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FACTORS ASSOCIATED WITH THE NURSING WORK LOAD IN INTENSIVE CARE: WHAT SHOULD BE CONSIDERED

FATORES ASSOCIADOS À CARGA DE TRABALHO DE ENFERMAGEM EM TERAPIA INTENSIVA: QUAIS SE DEVEM CONSIDERAR?

FACTORES ASOCIADOS A LA CARGA DE TRABAJO DE ENFERMERÍA EN TERAPIA INTENSIVA: ¿CUALES DEBEMOS CONSIDERAR?

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ABSTRACT

Objective: to analyze comparatively the Nursing workload in two intensive care units. **Method:** quantitative, cross-sectional, descriptive study performed in two ICUs of a university hospital. The sample was random and consisted of 100 patients. The analysis was performed through multivariate regression, whose dependent variable was Nursing workload, remaining, in the final model, the independent variables with statistical significance lower than 0.05. **Results:** the majority of the patients were male (60%), with a mean age of 52.3 years. The workload of Nursing in the ICU presented the mean of the total NAS score of the set of patients of 75.65 and APACHE II score of 25.5. **Conclusion:** length of stay, sex and age group did not present a significant association with the nursing workload, however, this was associated with the severity score (APACHE II) and the patient's exit status (discharge / death). **Descritores:** Workload; Intensive Care Units, Nursing.

RESUMO

Objetivo: analisar comparativamente a carga de trabalho de Enfermagem em duas unidades de terapia intensiva. **Método:** estudo quantitativo, de coorte transversal, descritivo, realizado em duas UTI de um hospital universitário. A amostra foi aleatória constituindo-se de 100 pacientes. A análise foi realizada por meio da regressão multivariada, cuja variável dependente foi carga de trabalho de Enfermagem, permanecendo, no modelo final, as variáveis independentes com significância estatística menor que 0,05. **Resultados:** a maioria dos pacientes foi do sexo masculino (60%), com média de idade de 52,3 anos. A carga de trabalho de Enfermagem nas UTI apresentou a média do escore NAS total do conjunto de pacientes de 75,65 e escore APACHE II de 25,5. **Conclusão:** o tempo de permanência, o sexo e a faixa etária não apresentaram associação significativa com a carga de trabalho de Enfermagem, porém, esta se associou ao escore de gravidade (APACHE II) e à condição de saída do paciente (alta/óbito). **Descritores:** Carga de trabalho; Unidades de Terapia Intensiva; Enfermagem.

RESUMEN

Objetivo: analizar comparativamente la carga de trabajo de Enfermería en dos unidades de terapia intensiva. **Método:** estudio cuantitativo, de cohorte transversal, descriptivo, realizado en dos UTI de un hospital universitario. La muestra fue aleatoria constituyéndose de 100 pacientes. El análisis fue realizado por medio de la regresión multivariada, cuya variable dependiente fue carga de trabajo de Enfermería, permaneciendo, en el modelo final, las variables independientes con significancia estadística menor que 0,05. **Resultados:** la mayoría de los pacientes fue la del sexo masculino (60%), con promedio de edad de 52,3 años. La carga de trabajo de Enfermería en las UTI presentó la media del score NAS total del conjunto de pacientes de 75,65 y score APACHE II de 25,5. **Conclusión:** el tiempo de permanencia, el sexo y el grupo de edad no presentaron asociación significativa con la carga de trabajo de Enfermería, pero, ésta se asoció al score de gravedad (APACHE II) y la condición de salida del paciente (alta / óbito). **Descritores:** Carga de Trabajo; Unidades de Terapia Intensiva; Enfermagem.

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INTRODUCTION

The allocation of personnel should be based on objective criteria and this may be conflicting when it comes to an institution that serves patients of different clinical and epidemiological profiles.¹

Some instruments are used to measure Nursing workload and assist in the appropriate staffing. In 2002, the authors validated the Nursing Activities Score (NAS) instrument in Brazil, an instrument that represents 80.8% of Nursing activities.²⁻³

This instrument has allowed not only to estimate the number of personnel and to assist in the budget calculation of the Nursing service, but, also, to establish diverse relationships among Nursing care needs of different populations, to study the association with ICU indicators and to analyze the factors associated with the burden of work.²

In this sense, considering that ICUs have become sectors that concentrate highly specialized human and technological resources and where the profile of patients corroborates to complex Nursing care, it is of great relevance to study the factors associated with the workload, as well as the profile of the patients hospitalized in these units, which can become a concrete element in the provision of Nursing human resources.

In the international scientific literature, many studies have presented evidence of the relationship between Nursing staff allocation and the quality of care, with implications for patient safety, often, expressed through adverse events.⁴⁻⁹

OBJECTIVES

- To analyze the Nursing workload in two intensive care units.
- To verify that demographic and clinical characteristics are independent factors associated with it.

METHOD

A quantitative, cross-sectional, descriptive study conducted in a university, tertiary hospital. The data were collected after the approval by the Research Ethics Committee of the institution. (Process nº 2153) in a systematized form, by the researcher, with the aid of three nurses with experience in intensive care, who were properly trained for the procedure. The instrument manual was used, to complete the NAS.¹⁰

The study sample was random and its size was calculated in order to allow a

multivariate statistical analysis. Additionally, the total number of beds of the two ICUs investigated and the monthly movement of each investigated unit were considered, constituting, 100 patients, 50 of each of them. The first ICU is intended for the care of chronic clinical and surgical patients, and the second treats those coming from urgency and emergency.

Patients older than 18 years with a residence time of more than 24 hours were included in the inclusion criteria. Two instruments were used for data collection.

1) Intensive Care Unit (ICU) characterization tool: to obtain information regarding the number of Nursing professionals present per shift, in each of the units, during the period of data collection.

2) Patient characterization instrument composed of four fields: Field 1 - patient identification data; Field 2 - Date of hospitalization, origin, type of hospitalization, reason for hospitalization in the unit, date of departure and destination after discharge from the ICU; Field 3 - NAS instrument composed of 23 items related to Nursing care and therapeutic interventions; Field 4 - APACHE II instrument used by the medical team to assess the severity of patients admitted to the ICU (completed within the first 24 hours of admission).

All the data collected were inserted into an ExcelR spreadsheet and then analyzed using the Statistical Package for Social Sciences (SPSS) program. The parametric ANOVA test was used to evaluate the nursing workload and the variables of origin, hospitalization type and exit condition. To verify the linear correlation between the Nursing workload variable and the quantitative variables, time of hospitalization and APACHE II score, the Pearson Correlation Parametric Test was used.

In the multivariate regression, whose dependent variable was the Nursing workload, the independent variables whose bivariate statistical tests resulted in $p < 0.20$ were selected, for inclusion in the initial model. In the final model, the variables with a statistical significance lower than 0.05.

RESULTS

Regarding the profile of the patients in the intensive care units studied, table 1 presents the main results.

Table 1. Comparison of the sample of patients between the different units, according to demographic and clinical data. Ribeirão Preto (SP), Brazil, 2015.

Characteristics	ICU Campus	ICU UE	Total Sample
	14 beds N=50	16 beds N=50	N=100
	n / %	n / %	n / %
Sex			
Male	32 (64%)	28 (56%)	60 (60%)
Female	18 (36%)	22 (44%)	40 (40%)
Age			
Average - in days (standard deviation)	57.0 (17.3)	47.6 (20.5)	52.3 (19.4)
Origin			
Surgical center	4 (8%)	16 (32%)	20 (20%)
Emergency room	0	23 (46%)	23 (23%)
Hospitalization unit	37 (74%)	8 (16%)	45 (45%)
Others	9 (18%)	3 (6%)	12 (12%)
Type of hospitalization			
Clinic	40 (80%)	32 (64%)	72 (72%)
Elective surgery	8 (16%)	2 (4%)	10 (10%)
Emergency surgery	2 (4%)	16 (32%)	18 (18%)
Time of hospitalization in the ICU			
Average (standard deviation)	7.2 (7.5)	12.5 (9.8)	9.9 (9.1)
Exit condition			
Survivor	22 (44%)	36 (72%)	58 (58%)
Non Survivor	28 (56%)	14 (28%)	42 (42%)
APACHE II			
Average (standard deviation)	26.2 (8.6)	24.5 (6.9)	25.5 (7.7)

The Nursing workload in the ICU showed the mean of the total NAS score of the set of patients of 75.65, a value very close to that found in the units separately, being in Campus 75.2 (SD = 16.1) and EU 76, 2 (SD = 16.5).

Table 2 presents the results of the comparison of the Nursing workload (NAS), according to the demographic and clinical variables in the analyzed ICUs.

Table 2. Comparison of the means of the NAS score of the different ICUs according to gender, age, origin, type of hospitalization, length of hospital stay, exit condition among different ICUs. Ribeirão Preto (SP), Brazil, 2015.

Variables	ICU Campus (NAS)		ICU UE (NAS)	
	Averag e	SD	Averag e	SD
Sex				
Male	78.07	17.06	77.73	17.04
Female	69.98	13.05	74.13	16.05
Age				
≤60 years	77.28	17.19	77.36	17.46
> 60 years	72.22	14.29	73.79	14.82
Origin				
Surgical center	72.77	17.87	78.27	15.80
Emergency room	-	-	75.39	17.22
Hospitalization unit	74.86	15.22	74.35	19.78
Others	77.45	20.33	75.47	12.07
Type of hospitalization				
Clinic	75.46	15.54	75.39	17.44
Elective surgery	71.49	20.65	73.55	6.72
Emergency surgery	83.8	2.54	77.98	16.03
Exit condition				
Survivor	64.2	17.39	70.94	15.35
Non survivor	83.50	13.17	89.54	11.34

The comparison between the mean scores of the Nursing workload in Campus and EU ICU units, according to the Student t test, was p = 0.762. The same test, for the variable age, resulted in p = 0.190 and the variable male and female, resulted in p = 0.088. In this way, the variables age and sex with (p <0.20) were

selected, for the initial multiple regression model.

The Kolmogorov Smirnov test showed adherence to the Normal distribution (p> 0.05) in the comparison between the Nursing workload and the variables origin, type of hospitalization and exit condition. Thus, the

ANOVA test was used to compare the mean scores of Nursing workloads and the different

groups of variables. Table 3 shows the results found.

Table 3. Relationship of the variable workload with the independent variables using the ANOVA test. Ribeirão Preto (SP), Brazil, 2015.

<i>Independent variables</i>	<i>p</i>
Origin	0. 944
Type of hospitalization	0.567
Type of exit	0. 00

In this way, the output type variable ($p < 0.20$) was selected, for the initial multiple regression model.

and the variables length of hospitalization, APACHE II score and age. The results are presented in table 4.

Pearson's linear correlation coefficient was used between the variable Nursing workload

Table 4. Relation of the variable workload with the independent variables using the Pearson correlation coefficient. Ribeirão Preto (SP), Brazil, 2015.

<i>Independent variables</i>	<i>r</i>	<i>p</i>
Time of hospitalization	-0.183	0. 068
APACHE score	0.502	0.00
Age	-0.082	0.417

Based on the results found, the variables hospitalization time and APACHE II score were selected for the initial multiple regression model ($p < 0.20$). Although the variable age did not meet the criteria for performing this

correlation, because it is a variable of interest in the study, it was chosen to include it.

Table 5 expresses the relation of the selected independent variables.

Table 5. Relationship of independent variables to multiple linear regression analysis. Ribeirão Preto (SP), Brazil, 2015.

<i>Independent variables</i>	<i>β</i>	<i>p</i>
Time of hospitalization	-0. 014	0.870
APACHE II score	0. 349	0.001
Sex	0. 137	0.111
Age	0. 142	0.098
Type of exit (discharge/death)	0. 319	0.002

In view of these results, the independent variables for the final model were the APACHE score, gender, age and type of output, using

the Backward method, as presented in table 6.

Table 6. List of independent variables selected for multiple linear regression analysis. Ribeirão Preto (SP), Brazil, 2015.

<i>Independent variables</i>	<i>β</i>	<i>p</i>
APACHE score	0. 350	~ 0
Sex	0. 139	0. 098
Age	0. 145	0. 078
Type of exit	0. 322	0. 001

The variables gender and age had no impact on Nursing work demand. On the other hand, APACHE II and, the type of output interfered in the workload, and in this sample, patients with higher APACHE II values and those who evolved to death demanded a higher Nursing workload.

This result can be explained considering that, as the patient presents worsening of clinical conditions, the patient's observation and the monitoring of vital signs, laboratorial, medical and Nursing interventions intensify, which contribute to an increase in the workload.

DISCUSSION

Brazilian studies, over time, have confirmed the predominance of hospitalization of male patients in ICU, as demonstrated in this study. The percentages range from 54 to 58%¹¹⁻⁵

Regarding the patient's age, the results of this work differ from other studies that indicate the high number of elderly patients in intensive care. Researchers investigated five adult ICUs from two university hospitals and identified that most patients (53.7%) were over 60 years of age.¹²

In the variable type of hospitalization, the prevalence of clinical hospitalization (72%) in

the total sample was noted. The majority (54%) of the patients studied in another investigation were also. Regarding the length of stay in the ICU, the mean in the total sample pointed to the patients' 9.9 day stay. Several national studies indicate that, as the average length of stay of patients, from one to six days,¹⁶⁻⁸ however, other investigations have already identified a longer average stay between 7.64 and 17 days.^{14-5,19-20}

Regarding the ICU discharge condition, it is evident that 42% of the total number of patients studied in the period, were non-survivors. The high mortality found is higher than that observed in Brazilian studies, with a variation of 20% to 35%. The study obtained indices varying from 4.8 to 20% in the mortality of elderly patients admitted to general ICUs, related to the question of the age of the patients.¹⁸ Another investigation obtained, in the analysis of surgical patients hospitalized in three ICUs of a school hospital, a mortality of 25.2%.¹⁷⁾

The finding of high mortality in the patients analyzed in this study may be justified by the association of different factors, such as the existence of many pre-existing comorbidities and clinical severity, and it is not possible to rule out ICU admissions for patients out of therapeutic possibilities. This fact can be reaffirmed by observing the mean value of the APACHE II score obtained in this study, which are well above those described in the literature in other national surveys, with values of 13.4 points²⁰ and 14.7 points.¹⁷

The values obtained by the NAS were also well above those reported in other studies, that obtained the following mean values of NAS score: 80.09 (SD = 7.28) 17; 65.5 (SD = 18.8) 15; 52.7 (SD = 9.2) 2; 72.93 (SD = 14.47) 18; 67.1 (SD = 8.42) 13.

Regarding the variables that were associated with the workload, we identified the severity of the disease, according to APACHE II, and the type of output (non-surviving patients). Research identified that only the disease severity variable measured by the SAPS II, was directly related to the Nursing workload and the age was inversely related.²¹ A prospective, longitudinal study, identified that patients with more advanced age maintained a higher demand for care than adults after discharge.²²

Research evidenced as factors predictors of high Nursing demand: severity, age and type of hospitalization (surgical patients). There was no difference in the demand for Nursing work for the elderly of different age groups.¹⁸

In another study, the only factor associated with the high Nursing workload was the length of stay of patients evaluated in the ICU⁽¹²⁾. Already in another study²³ identified a workload relation with the variables gender, age, origin and type of hospitalization in a cardiologic ICU. These same authors also observed a poor correlation between the workload and organic dysfunction scores, as well as between the NAS and the SAPS II severity indicator and found a moderate correlation between the NAS mean and the length of stay in the ICU.

This study presents limitations as having been performed in a single center and the sample has been calculated in order to meet the minimum requirement for the development of multivariate regression analysis.

It is shown that the severity variable is extremely relevant for the calculation of the personnel supply, as well as the variable condition of exit. However, the variables age and length of stay are controversial as to their relevance.

Future studies could be carried out with the objective of increasing the applicability of this instrument to quantify the workload, as well as to identify the factors influencing it, so that it can be safely used to classify patients and, consequently, provide the framework of the unit's Nursing staff, guided by quality of care.

CONCLUSION

The performance of Nursing, in different contexts of action, has a direct influence of the quantity of available human resources. The adequate provision of Nursing workers has become a relevant strategy for the quality or improvement of the quality of health services and, consequently, for the results of care.

It was concluded that, the length of stay, sex and age were not significantly associated with the Nursing workload, but, this was associated with the severity score (APACHE II) and, the patient's exit status (discharge / death).

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