

# Severity and workload of nursing with patients seeking admission to an intensive care unit

*Gravidade e carga de trabalho de enfermagem em pacientes candidatos à vaga na UTI*

*Gravedad y carga de trabajo de enfermería de pacientes candidatos a la vacante de unidad de cuidados intensivos*

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## ABSTRACT

**Objective:** To identify the severity and workload of nursing with adult patients seeking admission to an Intensive Care Unit (ICU).

**Methods:** A cross-sectional study with a quantitative, exploratory and prospective approach was performed, developed in a hospital in the state of São Paulo. Demographic data on patients were collected, the Simplified Acute Physiology Score III (SAPS III) was applied to assess the severity of patients and the Nursing Activities Score (NAS) was used to evaluate nursing workload, between July and August 2014. **Results:** The overall mean score of the SAPS III was  $30.52 \pm 18.39$  and that of the NAS was  $58.18 \pm 22.29$ . The group of patients admitted to the ICU showed higher severity and higher workload of nursing compared to non-admitted patients. Non-admitted patients had an NAS of 53.85. **Conclusion:** The nursing workload in patients who were not admitted to the ICU was also high. The evaluation of workload in other contexts where patients are seriously ill is important. The workload assessment in other contexts where severely ill patients are found is evident.

**Keywords:** Severity of Illness Index; Workload; Nursing; Intensive Care Units; Personnel Management.

## RESUMO

**Objetivo:** Identificar a gravidade e a carga de trabalho de enfermagem requerida por pacientes adultos candidatos à vaga em Unidade de Terapia Intensiva (UTI). **Método:** Estudo transversal, quantitativo, exploratório e prospectivo, realizado em um hospital do interior do estado de São Paulo. Foram coletados os dados demográficos dos pacientes, o *Simplified Acute Physiology Score III* (SAPS III) para avaliar a gravidade e o *Nursing Activities Score (NAS)* para avaliar a carga de trabalho, entre julho e agosto de 2014. **Resultados:** A média geral do escore SAPS III foi  $30,52 \pm 18,39$  e do NAS foi  $58,18 \pm 22,29$ . Os pacientes admitidos na UTI apresentaram maior gravidade e carga de trabalho em comparação com os não admitidos. Os pacientes não admitidos apresentaram NAS médio de 53,85. **Conclusão:** A carga de trabalho de enfermagem nos pacientes que não são admitidos na UTI também é alta. Evidencia-se a avaliação da carga de trabalho em outros contextos onde estejam pacientes graves.

**Palavras-chave:** Índice de Gravidade de Doença; Carga de trabalho; Enfermagem; Unidade de Terapia Intensiva; Administração de recursos humanos.

## RESUMEN

**Objetivo:** Identificar la gravedad y la carga de trabajo de enfermería requerida por pacientes adultos candidatos a una vacante en Unidad de Terapia Intensiva (UTI). **Método:** Estudio transversal, cuantitativo, exploratorio y prospectivo, realizado en un hospital del interior de São Paulo. La recolección de datos demográficos utilizó el *Simplified Acute Physiology Score III* (SAPS III), para evaluar la gravedad, y el *Nursing Activities Score (NAS)*, para evaluar la carga de trabajo de enfermería, entre julio y agosto de 2014. **Resultados:** El promedio general de la puntuación SAPS III fue 30,52; el NAS, 58,18. Los pacientes admitidos en la UTI presentaron mayor gravedad y carga de trabajo en comparación con pacientes no admitidos (NAS promedio de 53,85). **Conclusión:** La carga de trabajo de enfermería en los pacientes que no son admitidos en la UTI también es alta. Se debe evaluar la carga de trabajo en otros contextos donde estén pacientes graves.

**Palabras clave:** Índice de Severidad de la Enfermedad; Carga de Trabajo; Enfermería; Unidad de Cuidados Intensivos; Administración de Personal.

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## INTRODUCTION

Health care for severely ill patients is included in Intensive Care Units (ICU), where two main dimensions stand out: the complexity of care and the resources required for the team work process. Admission to this particular sector is a multi-factorial decision and an ethical challenge in many cases. Thus, it is recommended that the health care team should discuss aspects associated with the clinical condition and prognosis of patients to meet the demands, while respecting the adequate levels and complexities, because limited resources can truly compromise the results in the admission process.<sup>1-3</sup>

In Brazil, the vulnerability of the universalization of services in the *Sistema Único de Saúde* (SUS - Unified Health System), especially high-complexity and high-cost services, such as hospitalizations in ICU beds. There are 17,940 registered ICU beds, of which 11,615 are designated for adult patients, thus not meeting the current demands.<sup>4</sup> As a result, access is limited and services for severely ill patients are delayed, which may negatively affect clinical results and mortality rate.

In this context, the use of criteria associated with the severity and prognosis of patients is becoming increasingly more frequent for admission to these units, mainly due to the increase in demand.<sup>5-7</sup>

The severity of patients' condition can be assessed with the Disease Severity Classification System, established by the *Associação de Medicina Intensiva Brasileira* (AMIB - Brazilian Intensive Care Medicine Association).<sup>8</sup> The prognosis index for the assessment of adult ICU patients can be evaluated with the Simplified Acute Physiology Score III (SAPS III), aimed at establishing predictive mortality indices in intensive care.<sup>9,10</sup>

Nursing workload is not an admission criterion for ICU patients. However, it is a relevant index to calculate the adequate number of professionals according to need, as patients with a high workload require increased length of care, especially from the nursing team. Many adverse events and incidents are attributed to the health team actions, as the result of work overload and the deficit in personnel to meet the actual demand needed for patient care. Thus, identifying the workload required by patients with a severe clinical or surgical condition can be an important tool to support work process management.<sup>1-3</sup>

The Nursing Activities Score (NAS) has been the main instrument used to measure the workload of the nursing team in ICUs located in Brazil and other countries. It is a safe tool for evaluation and management, which can help nurses to adequately define the nursing team and safe health care practices.<sup>1,11-13</sup>

It is relevant to assess the workload required by patients who need intensive care and seek admission to an ICU, in other units not designated for critical patients. Based on their technical and structural dimensions, these locations may not be prepared to provide effective care, thus posing a risk to patients and the health team.

While severely ill patients wait for a bed in the ICU, the hospitalization units, emergency services and post-anesthetic recovery rooms begin to work with a significant increase in nursing workload, without using adequate human and technological resources.<sup>1,12</sup>

This relationship between patient severity and workload has been observed and taken into consideration in patients already hospitalized in ICUs. However, there are no studies that have identified this in patients seeking ICU care. In this sense, the importance of assessing nursing workload and the severity of patients not admitted to the ICU, as services for those seeking ICU care is also complex.<sup>14-17</sup>

Thus, the present study aimed to identify the severity and nursing workload required by adult patients seeking ICU care.

## METHODS

An exploratory-descriptive, prospective and cross-sectional study was performed with patients seeking admission to the ICU in a public hospital in the countryside of the state of São Paulo, which includes 24 beds aimed at adult patients requiring several specialties.

Study participants were adult patients hospitalized in infirmaries or emergency rooms and those seeking admission to the ICU. Each patient was included in the present study when they sought ICU care. Next, they were followed daily until the outcome of their request was known: either admission was granted or denied, or their request was canceled.

Data were collected between July and August 2014, with daily visits to the units, accompanied by the nurse responsible for receiving information about each patient, in addition to the daily reading of medical records and application of the previously described instruments. The variables collected were as follows:

1. Information about socio-demographic aspects and health/disease status of patients: age, sex, bed characterization, type of admission (clinical, elective surgical and urgent), and status when leaving the hospitalization unit or emergency service (discharged or deceased);
2. Severity patterns evidenced through the application of the SAPS III instrument:<sup>18,19</sup> this instrument is comprised of 20 different variables measured upon admission of ICU patients and divided into three parts: demographic variables, reasons for admission to ICU and physiological variables. A weight was attributed to each variable analyzed, which theoretically has the lowest assigned value of 16 points and the highest value of 217 points, so that the higher the score, the worse the patient prognosis. Physiological variables comprising the acute physiological score were as follows: temperature, systolic arterial pressure, heart and respiratory rate, oxygenation, arterial pH, sodium,

potassium, creatinine, bilirubin, hematocrit, leukocytes, platelets and Glasgow Coma Scale. In South America, this index was calibrated at a value of 1.3, which means that the relationship between observed and expected mortality is 1.3. The instrument was applied when patients were included in this study.

- Score of nursing workload obtained with the application of the NAS instrument: this instrument was translated and validated for the Brazilian culture by Queijo (2009).<sup>12</sup> It represents 81% of the nursing activities and it is divided into seven major categories (basic activities; ventilator, cardiovascular, renal, neurological and metabolic support; and specific interventions) and 23 items that correspond to the needs of direct and indirect care of patients in the last 24 hours. A score was attributed to each item, with a variation from 1.2 to 32.0 and maximum score of 176.8%. The NAS score is correlated to the length of care provided, i.e. a patient with an NAS score of 90 requires 90% of the time of a nursing professional, where each NAS point equals to 14.4 minutes. The instrument was daily administered by the researcher, 24 hours after the application of the SAPS III and at the same time, until the response to the request for admission to the ICU was obtained.

An Informed Consent Form was applied to patients and the legal guardians of those who had no condition to understand this. The present study was authorized by the Research Ethics Committee of the Medical School of the city of Botucatu, São Paulo, under Ethical Appreciation Submission Certificate number 26365014.6.0000.5411 and approval number 520705. Data were collected and stored through double entry on a Microsoft Office Excel<sup>®</sup> spreadsheet and subsequently analyzed with the SAS System<sup>®</sup> software.

Initially, descriptive analysis was performed, with absolute frequencies for categorical variables, mean, standard deviation, median, and minimum and maximum values for quantitative variables and the NAS score. Quantitative variables such as age, NAS and SAPS III scores were analyzed with Pearson correlation, aiming to compare the means and verify the relationship between them. Tests were considered to be statistically relevant when  $p < 0.05$ .

## RESULTS

A total of 160 patients were included in the present study, of which 75 (46.9%) were admitted to the ICU, 66 (41.25%) had their request for admission denied, 11 (6.9%) died before the response to their request and eight (5%) had their request canceled before the decision of the ICU team. Patients were categorized into two groups: admitted patients, 75 (46.8%); and non-admitted patients, 85 (53.2%), the latter including patients who had their request for admission denied or canceled or who died.

The majority of patients were males, 85 (53.1%), both among admitted patients, 41 (54.6%), and non-admitted patients, 44 (51.7%). The mean age of all patients was  $60.1 \pm 15.9$  years (19 to 91 years), thus revealing the homogeneity between the ages of both groups, 59.5 years for admitted patients and 60.6 years for non-admitted ones. The mean age of patients who died was 66.5 years.

The majority of requests for hospitalization were from elective surgical patients, 98 (61.2%), followed by clinical patients, 51 (31.8%), and patients who had emergency surgeries, 11 (6.8%). The specialty that most frequently requested ICU beds was neurosurgery, 43 (26.8%), followed by gastric surgery, 36 (22.5%) and internal medicine, 34 (21.2%). Table 1 shows the characteristics of admitted and non-admitted patients, according to the specialty of their request.

**Table 1.** Distribution of patients who were admitted and not admitted to the ICU, according to specialty. Botucatu, SP, Brazil, 2014 (n = 160)

Variable	Admitted patients (n = 75)		Non-admitted patients (n = 85)	
	F	%	F	%
Neurosurgery	21	28.0	22	25.8
Gastric surgery	17	22.6	19	22.4
Internal medicine	19	25.4	15	17.6
Vascular surgery	10	13.4	9	10.5
General surgery	3	4.0	5	6.0
Cardio-thoracic surgery	2	2.6	5	6.0
Otorhinolaryngology	1	1.4	5	5.8
Orthopedics	0	0	3	3.5
Urology	2	2.6	0	0
Plastic surgery	0	0	1	1.2
Gastric clinic	0	0	1	1.2

n: absolute number; F: frequency; %: percentage.

The mean SAPS III score was  $30.52 \pm 18.39$  (3 to 76), with a mean value of 39.47 for admitted patients and 22.62 for non-admitted ones ( $p < 0.0001$ ). In contrast, the NAS score was  $58.18 \pm 22.29$  (18.40 to 127.10), with a mean value of 63.09 for admitted patients and 53.85 for non-admitted ones ( $p = 0.0085$ ). Regarding patients who died, the mean SAPS III score was 44.5 and the NAS score was 96.9.

Table 2 shows Pearson correlation test among the "SAPS III versus age", "SAPS III versus NAS" and "NAS versus age" variables of patients waiting for admission to the ICU. Statistical significance was found between "SAPS III versus age" and between "SAPS III versus NAS", but not between "NAS versus age".

**Table 2.** Pearson correlation test among age, SAPS III and NAS of patients seeking admission to the ICU. Botucatu, SP, Brazil, 2014 (n = 160)

Correlation	R	P
SAPS III x age	0.43163	< 0.0001
SAPS III x NAS	0.52066	< 0.0001
NAS x age	0.8458	0.2876

R: Pearson Correlation Coefficient.  $p < 0.005$ .

## DISCUSSION

Data analysis revealed the profile of patients who require admission to the ICU. The mean age of patients is in agreement with the world trend of those admitted to intensive care, which can be associated with the increase in life expectancy and, consequently, the high number of comorbidities.<sup>14-16</sup>

The specialties that most frequently requested admission to the ICU were neurosurgery and gastric surgery, which also had the highest percentages of admitted patients. This finding corroborates another study<sup>17</sup> performed in ICUs of the city of São Paulo that showed that patients hospitalized in the ICU mainly originated from the surgical center and emergency room.

The analysis of the SAPS III variable in both groups revealed that the group of admitted patients showed a higher score, compared to the group of non-admitted patients ( $p < 0.0001$ ). This enables us to conclude that those being admitted to intensive care had a more severe condition. It should be emphasized that patients with a higher SAPS III score (76 points) were in the group of those admitted to the ICU.

When the applicability of the SAPS III score to Brazilian hospitals is assessed, patients with a score equal to or higher than 57 showed a higher SAPS III index, compared to those with a lower index. Thus, the values found in the present study are associated with the high mortality rate, as 75.3% of these patients did not survive.<sup>10</sup>

The overall mean NAS score was higher than the Brazilian mean of 54.0.<sup>11</sup> Although the NAS score is higher in patients admitted to the ICU ( $p = 0.0085$ ), the NAS score obtained among non-admitted patients (53.85) should be reflected upon as this value was very close to the Brazilian mean for ICU patients. Thus, hospitalized patients seeking admission to the ICU require a high level of workload from the nursing team.

Additionally, the peculiarity and classification of such units is well known, as they are planned and designed to serve patients requiring less health care complexity. The present study did not aim to assess the variables that can compromise the work process and results. Nonetheless, these conditions and their determinants should be emphasized.

In this sense, the fixed number of 17,940 registered ICU beds for 11,615 adult patients does not meet the actual demand, which has been proved by the literature and media through many severe social situations with ethical implications for professionals.<sup>4</sup>

This context can cause the health team to experience work overload and severe strain and impose conditions that are inadequate for patient safety, thus contributing to the occurrence of adverse events such as pneumonia, urinary tract infection, increase in length of hospital stay, and increase in hospitalization costs. It should be mentioned that work overload is the main factor causing the burnout syndrome in the nursing team.<sup>20,21</sup>

Although the NAS is not aimed at designing personnel, this instrument is known to integrate data that collaborate for human resource planning. Managers can take these data into consideration for context analysis and the proposal of measures that meet these deficiencies in the work process and, consequently, in the results. In these locations, the different proportion between nurses and technical professionals must be taken into consideration.<sup>22,23</sup>

Additionally, the planning of material resources, required to meet the epidemiological profile, modified in these health care contexts, must be performed by the nurses from such hospitalization units.

The analysis of data from patients who died in the process of waiting for the response to their request for ICU hospitalization is also evidenced through the severity and complexity of this group of patients. It should be emphasized that the criteria for admission, discharge and screening of patients to whom intensive care is recommended determine the acceptance of severely ill patients with a favorable prognosis.<sup>9</sup> To simply analyze prognostic indices during the decision-making process for requests for ICU beds is neither sufficient nor a determinant of the need or not of intensive care.

The mean NAS of patients who died before the response to their request for an ICU bed (96.6) shows a high level of workload of the nursing team. The health care required is complex in several dimensions. The biological dimension is clearly affected by the instability shown in the physiopathological parameters, although the remaining dimensions such as the psychosocial and spiritual are not less important.

The family as a unit requires care in this complex process. Thus, they must rely on the time and support from the health team, especially the nursing team. In view of this reality, managerial measures must be adopted to guarantee the conditions required by patients, families and the health team to perform their work ethically.

The correlation test between variables showed an association between age and severity, which can be explained by the impairment of physiological functions in elderly patients. The aging process and stressful situations can influence an organism's self-regulatory capacity.

However, there was not a relationship between NAS and age, thus corroborating the trend found in some studies that assessed the profile of patients hospitalized in an ICU and predictors of nursing work demand among the elderly. Additionally, these studies did not find differences in work overload between elderly and adult individuals.<sup>15,24</sup> However, there are studies that

assessed the severity and workload required by adult patients, who showed an increase in workload in elderly care.<sup>25,26</sup>

The association between "NAS *versus* SAPS III" ( $p < 0.0001$ ) shows that there was a relationship between workload of the nursing team and severity, as previously shown in a study on workload in public and private ICUs in Brazil.<sup>27</sup> This finding corroborates the interference caused by the existing relationship between NAS and SAPS III. Consequently, this relationship must be acknowledged so that measures can be taken in the work process, thus guaranteeing the conditions for safe care.

The overall assessment of workload for this group of patients showed a high level of workload required for the care provided to severely ill patients seeking admission to an ICU. It is known that the workload tends to be higher in the ICU of public institutions, compared to private ones. This relationship occurs according to the number of therapeutic interventions, which tend to be higher in public institutions.<sup>28</sup>

In recent years, the investigation of nursing workload is mainly performed in ICUs, aiming to manage factors associated with patient safety and the rational use of resources in these units.<sup>9,16</sup> The present study develops such investigation as it contributes to both the assessment and results of patients, in addition to being the context of actual research, with current issues experienced by innumerable hospital institutions.

Taking the characteristics of each unit, groups of patients and their epidemiological profile, and health care teams into consideration is an important strategy in the work process to provide care with safety to service users and workers. It should be emphasized that the review of health care processes supports changes in planning and interventions with possible improvements in the results.<sup>3,29</sup>

The data from the present study suggest the need to promote discussions about ICU hospitalization criteria, including not only questions about severity, but also the type of care required by patients. Questions about human resources aimed at health care for severely ill patients must be taken into consideration, as it is highly relevant to discuss and think about proposals that minimize the impossibility of patients with such profile being admitted to the ICU. There is the need for a public policy and continuous assessment of hospitalization criteria, apart from the reorganization of hospital beds and construction of measures that can meet the needs of patients who require intensive care.

## CONCLUSIONS

The present study identified a high nursing workload (NAS of 58.18) in adults seeking admission to an ICU, both among admitted and non-admitted patients. However, the severity and nursing workload of admitted patients were higher, with the mean NAS score being close to the value considered to be high.

When the importance of the theme is taken into consideration, the results found can develop the strategies of monitoring and identification of severely ill patients with specific health care

demands in other hospital wards, apart from the ICU. The high workload found in these patients out of ICUs shows the need for changes in the assessments of health care processes.

However, workload must be measured not only in ICUs, but also in other health care contexts where severely ill patients are present, such as infirmaries and emergency units, aiming to assess and plan safe high-quality nursing care. Finally, one of the limitations of this study was the fact that it was performed in a single institution. Thus, the replication of this investigation in other hospitals should be encouraged.

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