

## Nurses' workload in critical care units

*Carga de trabalho de enfermagem em unidades de atendimento a pacientes críticos*

*Carga de trabajo de enfermería en unidades de atención a pacientes críticos*

Amanda Diniz Silva<sup>1</sup> ; Suzel Regina Ribeiro Chavaglia<sup>1</sup> ; Rosali Isabel Barduchi Ohl<sup>II</sup> ;  
Maria Helena Barbosa<sup>1</sup> ; Fabiana Cristina Pires<sup>1</sup> ; Caroline Bueno de Moraes Pereira<sup>1</sup> 

<sup>1</sup>Universidade Federal do Triângulo Mineiro, Uberaba, MG, Brazil; <sup>II</sup>Universidade Federal do Estado de São Paulo, São Paulo, SP, Brazil

### ABSTRACT

**Objective:** to relate nurses' workload to associated factors in critical care facilities. **Method:** in this cross-sectional study of 116 patients admitted to a public teaching hospital in Minas Gerais, data were collected using four instruments: Patient Characterization Instrument, Patient Classification System, Nursing Activities Score and Acute Physiology and Chronic Health Evaluation II. The data were analyzed using absolute and relative frequencies, summary measures of position and variability, Student t-test, Pearson correlation and multiple linear regression analysis. **Results:** the average workload in the Intensive Care Unit and the Accident and Emergency Service was 20.8 hours and 18.8 hours and the risk of death, 22.1 and 24.4, respectively. **Conclusion:** the inpatient sector involved and risk of death influence the nursing workload. **Descriptors:** Nursing; Critical Care; Intensive Care Units; Emergency Service Hospital; Workload.

### RESUMO

**Objetivo:** relacionar a carga de trabalho de enfermagem aos fatores associados em unidades de atendimento a pacientes em cuidados críticos. **Método:** estudo transversal realizado com 116 pacientes internados em um hospital público de ensino de Minas Gerais. Utilizaram-se quatro instrumentos para coleta de dados: Instrumento de Caracterização do Paciente, Sistema de Classificação de Pacientes, *Nursing Activities Score* e *Acute Physiology and Chronic Health Evaluation II*. Para a análise dos dados empregou-se frequências absolutas e relativas, medidas de resumo de posição e a variabilidade, teste t-*student*, correlação de Pearson e análise de regressão linear múltipla. **Resultados:** a média da carga de trabalho na Unidade de Terapia Intensiva e no Serviços de Urgência e Emergência foi de 20,8 h e 18,8 h e o risco de óbito foi de 22,1 e 24,4, respectivamente. **Conclusão:** o setor de internação e o risco de óbito influenciam na carga de trabalho de enfermagem. **Descritores:** Enfermagem; Cuidados Críticos; Unidades de Terapia Intensiva; Serviço Hospitalar de Emergência; Carga de Trabalho.

### RESUMEN

**Objetivo:** relacionar la carga de trabajo de enfermería con los factores presentes en las unidades de atención a pacientes en cuidados críticos. **Método:** estudio transversal realizado con 116 pacientes ingresados en un hospital universitario público de Minas Gerais. Se utilizaron cuatro instrumentos para la recolección de datos: Instrumento de Caracterización del Paciente, Sistema de Clasificación de Pacientes, *Nursing Activities Score* e *Acute Physiology and Chronic Health Evaluation II*. Para el análisis de datos se utilizaron frecuencias absolutas y relativas, medidas de resumen de posición y variabilidad, prueba T de Student, correlación de Pearson y análisis de regresión lineal múltiple. **Resultados:** la carga de trabajo promedio en la Unidad de Cuidados Intensivos y en los Servicios de Urgencias y Emergencias fue de 20,8 h y 18,8 h y el riesgo de muerte fue de 22,1 y 24,4, respectivamente. **Conclusión:** el sector de hospitalación y el riesgo de muerte influyen en la carga de trabajo de enfermería. **Descriptor:** Enfermería; Cuidados Críticos; Unidades de Cuidados Intensivos; Servicio de Urgencia en Hospital; Carga de Trabajo.

## INTRODUCTION

Nursing workload has been discussed worldwide, especially in more complex scenarios such as Emergency Hospital Services (EHS) and Intensive Care Units (ICU) due to its implications for providing quality care<sup>1</sup>. It can be determined by the severity of the patient from a clinical point of view, since they require more care and more procedures, making it highly dependent on the care provided by the nursing team<sup>2</sup>.

Systems for assessing the degree of severity of patients in critical units, such as the Acute Physiology and Chronic Health Disease Classification System II (APACHE II), were developed in response to a growing need for monitoring vital parameters in order to assess the prognosis of patients, quantifying the severity of the disease/condition, and evaluating the performance of professionals and the quality of care provided<sup>3</sup>.

It is known that work overload is a factor faced by nursing staff who work with critical and semi-critical patients, requiring constant and precise work from the professional, which, added to the insufficient number of professionals, causes stress and physical and emotional exhaustion, which can lead to failures in the care process, generating the occurrence of adverse events<sup>4</sup>.

Acknowledgements to the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES, Brazil), for the research grant by the Social Demand Program.  
Corresponding author: Suzel Regina Ribeiro Chavaglia. E-mail: [suzel.ribeiro@yahoo.com.br](mailto:suzel.ribeiro@yahoo.com.br)  
Scientific Editor: Cristiane Helena Gallasch; Associate Editor: Magda Guimarães de Araujo Faria

An imbalance between the number of nursing professionals and the workload reduces the effectiveness of care, which causes risks and an increase in the occurrence of adverse events<sup>5</sup>. Therefore, evaluating the clinical condition of patients and their demand for care becomes essential to determine the number of nursing professionals needed for developing quality care in patient care units in critical care<sup>5</sup>.

In this context, the Nursing Activities Score (NAS)<sup>6</sup> instrument was developed, which has been used internationally and nationally for this purpose after its validation in Brazil, constituting a reliable tool used to support the workload and to calculate the number of nursing professionals in the ICU, which helps in scaling the nursing team and planning interventions<sup>7</sup>.

The NAS is composed of seven categories: basic activities; ventilatory support; cardiovascular support; renal support; neurological support; metabolic support; and specific interventions. These are subdivided into 23 dimensions, ranging from 1.2 to 32.0 points, covering 80.8% of nursing activities<sup>7</sup>.

Therefore, applying this instrument is essential to guarantee patient safety in all those units which are characterized by a high level of patient complexity and a high demand for care, such as for patients in intensive care units<sup>4,8</sup>.

Thus, according to the above, the aim of this study was to relate the nursing workload to associated factors in providing care to patients in intensive care units.

## METHOD

This is an observational, cross-sectional, quantitative study carried out in a public teaching hospital of high complexity in the interior of Minas Gerais, being a reference for 27 municipalities which compose the health macro-region. The adult EHS (EHS-A) provides 24-hour care, has 25 beds, one for isolation, 20 for observation and an emergency room with a capacity for four simultaneous visits, serving an average of two thousand patients per month. The adult ICU (ICU-A) has 10 beds, eight for inpatients and two rooms for patients who need treatment in an isolated environment<sup>9</sup>.

The study population consisted of patients hospitalized in the ICU-A and EHS-A with the following inclusion criteria: being hospitalized in the ICU-A, in the wards and emergency room of the EHS-A; classified into intensive and semi-intensive care with a minimum period of stay of 24 hours; and be 18 years of age or older. Patients readmitted to the ICU-A or EHS-A units during the collection period were excluded.

The sample was calculated using the number of beds parameter. The average number of monthly hospitalizations in the investigated units was calculated by using the Power Analysis and Sample Size (PASS) program for statistical assistance.

The sample size calculation considered an aprioristic determination coefficient,  $R^2 = 0.13$ , in a linear regression model with five predictors, having  $\alpha=0.05$  as the significance level or type I error and type II error of  $\beta=0.1$ , therefore resulting in an aprioristic statistical power of 90%, and obtaining a sample of  $n= 116$ . The main outcome variable was the demand for nursing workload.

Four instruments were used for data collection: the patient characterization instrument with demographic and clinical variables; the Patient Classification System (SCP); the NAS; and APACHE II. The instrument for characterizing the patient went through a process of face and content validation carried out by a committee of experts. The collection was performed by the researcher from June to September 2018 after applying the pilot test, and the participants in this stage were excluded from the final study sample.

For patients admitted to the EHS-A, the SCP was applied to classify patients according to care complexity into semi-intensive and intensive care. After identifying the patients admitted to the intensive care units, the Informed Consent Form (ICF) was presented to the person responsible and authorization was requested to carry out the research; next, the patient's characterization form, the NAS and the APACHE II were sequentially applied. All data were collected from patient medical records.

The collected data were entered into an electronic data spreadsheet in Excel® 2002 from Microsoft Office® and imported into the Statistical Package for Social Sciences (SPSS), version 22, for Windows 10® for processing and analysis.

Categorical variables are presented in tables of absolute and relative frequencies, while quantitative variables are summarized using summary measures of position and variability. Bivariate analysis included a Student's t-test for independent groups, as well as Pearson's correlation for quantitative predictors. The simultaneous influence of demographic and clinical predictors on the NAS included multiple linear regression analysis. This work considered an  $\alpha$  significance level of 5%.

The study is the product of a Master's thesis approved by the Research Ethics Committee.

## RESULTS

Of the 116 patients, there was a predominance of males (60.3%) and an older adult age group (58.6%), and this profile was confirmed in both sectors studied. Table 1 shows the sociodemographic variables of patients seen in the EHS-A and ICU-A sectors.

**TABLE 1:** Presentation of the demographic variables of critically-ill patients treated in the EHS-A and ICU-A (n= 116). Uberaba, MG, Brazil, 2018.

	EHS-A		ICU-A		Total	
	n	%	n	%	n	%
Gender						
Male	46	59.7	24	61.5	70	60.3
Female	31	40.3	15	38.5	46	39.7
Age group						
Adult	29	37.7	19	48.7	48	41.4
Older adult	48	62.3	20	51.3	68	58.6

Source: Research data, 2018.

The age in the EHS-A ranged from 20 to 95 years (mean 63.7 years and SD  $\pm$  19.1), while the age in the ICU-A ranged from 21 to 91 years (mean of 56.5 years and SD  $\pm$  16.5). Data related to comorbidities and survival are presented in Table 2.

**TABLE 2:** Presentation of the presence and type of comorbidities and condition of leaving the sector of critically-ill patients treated at EHS-A and ICU-A (n= 116). Uberaba, MG, Brazil, 2018.

	EHS-A		ICU-A		Total	
	N	%	N	%	n	%
Presence of comorbidities						
Yes	65	84.4	25	64.1	90	77.6
No	12	15.6	14	35.9	26	22.4
Comorbidities by systems						
Cardiovascular disease	43	55.8	18	46.2	61	52.6
Endocrine disease	23	29.9	11	28.2	34	29.3
Respiratory disease	17	22.1	0	0	17	14.7
Other diseases	12	15.6	5	12.8	17	14.7
Neurological disease	10	13.0	5	12.8	15	12.9
Kidney disease	7	9.1	4	10.3	11	9.5
Neoplastic disease	5	6.5	1	2.6	6	5.2
Liver disease	2	2.6	0	0	2	2.0
Clinical outcome						
Survivor	58	75.3	26	66.7	84	72.4
Non-survivor	19	24.7	13	33.3	32	27.6

Source: Research data, 2018.

Most patients (90 - 77.6%) presented an association of two or more pathologies regarding comorbidities, with cardiovascular diseases being the most frequent with 61 (52.6%) cases. There was a high prevalence of survival of these trauma victims (72.4%) in both sectors.

Descriptive measures of the variables length of stay, NAS score, length of care (hours), APACHE II score and calculated risk of death in EHS-A and ICU-A are described in Table 3.

It was observed that the mean length of stay in the ICU-A was 11.36 days (SD  $\pm$  16.17), with a maximum value of 101 days. The mean NAS score was 86.10 (SD  $\pm$  14.73), requiring 20.79 hours of nursing care per patient in 24 hours. The mean APACHE II score in the analysis of the patient's severity index was 22.1 and the mean risk of death was 37.39%.

**TABLE 3:** Length of stay, NAS score, care time in hours, APACHE II score, risk of death of patients admitted to the ICU-A and to the EHS-A (n= 116). Uberaba, MG, Brazil, 2018.

Variables	Mean (SD)	Min.	Max.
<b>ICU-A</b>			
Length of stay (days)	11.3 (16.2)	1.0	101.0
NAS score (%)	86.1 (14.7)	50.9	121.0
Care time (h)	20.8 (3.5)	12.2	29.0
APACHE II score	22.1 (9.6)	8.0	41.0
Risk of death (%)	37.4 (28.5)	3.1	92.9
<b>EHS-A</b>			
Length of stay (days)	8.9 (11.0)	1.0	68.0
NAS score (%)	78.4 (15.4)	39.8	122.8
Care time (h)	18.8 (3.7)	9.5	29.5
APACHE II score	24.4 (9.0)	5.0	42.0
Risk of death (%)	44.6(27.0)	1.7	95.6

Source: Research data, 2018.

The mean length of stay regarding patients admitted to the EHS-A was 8.97 days (SD ± 11), with a maximum value of 68 days. The NAS score averaged 78.46 (SD ± 15.36), requiring 18.83 hours of nursing care per patient per day. The mean APACHE II score for the patient's severity index was 24.48 points and the calculated risk of death had an average of 44.63%.

The student's t-test indicated that the only statistically significant variable associated with the NAS was the hospitalization sector with a p-value < 0.05, which allows us to state that the patient hospitalized in the ICU-A has a higher average nursing care time than the average of patients admitted to the EHS-A. The analysis also demonstrates that there was no association between gender and comorbidities with nursing workload.

Another statistical analysis using the Pearson correlation enabled verifying that there was a correlation between the variables risk of death and the nursing workload (p < 0.001). It is also possible to state that there was no correlation between the length of stay and the patient's age and the nursing workload.

The result of the multiple linear regression analysis with the nursing workload as the outcome and the variables of age, hospitalization sector, comorbidities, risk of death and length of stay is described in Table 4.

**TABLE 4:** Presentation of the multiple linear regression result with the outcome being the nursing workload in hours. Uberaba – Minas Gerais, Brazil, 2021 (N= 116)

Variables	$\beta$ †	p*
Age	-0.168	0.075
Hospitalization sector	0.292	0.001
Comorbidities	0.018	0.847
Risk of death	0.471	<0.001
Length of stay	-0.121	0.142

Source: Research data, 2018. p\* - level of significance: p < 0.05  $\beta$  † - Beta

This statistical analysis found that the risk of death and hospitalization sector variables (in that order of impact) were statistically significant on the nursing workload.

## DISCUSSION

The results for the gender variable in this study are similar to studies carried out in other ICUs and EHS, in which the percentages of males ranged from 58% to 61.6%<sup>2,10</sup>. It was found that the prevalence of males was not statistically associated with the nursing workload, and not constituting significance for this work.

The mean age was  $61.3 \pm 18.5$ , with a minimum of 20 and a maximum of 95 years. There is a 58.6% prevalence of older adult hospitalization when the sample is dichotomized into age group. The literature shows that there is no need to classify older adult patients into age groups, as there are no statistical differences between them when analyzing the nursing workload<sup>11</sup>.

The nursing workload in older adults was greater when compared to adults. Despite this, age did not have a significant correlation with the nursing workload in this study, corroborating another study related to this theme<sup>11</sup>.

The most prevalent comorbidities in this investigation were cardiovascular diseases. Research shows that people with non-communicable chronic diseases, such as systemic arterial hypertension and diabetes mellitus, show little adherence to treatment, causing health problems. Thus, the importance of health policies and campaigns to prevent diseases and their harms is highlighted<sup>12</sup>.

Another study carried out in the ICU of a teaching hospital observed a correlation with the comorbidities presented, but with a prevalence of neoplastic diseases (26.6%), diabetes mellitus (17.9%), and respiratory diseases (7.9%), among others<sup>13</sup>.

These data differ from what was found in this study, in which there was no statistically significant association between comorbidities and nursing workload, which can be explained by the care profile of the hospital where this study was conducted characterized by the prevalence of patients with cardiovascular diseases.

The workload related with both the risk of death and hospitalization sector were statistically significant. A study carried out in the state of São Paulo (SP) showed opposite results to those found in this study, indicating that patients who demand a greater workload in critical units do not necessarily evolve to death<sup>14</sup>.

Another study carried out in Botucatu, SP, aimed to identify the profile of patients in need of hospitalization spaces in critical care units. The authors observed that the severity of patients admitted to the unit and the nursing workload in these locations were higher, with the mean value of the NAS score being close to the value considered high, which corroborates the findings of this study<sup>15</sup>.

The high nursing workload may be associated with the clinical complexity and worsening condition of the patient, demanding nursing treatment often based on semi-intensive care. A study carried out in Rio Grande do Sul observed that the NAS score on the first and last day of hospitalization indicated a greater workload, and that on the last day of hospitalization it was evident that patients who died corresponded to a significantly higher average workload due to the patient's condition worsening and the demand for post-death care<sup>16</sup>.

The clinical outcome showed that 27.6% of the patients did not survive, with the percentage of death in the ICU-A being higher than in the EHS-A; these data are in line with those in the literature, in which deaths ranged from 19.7% to 42%<sup>10,17,18</sup>.

In addition, 11.36 days were observed regarding the average length of stay in the ICU-A, with a minimum of one and a maximum of 101 days, and an average of 8.97 days in the EHS-A, with a minimum of one and a maximum of 68 days. Other studies have shown an average of nine days of ICU stay<sup>10,17</sup>. However, there is no consensus in the literature regarding the recommended length of stay in the ICU-A.

The occurrence of intensive and/or semi-intensive care beds was identified in the EHS-A in the investigated institution. The occupancy rate of this unit reaches 200%, with a corridor full of stretchers with patients under observation<sup>9</sup>. Overcrowding is frequent on the national scene, especially in public hospitals, causing crises in the urgency and emergency sectors<sup>18,19</sup>.

Thus, the nursing team should consider the NAS as an important management tool for the ICU and EHS, aiming to improve the sizing of professionals and assist in care planning<sup>1,20</sup>.

The mean total score of the NAS was 86.1% in the ICU-A and 78.4% in the EHS-A. A high workload was evidenced in a study whose objective was to compare the nursing workload measured by the NAS between intensive care units in both the general and specialized ICUs, with a NAS score > 50.00, highlighting the ICU trauma, which was characterized with higher scores of 72.00 and 71.3<sup>21</sup>.

A cross-sectional study carried out in an EHS-A of a public university hospital (n=2,303) found an undersized nursing staff, with a deficit of nurses for care with only one nurse per shift<sup>22</sup>.

Another study carried out showed that patients admitted to the EHS-A waiting for a place in the ICU require a high nursing workload, and those who died before the transfer had a high workload for the nursing team<sup>23</sup>.

The APACHE II calculated the severity and risk of death in the ICU-A in this study, in which the score was 22.1 points and a risk of death of 37.4%, while the APACHE II score in the EHS-A was 24.4 points and a risk of death of 44.6%. A study found that the mean of the APACHE II scores was 25.5, with 26.2 in one ICU and 24.5 in another ICU<sup>10</sup>.

Although the literature shows that the clinical comorbidities of patients and length of stay have an impact on the nursing workload, in this study there was only statistical significance in the hospitalization sector ( $p=0.001$ ) and risk of death ( $p<0.001$ ) variables.

A limitation of this study is the impossibility of generalizing the results obtained due to the study being carried out in a single health institution, even though it is a reference center for 27 municipalities in the health region. The study is also limited by the absence of important information in the patients' medical records and hospital records regarding the study purpose.

## CONCLUSION

The high workload and high clinical severity of patients hospitalized in the study sectors are related to the patient's inpatient sectors, EHS and ICU, and the risk of death, meaning that the greater the risk of death, the greater the nursing care demand. Among the hospitalization sectors studied, it was observed that patients admitted to the ICU-A required a greater number of hours of nursing care.

This study contributes to teaching, research, management, nursing and healthcare in order to define strategies for care planning and nursing staff sizing. It suggests that further research be carried out on the theme, as well as covering the care of patients infected by COVID-19 who require hours of intensive care, favoring the overload of nursing work and becoming a challenge for sizing and managing human resources.

In addition, it is worth emphasizing the importance of continuing to advance studies on nursing workload for future comparisons of the results of this research, including critical patient care analyzes also involving different methodological approaches.

## REFERENCES

1. Oliveira SP, Fátima JC, Vieira TL, Miranda BL, Sérvio AT, Tavares BG. Nursing workload required by patients during ICU admission: a cohort study. *Enferm. Glob.* [Internet]. 2020 [cited 2020 Apr 02]; 19(59):450-78. DOI: <https://doi.org/10.6018/eglobal.400781>.
2. Serafim CTR, Dell'Acqua MCQ, Novelli e Castro MC, Spiri WC, Nunes HRC. Severity and workload related to adverse events in the ICU. *Rev. Bras. Enferm.* [Internet]. 2017 [cited 2020 Apr 02]; 70(5):942-8. DOI: <https://doi.org/10.1590/0034-7167-2016-0427>.
3. Pal N, Sujatha R. Evaluation of Acute Physiology and Chronic Health Evaluation Score II in *Acinetobacter baumannii* Infection/Colonization and its Antimicrobial Resistance Profile in Kanpur, India. *Int. J. Curr. Microbiol. Appl. Sci.* [Internet]. 2017 [2020 Apr 02]; 6(7):1056-61. DOI: <https://doi.org/10.20546/ijcmas.2017.607.127>.
4. Silva TCMS, Castro MCN, Popim RC. Adaptation of the Nursing Activities Score for oncologic care. *Rev. Bras. Enferm.* [Internet]. 2018 [cited 2020 Apr 02]; 71(5):2383-91. DOI: <https://doi.org/10.1590/0034-7167-2017-0015>.
5. Sell BT, Amante LN, Martins T, Loccioni MFL. Dimensioning of nursing professionals and the occurrence of adverse events on surgical admission. *Ciênc. Cuid. Saúde* [Internet]. 2018 [cited 2020 Apr 02]; 17(1):1-7. DOI: <https://doi.org/10.4025/ciencucidsaude.v17i1.33213>.
6. Miranda DR, Nap R, Rijk A, Schaufeli W, Iapichino G. Nursing Activities Score (NAS). *Crit. Care Med.* [Internet]. 2003 [cited 2020 May 01]; 31(2):374-82. DOI: <https://doi.org/10.1097/01.CCM.0000045567.78801.CC>.
7. Queijo AF, Padilha KG. Nursing Activities Score (NAS): Cross-cultural adaptation and validation to Portuguese language. *Rev. Esc. Enferm. USP* [Internet]. 2009 [cited 2020 May 01]; 43(spe):1018-25. DOI: <https://doi.org/10.1590/S0080-62342009000500004>.
8. Grebinski ATKG, Biederman FA, Berte C, Barreto GMS, Oliveira JLC, Santos EB. Workload and sizing of therapy in nursing staff intensive newborn. *Enferm. Foco* [Internet]. 2019 [cited 2020 Sep 10]; 10(1):24-8. Available from: <http://revista.cofen.gov.br/index.php/enfermagem/article/view/1468/488>.
9. Ebserh. Empresa Brasileira de Serviços Hospitalares. Dimensionamento de serviços assistenciais - Hospital de Clínicas da Universidade Federal do Triângulo Mineiro/HC-UFTM. Brasília, 2013 [cited 2020 Sep 10]. Available from: [https://www.gov.br/ebserh/pt-br/hospitais-universitarios/regiao-sudeste/hc-uftm/governanca/adesao-a-ebserh-1/dimensionamento\\_de\\_servicos\\_hc\\_uftm.pdf](https://www.gov.br/ebserh/pt-br/hospitais-universitarios/regiao-sudeste/hc-uftm/governanca/adesao-a-ebserh-1/dimensionamento_de_servicos_hc_uftm.pdf).
10. Laus AM, Meneguetti MG, Auxiliadora-Martins M, Chaves LDP, Camelo SH. Factors associated with the nursing workload in intensive care: What should be considered. *Rev. enferm. UFPE on Line* [Internet]. 2017 [cited 2020 May 01]; 11(12):5305-11. DOI: <https://doi.org/10.5205/1981-8963-v11i12a22847p5305-5311-2017>.

11. Ferretti-Rebustini REL, Nogueira LS, Silva RCG, Poveda VB, Machado SP, Oliveira EM, et al. Aging as a predictor of nursing workload in Intensive Care Unit: Results from a Brazilian Sample. *Rev. Esc. Enferm. USP* [Internet]. 2017 [cited 2020 Sep 10]; 51:e03216. DOI: <https://doi.org/10.1590/s1980-220x2016237503216>.
12. Pedroza Cosío GA, Sánchez Escobar LE, Munguía Lozano S, Beltrán Lagunes L, Ferrer Álvarez JG, Medina Arreguín R, et al. Evaluation of the FD-66 Scale as a tool for predicting treatment adherence in patients with chronic non-communicable diseases. *Rev. Panam. Salud Publica* [Internet]. 2017 [cited 2020 Sep 10]; 41:e113. DOI: <http://doi.org/10.26633/RPSP.2017.113>.
13. Roque KE, Tonini T, Melo ECP. Adverse events in the intensive care unit: Impact on mortality and length of stay in a prospective study. *Cad. Saúde Pública* [Internet]. 2016 [cited 2020 May 01]; 32(10):e00081815. DOI: <https://doi.org/10.1590/0102-311X00081815>.
14. Nassiff A, Araújo TR, Meneguetti MG, Bellissimo-Rodrigues F, Basile-Filho A, Laus AM. Nursing workload and patient mortality at an intensive care unit. *Texto contexto-enferm.* [Internet]. 2018 [cited 2021 Mar 19]; 27(4):e0390017. DOI: <https://doi.org/10.1590/0104-07072018000390017>.
15. Castro MCN, Dell'Acqua MCQ, Unger IC, Cyrino CMS, Almeida PMV. Severity and workload of nursing with patients seeking admission to an intensive care unit. *Esc. Anna Nery* [Internet]. 2018 [cited 2021 Mar 19]; 22(1):e20170167. DOI: <https://doi.org/10.1590/2177-9465-ean-2017-0167>.
16. Pinno P, Taschetto CF, Freitas EO, Nunes LM, Menezes JA, Petry KE, Camponogara S. Workload in a hospital inpatient unit using the Nursing Activities Score. *Revista de Enfermagem Referência* [Internet]. 2020 [cited 2021 Mar 19]; 5(4):e20047. DOI: <https://doi.org/10.12707/RV20047>.
17. Cyrino CMS, Dell'Acqua MCQ, Castro MCN, Oliveira EM, Deodato S, Almeida PMV. Nursing Activities Score by assistance sites in Intensive Care Units. *Esc. Anna Nery* [Internet]. 2017 [cited 2020 Sep 10]; 22(1):e20170145. DOI: <https://doi.org/10.1590/2177-9465-ean-2017-0145>.
18. Albuquerque JM, Silva RFA, Souza RFF. Epidemiological profile and monitoring after discharge of patients hospitalized at an intensive care unit. *Cogitare Enfermagem* [Internet]. 2017 [cited 2020 Sep 10]; 22(3):50609. DOI: <https://doi.org/10.5380/ce.v22i3.50609>.
19. Rodrigues CK, Malderran R, Novo NF. Risk classifications help in a safe department of the municipality of São Paulo: analysis of case outcome in studying. *Revista Recien* [Internet]. 2019 [cited 2020 Sept 10]; 9(28):137-45. DOI: <https://doi.org/10.24276/rrecien2358-3088.2019.9.28.137-145>.
20. Oliveira EM, Secco LMD, Figueiredo WB, Padilha KG, Secoli SR. Nursing Activities Score and the cost of nursing care required and available. *Rev Bras Enferm* [Internet]. 2019 [cited 2020 Sep 10]; 72(Suppl 1):137-42. Available from: <http://dx.doi.org/10.1590/0034-7167-2017-0655>.
21. Nobre RAS, Rocha HMN, Santos FJ, Santos AD, Mendonça RG, Menezes AF. Application of Nursing Activities Score (NAS) in different types of ICUs: an integrating review. *Enferm. Glob.* [Internet]. 2019[cited 2020 Nov 07]; 56:500-14. DOI: <http://dx.doi.org/10.6018/eglobal.18.4.362201>.
22. Girardi C, Feldhaus C, Oliveira JLC, Scharan LS, Luz MP, Tonini NS, et al. Sizing of nursing staff in hospital emergency room. *Rev. Adm. Saúde* [Internet]. 2018 [cited 2020 Nov 22]; 18(71). DOI: <http://dx.doi.org/10.23973/ras.71.95>.
23. Castro MCN, Dell'Acqua MCQ, Unger IC, Cyrino CMS, Almeida PMV. Severity and workload of nursing with patients seeking admission to an intensive care unit. *Esc. Anna Nery* [Internet]. 2017 [cited 2020 Dec 11]; 22(1):e20170167. DOI: <https://doi.org/10.1590/2177-9465-ean-2017-0167>.