enfermagem em Unidade de Terapia Intensiva (UTI) por meio da aplicação do *Nursing Activities Score* (NAS). **Métodos:** Estudo descritivo quantitativo, retrospectivo, realizado em uma das UTIs de um Hospital Filantrópico de Teresina-PI, de setembro a outubro de 2010, com amostra de 66 pacientes. Foram realizadas 285 medidas do escore NAS. **Resultados:** Quanto à carga de trabalho de enfermagem, foi verificada uma média do escore total do NAS de 68,1% (51,5% e 108,3%), correspondendo à porcentagem de tempo gasto pelo profissional de enfermagem na assistência direta ao paciente nas 24 horas. Houve correlação estatística entre NAS e desfecho clínico ($p= 0,001$). Já entre NAS e tempo de internação ($p= 0,073$) e NAS e idade ($p=0,952$), não houve significância estatística. **Conclusão:** Os resultados mostraram que os pacientes apresentaram elevada necessidade de cuidados, refletida pela média elevada do NAS.

Descritores: Carga de trabalho; Jornada de trabalho; Unidades de Terapia Intensiva

RESUMEN

Objetivo: Medir y caracterizar la carga de trabajo de enfermería en una Unidad de Cuidados Intensivos (UCI) por medio de la aplicación del *Nursing Activities Score* (NAS). **Métodos:** Estudio descriptivo cuantitativo, retrospectivo, realizado en una de las UCIs de un Hospital Filantrópico de Teresina-PI, de setiembre a octubre del 2010, con una muestra de 66 pacientes. Se realizaron 285 medidas del score NAS. **Resultados:** En cuanto a la carga de trabajo de enfermería, se verificó una media del score total del NAS del 68,1% (51,5% e 108,3%), correspondiendo al porcentaje de tiempo gastado por el profesional de enfermería en la asistencia directa al paciente en las 24 horas. Hubo correlación estadística entre NAS y deshecho clínico ($p= 0,001$). Ya entre NAS y tiempo de internamiento ($p= 0,073$) y NAS y edad ($p=0,952$), no hubo significancia estadística. **Conclusión:** Los resultados mostraron que los pacientes presentaron elevada necesidad de cuidados, reflejada por la elevada media del NAS.

Descriptores: Carga de trabajo; Horas de trabajo; Unidades de Cuidados Intensivos

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INTRODUCTION

The Intensive Care Unit (ICU) emerged in the 1950s in response to the polio epidemic in a municipal hospital in Copenhagen by the precursor physician Bjorn Ibsen. His goal was to maintain a structure capable of providing support for critically ill potentially life-threatening patients, 24 hours a day, trying to restore and maintain the functions of vital organs, increasing the chances of survival [1]. These units were organized to provide specialized assistance, requiring control and constant health care, which justifies the increasingly introduction of improved technologies, requiring trained professionals to handle them safely.

Nursing care and technology are interrelated, since the profession is involved with principles, laws and theories, additionally, the technology is expressed as scientific knowledge and its own transformation [2]. Thus, the nursing staff of the ICU should be well trained, able to receive and interact with patients/families and handle the equipment safely.

Another factor which stands out is the humanization of hospital care, especially at the ICU, which represents a set of initiatives aimed at the production of health care, able to combine the best technology available to promote care, ethical and cultural respect for the patient, favorable workspaces to good technical practice, satisfaction of healthcare professionals and users [2]. However, it is observed that often, because of the imposed daily workload in this type of specialized unit, the nurses usually assists in a mechanized and technicist manner, disregarding, for the most part, the principles of humanized care, as evidenced in practice.

In recent decades, the workload in nursing became a worldwide topic discussed in hospitals institutions for its implications on the professionals quality of life, hospital costs resulted from staffing and quality of patient care [3]. Nowadays, many newscasts have shown the "medical errors" in Brazilian health institutions, however little is discussed about the workload and unsanitary conditions in nursing to which these professionals undergo.

The nursing staff represents the quantitative percentage and the most significant budget in health institutions. The measurement of nursing staff in the ICU is closely related to the standard of quality desired for a particular unit, aiming at a great assistance and adequate attention to harmony and cooperativeness [4].

According to the National Policy for the Critical Patient Care, in the assistance units for adults, Annex VII of GM / MS n º 1071/2005, the minimum composition of the nursing staff in critical care units should be: a nurse coordinator responsible for the nursing area; a clinical nurse per shift, unit exclusive, for every ten beds/fraction; and a nursing assistant for every two beds/fraction per shift [5].

The nursing workload, therefore, is an indispensable factor for adequate staffing at different hospitals units, as well as for evaluating the quality and efficiency of care. In this regard, the need to characterize the demand for nursing work in the ICU in order to assist in the qualitative and quantitative evaluation of human resources with respect to workload, which triggered, over time, the development of measuring instruments.

In this context the index Nursing Activities Score (NAS) is situated, result from modifications of the Therapeutic Intervention Scoring System-28 (TISS-28). NAS is an instrument for evaluating the workload of nurses in ICU, translated and validated into Portuguese [6], which features a total of 23 items whose weights range from as low as 1.2 to a maximum of 32 ,0 in seven major areas: basic activities, ventilator support, cardiovascular, renal, neurological, metabolic and specific interventions [7].

Items fulfillment is based on the recording of nursing activities performed in the last 24 hours of hospitalization, providing thus retrospective workload information. As a result, NAS score started to represent the percentage of time spent by nurses in direct patient care, reaching 176.8% [8]. As each point of NAS corresponds to 14.4 minutes, it is possible to quantify the total hours required for the direct or indirect nursing assistance to specific patient, as the sum of the scores of its items, reliably measuring up the nursing workload in ICU [9]. If the final score is greater than 100%, it is interpreted that you need more than one professional to assist a patient in a day.

Thus, considering the importance of this study nature, with application of translated and validated instruments in Brazil, it is considered relevant to objectively assess the nursing workload in ICU, since this will serve as subsidy to promote allocation of nursing human resources, adapting them to the demands of care, with a view to humanistic, safe and quality care. It is also noteworthy that in the state of Piaui, this is the first study on the subject, applying NAS.

Considering the complexity of factors inherent to this environment of intensive care, the questions are: what is the nursing workload in ICU? Does the length of hospital stay and the clinical outcome influence the workload? The older the patient is, the greater is the workload?

Given the above, this study aimed to measure and characterize nurses workload in ICU through the application of NAS and to verify its association with the following patients variables: age, length of hospital stay and clinical outcome.

METHODS

This study has a quantitative approach developed in an ICU, composed of ten beds from a large hospital in the city of Teresina-PI. The non-probabilistic sample, for convenience, included all patients admitted to the unit from September to October 2010, aged from 18 years old, and who remained for at least 48 hours. This criterion was adopted because it was considered a satisfactory period for adaptation and more effective care delivery by nursing staff, according to the therapeutic needs of the patient and the institutional dynamics. Readmissions were excluded from the study, 285 measurements of NAS were collected, as it was daily assessed in the records of care of 66 patients admitted to the ICU in the data collection period.

Data were collected only with the consent of patients included in the study, following the aspects contained in Resolution No. 196/96, which deals with ethics in research involving humans. When the patient was not conscious, authorization was granted by the parent or legal guardian present. It is noteworthy that the data collection was conducted after approval of the research project by the Ethics Committee of the Federal University of Piaui (CAAE: No. 0186.0.045.000-10).

Data were collected by the first researcher, daily, in the afternoon, through hospital records, registering information about nursing care and therapeutic interventions that patients underwent during the data collection period. Data were obtained by applying a form divided into two parts: the first included demographic and clinical data of patients, and the second included NAS. Thus, for standardization purposes, we considered the information regarding the 24 hours of the previous day which completed at 7 o'clock in the morning, being possible to collect more complete and reliable information [9,10].

Data were stored in an electronic spreadsheet created in the software Excel 2000/Windows 98, and statistical analyzes were performed using Statistical Package for Social Sciences (SPSS) version 16.0, subsequently tabulated. The results regarding the clinical and demographic characteristics were analyzed descriptively. For the association of nursing workload (NAS) and the variables age, clinical outcome (discharge, death) and length of hospital stay (2 to 7 days and 8 or more days), it was applied the nonparametric test Mann-Whitney . It was adopted a significance level of 5%. For better understanding of the variables and discussion of the data, Box-Plot figures and tables were presented.

RESULTS

The sample consisted of 66 patients. Regarding demographic data, it was found, as shown in Table 1, the same distribution between female and male, both with 50.0%. The mean age was 58 years (SD ± 19.5, median = 63). On the topic of length of hospital stay, most patients (84.8%) remained in hospital from 2-7 days, and 68.2% came from the Surgical Unit (SU). Concerning the type of hospital admission, 46.9% were due to elective surgery, followed by 28.8% from emergency surgery.

With regard to the reason for hospital admission, the variability was evident, being more frequent those related to cardiovascular diseases (48.5%) and neurological diseases (18.2%). In respect to clinical outcomes, 89.4% were discharged from the ICU, and 10.6% died (Table 1).

Table 1 – Demographic and clinical characteristics of 66 patients admitted to an ICU Teresina-PI sept. and oct., 2010

Variables	n	(%)
Gender		
Female	33	(50.0)
Male	33	(50.0)
Age group (years)		
18 to 40	13	(19.7)
41 to 63	15	(22.7)
64 to 86	38	(57.6)
Length of hospital stay (days)		
2 a 7	56	(84.8)
8 a 14	10	(15.2)
Origin*		
IU	9	(13.6)
SU	45	(68.2)
ER	10	(15.2)
Other IU	2	(3.0)
Type of hospital admission		
Clinic	2	(3.0)
Elective Surgery	31	(46.9)
Urgency Surgery	19	(28.8)
Urgency	14	(21.3)
Reason for hospital admission		
Cardiovascular disease	2	(48.5)
Neurological Disease	12	(18.2)
Respiratory Disease	8	(12.1)
Ortophedic Disease	6	(9.1)
Other	8	(12.1)
Clinical outcome		
Discharge	59	(89.4)
Death	7	(10.6)
Total	**66**	**(100)**

* IU= Intensive Unit; SU= Surgical Unit; ER= Emergency Room

The nursing workload is presented in percentage, as suggested by NAS, and it was high (Table 2), with mean scores above 58.0% over the period analyzed. NAS total mean was 68.1%, ranging from 51.5% to 108.3%, on the first day of hospital admission 76.8% and 80.7% on day 13th.

Table 2 – NAS minimum, medium and maximum (%), per day (n = 285). Teresina-PI sept. and oct., 2010

	NAS		
Hospital Admission Day N of patients (n)	**Minimum**	**Medium**	**Maximum**
1st day 66	42.4	76.8	98.7
2nd day 66	41.0	61.0	129.3
3rd day 49	43.6	61.0	77.1
4th day 36	41.8	63.8	119.4
5th day 22	48.0	73.4	134.0
6th day 12	48.0	69.1	126.9
7th day 09	48.0	60.3	68.4
8th day 09	53.7	64.0	80.2
9th day 08	52.5	72.9	134.0
10th day 05	65.6	69.6	72.7
11th day 02	65.6	75.1	84.6
12th day 01	58.1	58.1	58.1
13th day 01	80.7	80.7	80.7

The patients who were hospitalized for 2-7 days showed a higher NAS mean than those who stayed for an equal period or greater than 8 days (Figure 1), however there was no statistically significant difference between them (p = 0.135). It is noteworthy that the cutoff point considered was the same as the cutoff point of the Brazilian Census of ICU from the Brazilian Association of Intensive Care Medicine, in which the mean length of hospital stay in intensive care for adults is approximately 7 days [11].

Patients who died demanded greater workload (NAS), as shown in Figure 2, than those who were discharged from the ICU (p = 0.001).

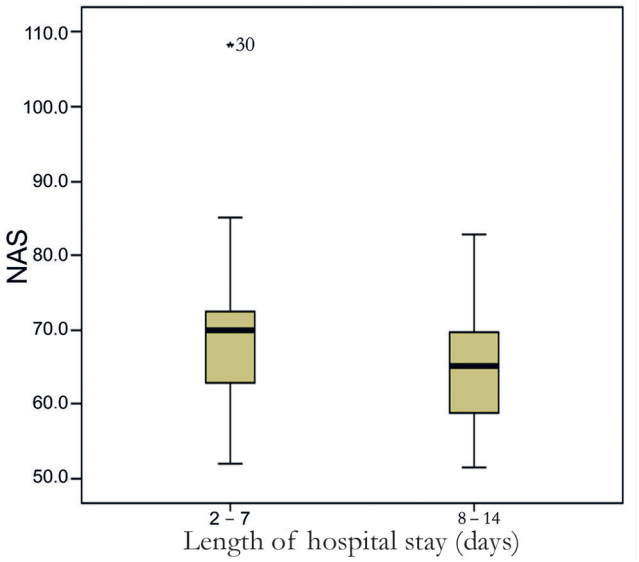

Figure 1 – Box-Plot of comparative values of NAS, as the time of ICU stay (days). Teresina-PI sept. and oct., 2010.

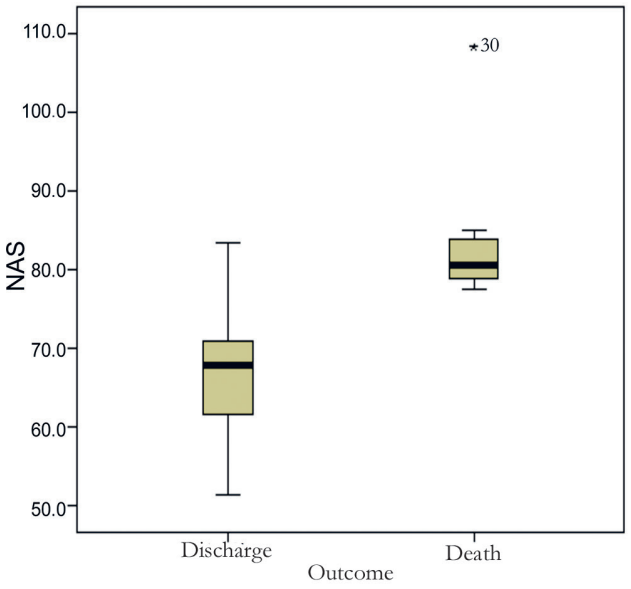

Figure 2 – Box-Plot of comparative values of NAS, as the clinical outcome of patients in the ICU. Teresina-PI sept. and oct., 2010.

In the following moment, the Mann-Whitney test was calculated, in which there were no statistically significant association between age and NAS (p = 0.237), therefore there was no influence between them.

We performed 285 measurements of NAS in 66 patients. Regarding the application of items and sub-items of NAS, it was observed that in 100% of the measures the following indicators appeared: monitoring and control; laboratory investigations; medication, except vasoactive drugs; hygiene procedures; mobilization and positioning; support and care for family and relatives; administrative and managerial tasks and quantitative measure of urine output.

With high frequency were also scored: caring for all drains, except gastric probe (91.6%); vasoactive drugs (75.1%); treatment for improving lung function (74%); care with artificial airways (72 6%) and enteral nutrition (54%). With much lower frequencies, the highlights were: intravenous administration of large fluid losses (1.7%); cardiopulmonary resuscitation (2.4%); techniques dialysis (1.7%); specific interventions in ICU (13%) and specific interventions outside ICU (8.7%).

With a low frequency scores, we may highlight: monitoring of the left atrium; intracranial pressure measure; treatment of metabolic acidosis/alkalosis and total parenteral nutrition.

DISCUSSION

There was equal distribution between male and female patients, although there was a predominance of males in the ICU, currently, there is a very close distribution of female [12,13]. Regarding age, the mean was 58 years, with the highest percentages above 60 years and, therefore, most of them consisted of elderly people, proven by research on the subject [14]. These higher mean ages clearly show this increasing clientele in every states capital of the country.

As for the length of hospital stay, most remained hospitalized from 2-7 days. Studies have shown interval ranging from 1 to 7 days [11,12,15], which confirms the national mean, minimizing the negative effects of long hospitalization in intensive care, as infections and other iatrogenic complications. It is emphasized that the reason for staying in the unit was not investigated due to discharge or death, although it was registered when the patient was discharged from the unit.

The majority of patients were predominantly coming from SU, 46.9% from elective surgery and 28.8% from urgent surgery. A similar result was found in a study performed in a general ICU [6], with a predominance of patients from the SU (43%), with the highest percentage of people who underwent elective surgery (41.5%). Peculiar characteristics to the type of care investigated in the institution in Teresina were confirmed by the sample age and reason for hospital admission, namely: cardiovascular disease followed by neurological disease.

These diseases are mainly associated to chronic condition due to aging population. Based on that, it is observed the need for more accurate care by the nursing staff, demanding a greater time of care, since most of them were partially or fully dependent patients.

Contradicting these findings, it was found in a study in a general ICU [8], applying NAS, that the main reasons for hospital admission were the result of problems with the nervous and respiratory systems with mortality rate of 17.3%. The mortality in the studied sample in this institution of Teresina (10.61%) is slightly lower than other studies, which ranged from 17.5% to 18.2% [6-9], reproducing the expected national indicators for this attendance type.

Regarding the nurses workload, the total score mean of NAS was 68.1%, ranging from 51.5% to 108.3% from 285 measurements of items. These values express the time spent by a nurse in direct assistance to patients within 24 hours, similar to national studies [8- 10,14]. Opposing to these findings, another study [16] found a mean of NAS of 40.8%.

Considering the obtained mean and the fact that each professional has only 100% of their time to provide care to patients, and thus, handling a maximum of two patients which requires 50% of the time, it is concluded that it would be impracticable to the proportion of nursing assistant for every two patients, as recommended by the Ministry of Health [5]. Since the mean in the unit was 68.1%, it is understood that two patients correspond to 136.2%, indicating that it would take more than one professional to take care for them. It is suggested that the care needs of these units are quite predictable, which leads to a more accurate method to prevent occupational diseases and better quality of care to pursuit excellence.

The workload was high during the day, with a mean of 76.8% on the first day of hospitalization and 80.7% on day 13th, there was no progressive correlation between these variables. There was no statistically significant difference in the mean workload among the up to 7 days hospitalization group and the 8 days or more hospitalization group ($p = 0.135$), indicating that those who stayed longer in the ICU not necessarily demanded greater workload, if compared to the group with the lowest time. However, long hospital stay patients tend to have higher score (Table 2). Contrarily, in a study [10] it was observed that remaining patients above six days had higher NAS mean values compared to those with time up to 5 days ($p = 0.032$).

Patients who died demanded greater workload than those who were discharged, confirming the statistical association. Corroborating this finding, studies [10,12] have shown that patients with severe condition require more time of nursing care, both at the time of hospital

admission, as throughout their stay, due mainly to organic instabilities which are installed in these units, as well as presenting elevated NAS in patients who have died. This data shows how reliable the application is to dimension professionals, according to the care.

On the relationship between age and workload there was no statistical significance between the variables (p = 0 237), indicating therefore that age did not affect the nursing workload, resembling another study [10]. Thus, behaviors related to the intensive care units, are embraced in order to improve the clinical status of patients, regardless of their age.

Therapeutic interventions daily performed in all patients, as NAS domains indicate that most patients had cardiorespiratory disorders, confirmed by the highest percentage of these disorders as reason for hospital admission, similar to the findings of a study conducted in Sao Paulo [14]. Less frequently were observed: intravenous administration of large fluid losses; technique of hemofiltration and dialysis, cardiopulmonary resuscitation, ICU-specific interventions and specific interventions outside the ICU. The items which scored less in another study with NAS [9] were: left atrial monitoring; treatment of metabolic acidosis/alkalosis, monitoring and controlling it, for four hours or more. Based on the above, it was noticed that the items not scored or less scored are related, mostly, to more specific interventions that do not apply to all patients who need intensive care, justifying the low frequency of scores. But such care should be provided in the planning.

Identifying such factors present in the ICU, directly associated with nursing workload, allows analyzing and verifying the relationship of care excellence, so that there is a correct distribution of personnel and services, therefore errors and incidents are carefully avoided. Through research with healthcare professionals [17], it was identified interviews about errors in patient care, with reports of excessive workload as key predisposing factor to the error, followed by lack of skill, knowledge and physical health, as the most important contributing factors.

CONCLUSION

The ICU patients studied had high care needs, with a high demand for nurse care. These findings bring subsidies to the adequacy of the number of staff needed for the unit to be guaranteed the care quality to the patient, as well as a work environment conducive to quality of life for professionals. Accordingly, with a proper scaling, there will be more time to perform the procedures applicable to the nursing staff, pursuing excellence of care.

The age and length of hospital stay in ICU did not directly interfere in the demand of nursing workload in the unit. However, patients who died, namely more severe, had a higher NAS, demanding greater workload.

It is important to mention that the convenience sample performed at a single hospital and a single ICU, as well as collecting retrospective data indicates the need for expansion in future investigations. The quality of the records is very important to fill NAS, especially because it is retrospective data collection. Thus, it is suggested that reproduction of this study occurs only in units where the records are accurate to the nursing care provided, as the unit investigated in Teresina-PI.

Still, further studies are suggested using NAS to check the demand of nursing workload in other settings, including neonatal units and other specialized ICU. As well as studies comparing NAS with variables related to laboratory tests of patients, the health care nursing staff, the quality of life and humanization of their work.

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