

SIZING OF THE NURSING STAFF IN ADULT INTENSIVE THERAPY

DIMENSIONAMENTO DO PESSOAL DE ENFERMAGEM NA TERAPIA INTENSIVA ADULTO

CÁLCULO DE PERSONAL DE ENFERMERÍA DE LA UNIDAD DE CUIDADOS INTENSIVOS ADULTOS

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ABSTRACT

The objective of this work was to investigate the sizing of the nursing staff of an adult intensive care unit. This is a cross-sectional, prospective, descriptive and quantitative research carried out in the Adult Intensive Care Unit (ICU-A) of a university hospital in Paraná, Brazil. Data collection occurred between June and October 2014 through the application of the Nursing Activities Score (NAS) to a sample of medical records of patient (n=81), obtaining the measurement of the average workload (565.32 points) of the nursing team of the sector. As a result, the staff of the category was compared to the national legislation corresponding to Resolution nº 543/2017 of the Federal Council of Nursing. The total size of the staff was 32 workers, of whom 17 were nurses and 15 were nursing technicians. Compared to the real picture, there was an overall deficit of three professionals. Eight nurses were missing, evidencing a surplus of five middle-level workers. We concluded that the nursing staff of the ICU-A is undersized and this situation can affect the quality and safety of intensive care, as well as compromise the professional identity of nurses.

Keywords: Dimensioning; Workload; Personnel Management; Intensive Care Units; Nursing Team.

RESUMO

O objetivo consistiu em dimensionar o quadro de pessoal de enfermagem de uma unidade de terapia intensiva para adultos. Trata-se de pesquisa transversal, prospectiva, descritiva e quantitativa. Foi realizada na Unidade de Terapia Intensiva para Adultos (UTI-A) de um hospital universitário do Paraná, Brasil. A coleta de dados ocorreu entre junho e outubro de 2014 pela aplicação do Nursing Activities Score (NAS) a uma amostra (n=81) de prontuários de pacientes, obtendo a mensuração da carga de trabalho média (565,32 pontos) da equipe de enfermagem do setor. Com isso, dimensionou-se o quadro de pessoal da categoria, confrontando-o com a legislação nacional correspondente à Resolução nº 543/2017 do Conselho Federal de Enfermagem. O quadro dimensionado total da equipe foi de 32 trabalhadores, sendo 17 enfermeiros e 15 técnicos de enfermagem. À comparação com o quadro real, houve déficit geral de três profissionais. Faltavam oito enfermeiros assistenciais, evidenciando superávit de cinco trabalhadores de nível médio. Concluiu-se que o quadro de pessoal de enfermagem da UTI-A é subdimensionado, o que pode afetar a qualidade e a segurança do cuidado intensivo, além de comprometer a identidade profissional do enfermeiro.

Palavras-chave: Dimensionamento; Carga de Trabalho; Administração de Recursos Humanos; Unidades de Terapia Intensiva; Equipe de Enfermagem.

RESUMEN

El objeto del presente estudio consistió en calcular el personal de enfermería de una unidad de cuidados intensivos adultos. Se trata de una investigación transversal, prospectiva, descriptiva y cuantitativa, realizada en la unidad de cuidados intensivos adultos (UCI-A) de un hospital universitario de Paraná, Brasil. La recogida de datos ocurrió entre junio y octubre de 2014 por medio del Nursing Activity Score (NAS) en una muestra (n = 81) de prontuarios de pacientes, por el cual se obtuvo la medición de la carga de trabajo promedio (565,32 puntos) del personal de enfermería del sector. Con ello, se calculó el personal de la categoría, de acuerdo con la legislación nacional correspondiente a la Resolución nº 543/2017 del Consejo Federal de Enfermería. El cálculo del total de personal fue de 32 trabajadores, entre ellos 17 enfermeros y 15 técnicos de enfermería. En la comparación con el personal de enfermería real, hubo déficit general de tres profesionales. Faltaban ocho enfermeros asistenciales, y había cinco trabajadores de nivel medio de más. Se concluyó que el personal de enfermería de la UCI-A es insuficiente, lo cual puede afectar la calidad y la seguridad de los cuidados intensivos, además de comprometer la identidad profesional del enfermero.

Palabras clave: Dimensionamiento; Carga de Trabajo; Administración de Personal; Unidades de Terapia Intensiva; Equipo de Enfermería.

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INTRODUCTION

In the troubled dynamics of personnel management of hospital nursing teams, the inadequate staff size interferes negatively in the quality of care.^{1,2} For this reason, the provision of an appropriate number and level of qualification of nursing professionals should be a growing concern among responsible managers, justified by the acquisition of new care technologies, changing the profile of patients, the need for skilled workers, and especially the viability of qualified and safe care.¹⁻⁴

In order to provide the ideal nursing team in terms of number of professionals and category composition, it is necessary to measure the real need of nursing professionals in each unit, according to the characteristics of the institution, the nursing service and, above all, the clientele.^{4,5} In this perspective, sizing is conceptualized as a systematic process that bases the planning and evaluation of the quantitative and qualitative aspects of the body of nursing professionals needed to provide care according to the uniqueness of the health services and, thus, to the safety of patients and workers.⁵

Due to the complex peculiarity of the care provided in Intensive Care Units (ICUs), the verification and the qualitative and quantitative adequacy of the nursing team favors the provision of safe care, since the professional performance in this service requires promptness and rapid decision making, service qualities associated with the need for high technical and scientific competence of the human capital required for intensive care.^{6,7}

In the context of ICU, by the way, the adequate number and professional categories of nursing is a tool that assists nurses in the development of their managerial activities related to work organization of rational distribution of the workload of the nursing team, making it more qualified and productive to the offer of care, since there is a relationship between the increase in the workload of professionals and occurrence of adverse events as well as the mortality of patients hospitalized in ICUs.^{1,3,8}

To manage the nursing team in a rational way, it is necessary for managers to strategically use means and instruments that culminate with the prediction of the qualitative and quantitative character of workers.⁴ In this scope, recently, in 2017, there was an updating in the parameters that govern the sizing of nursing teams in Brazil, representing undoubtedly a valuable bridge to the managerial action of nurses in favor of the adequacy of health care personnel.^{4,5}

One of the main variables for the prediction of sizing of nursing personnel is the team workload measurement.⁵ The Nursing Activities Score (NAS), a tool for evaluating the nursing care request per clientele, is considered the most used instrument for the measurement of the nursing workload in ICUs.⁹ After all, the NAS addresses the time of procedures and therapeutic interventions very well adapted to the reality of critical care,

besides having the specificity of contemplating in its items managerial activities and the support to relatives of ICU patients.^{9,10}

A literature review about research on sizing of the nursing staff showed that, although the volume of studies on the subject has increased, the category remains with a number lower than that recommended for care needs.¹¹ Another recent bibliographic study indicates that the increase in the workload of the nursing team, commonly associated with under-staffing, is responsible for worse results among quality indicators of care and management of affection for nursing services.¹²

Thus, there is a need for research because the body of evidence in this scope may be a means of leveraging the negotiating power of nursing managers if undersizing of personnel is common. Therefore, research on nursing staff sizing is socially and scientifically relevant. Such research should serve as a solid basis for improvements in human care, making feasible the adequate qualitative and quantitative sizing of the personnel responsible for producing care.

Based on the previous premise, the present study is grounded on the following question: "has the nursing staff of an adult ICU an adequate sizing?" and, in order to answer this question, the objective was to investigate the sizing of the nursing staff of an adult intensive care unit.

METHOD

Cross-sectional, prospective, descriptive study with a quantitative approach. The study was developed in the adult ICU (ICU-A) of a public university hospital in Paraná, Brazil. The unit has eight beds for intensive treatment. The nursing team was composed of a coordinating nurse, nine nursing assistants and 20 nursing technicians who work in a 36-hour workweek and are allocated in five teams as follows: morning shift, afternoon shift, night shift I, night shift II and night shift III.

Data were collected daily, prospectively, from June to October 2014. The collection was done by analyzing the medical records of all patients hospitalized in the unit in the temporal interval determined. The exclusion criterion was hospitalizations with time less than 24 hours. For this, besides the documentary analysis, daily visits were made to the nursing team to address possible doubts when the records were inconsistent/incomplete.

During the visit to the ICU-A, an instrument was filled out for each medical record. The instrument contained two parts, namely: the first was aimed at gathering demographic and clinical data of the clientele; and the second referred to the application of the NAS based on the care given to each patient in the 24 hours prior to the day of the visit, a necessary action to measure the nursing workload.¹⁰ Patients hospitalized twice had their data computed only once.

The NAS is divided into seven dimensions and 23 items: *basic activities* (eight items), related to hygiene, comfort, medication, monitoring and administrative activities; *ventilatory support* (three items), related to respiratory support and airway maintenance; *cardiovascular support* (four items) related to the use of vasoactive drugs, invasive monitoring and cardiorespiratory arrest; *renal support* (two items) on the need for renal replacement therapy; *neurological support* (one item) dealing with the need for invasive monitoring; *metabolic support* (three items), focused on feeding and control of metabolic acidosis/alkalosis; *specific interventions* (two items), dealing with common intensive care procedures such as the need for cardioversion and surgeries.¹⁰ Its maximum score per patient is 176.8 in 24 hours.^{9,10}

Data were compiled into Microsoft Office Excel® spreadsheets. After that, the analysis of sociodemographic and clinical data was performed based on descriptive statistics and for data collected with the NAS, the average daily and monthly workload of the nursing staff was obtained. In this calculation, regardless of professional category, it was considered that for every 100 points obtained in the average workload of the unit, there was a need for one nursing professional, as proposed in the literature.¹³ The sizing of the nursing staff of the ICU-A was calculated according to the following recommended formula⁶:

$$PE = (E \cdot (\mu \text{ NAS}/100)) + 15\%$$

Where:

- PE = number of nursing professionals required.
- E = number of nursing teams.
- μ NAS = average NAS score of the unit.

Based on the staffing table estimated by the equation considering the NAS, this figure was adjusted to the recommendations of the Resolution of the *Conselho Federal de Enfermagem* (COFEN) n° 543/2017, adding the Technical Security Index (TSI) of at least 15% in order to make up for the expected and unexpected absences of the nursing team.⁵

In the qualitative step (proportional definition of workers by professional category) of the design, the proportion of 52% of nurses was estimated on the total number of workers estimated, in accordance with the current recommendation for clientele of intensive care.⁵ After obtaining the qualitative and quantitative size definition of the nursing staff in the sector, these values were compared to the local reality, that is, the available work scale.

All the ethical and legal aspects that govern research with human beings disposed in the Resolution n° 466/2012 of the *Conselho Nacional de Saúde* were completely fulfilled and the research is registered under CAAE n° 30198614.0.0000.0104.

RESULTS

There were 88 hospitalizations, two of them with length of stay in the ICU-A less than 24 hours, and five readmissions. The study sample consisted of 81 patients, whose age ranged from 14 to 88 years (mean= 57.67 years, standard deviation \pm 19.31 years), with a higher concentration in the age group above 60 years (45.67%). Further sample characterization data are shown in Table 1.

Table 1 - Characterization of the patients (n = 81) hospitalized in the ICU-A. Maringá-PR, 2014

Variables	n	%
Sex		
Male	48	59.26
Female	33	40.74
Origin		
ICU	7	8.64
Surgical Clinic	13	16.05
Emergency Room	56	69.14
Others*	5	6.17
Diagnosis		
Cardiorespiratory Disorders	28	26.92
Acute abdomen	25	24.04
Septic shock	21	20.19
Neurological disorders	13	12.50
Traffic accident	6	5.77
Violence	5	4.81
Intoxications	4	3.85
Neoplasm	1	0.96
Complicated pregnancy	1	0.96
Hospitalization clinic		
Medical clinic	47	58.02
Elective surgery	4	4.94
Emergency surgery	29	35.8
Gynecology and obstetrics	1	1.23
Outcome		
Hospital discharge	47	59.76
Death	25	30.49
Transfer (other service)	1	1.22
Stay in the ICU	8	8.54

*Other hospitals/health services.

Regarding the NAS score, this ranged from 84.6 to 139.3 points. The average workload of the unit was 565.32 points (standard deviation \pm 14.47 points). Projected on this value, the total number of nursing personnel calculated was 32 workers.

Of this absolute value, in the proportional definition by category, the ICU-A required 17 nurses and 15 nursing technicians.

In direct care, the UTI-A worked with 29 workers, among nine assistance nurses and 20 nursing technicians. Figure 1 illustrates the projection of workers according to the sizing and the actual picture available in the ICU-A.

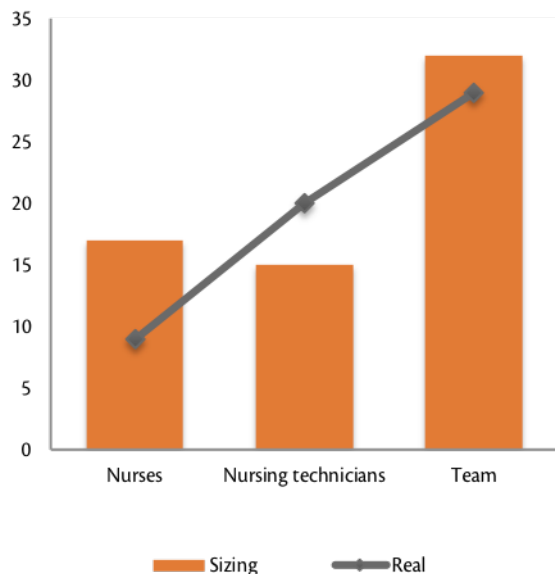


Figure 1 - Number of professionals calculated and number available in the ICU-A. Maringá-PR, 2014.

DISCUSSION

The demographic data of patients admitted to the ICU-A are in line with the results of another study⁹ performed in ICUs which showed a larger proportion of adult (mean = 57.67 years, standard deviation \pm 19.31 years) and elderly (45.67%) patients, predominantly male (59.26%). The findings also corroborate researches that evaluated the workload in ICUs.^{14,15} This homogeneous scenario is perhaps a fact to be considered by ICU nursing managers in the management of intensive care, either in team training, resource allocation, and workflow mapping.

Regarding the outcome or termination of hospital admissions, there were more patients who were discharged to complete the treatment in the ward (59.76%) than those who died (30.49%). This data deserves to be better investigated because it may be related to the quality of care provided in the sector. The literature reveals that the mortality rate is high among patients with cardiovascular and respiratory problems in an intensive regimen.¹⁶ Considering that the group of patients with cardiorespiratory problems represented the largest proportion of hospitalizations, it is postulated that the death rate may have been concentrated in this group, reinforcing that well-focused mortality studies are indeed necessary.

When analyzing the diagnoses at admission in the sample of patients, it is observed that there was not so much discrepancy between health problems, in line with other studies performed in general care ICUs, both in Brazil and in Turkey.^{6,17} This characteristic may be related to the fact that the UTI-A studied is the only one in the institution and a reference for both clinical and surgical cases. Despite being isolated raw data, they may be a guideline for managers to know that the nursing team needs extensive and diversified knowledge about the care to patients in this sector.

The workload of the ICU-A as a whole, if divided by the total of available beds, corresponds to a score of around 71 points of the NAS for each patient. This in itself is already a valuable data for service management, because there is a previous international literary recommendation that the assessment of 100 points in the NAS should correspond to one nursing worker.¹³ Although this strategy is useful to the allocation of personnel in the ICU, it is necessary to reflect that, in Brazil, nursing exercises a hierarchical work. This reinforces the qualitative sizing of personnel beyond the measurement of the workload, that is, the definition of the gross number of workers per professional category of nursing.⁵

It should be emphasized that the measurement of workload is an aspect of daily recommendation when considering the logic of personnel sizing.^{5,18} Another aspect that reinforces the use of means of measurement of nursing workload is the allusion that this can direct its own care planning and management actions.⁴ It is postulated, therefore, that the care management in ICUs certainly accompanies the complexity of the care provided in the daily routine of these services and, therefore, the use of NAS or other means of measuring workload and/or classifying patients should be incorporated in a rational way, linked to direct care improvement.

When comparing the general number of professionals projected for the ICU-A with the existing framework, we observed that there is a deficit of three professionals in relation to what is necessary to supply the demand of the sector. These data converge with the postulates of other studies, which affirm that nursing acts constantly with undersized teams and, therefore, experiences a high workload.^{11,12}

The undersizing observed in health institutions is an alert to managers because the workload is directly related to the results of the care.¹⁻³ For example, a recent study associated the workload with safety indicators of patients in hospitalization units of a large university hospital, in a retrospective analysis of 157,481 patients and 502 nursing professionals.¹⁹ In the investigation, it was found that the increase in the proportion of patients per nursing worker, translated as increased workload, was responsible for worse results among average hospital stay, urinary infection related to invasive procedures and also the patient's own satisfaction with nursing care.¹⁹ Based on the

construct of this study and the related literature, it is important to alert managers so that the adequate dimensioning of the nursing professionals be promoted in health institutions.

In the present research, the difference between the real and the calculated number of workers is more disproportionate when analyzing the number of nurses. This is because UTI-A professionals acted with a little more than half of the workers calculated for this category, in line with the findings of a literature review, indicating that, in Brazil, in the last 12 years, the number of nurses available in the institutions has been below the number recommended by the legislation.¹¹

The previous assumption is reinforced by the results of a recent national survey on the sizing of adult ICU personnel which showed that the biggest problem evidenced in the prediction of personnel size was the deficit (-38) of nurses that became notorious in the total interpretation of the investigation, when it was found that the overall deficit of the team was 27 workers.²⁰ That is, the greatest lack of human capital in the ICU was of higher level nurses, a fact corroborated by the findings of the present study.

For the authors of the research cited,²⁰ the new resolution that governs staff sizing in Brazil deserves to be used as a bridge for greater/better supervision by competent bodies, including in the critical care context, where the need for more qualified human capital is recommended in higher ratios.⁵ Therefore, this is possibly the reason for the evident discrepancy between the actual and the calculated size of the nursing staff in the ICU of this study, because the overall deficit of professionals (-3) was lower than the lack (-8) of nurses.

In the quest for quality of care and patient safety, it is necessary that institutions not only guarantee the quantitative aspect of the team, but also provide qualification to the nursing professionals who work in intensive care. After all, it is incumbent upon nurses to provide direct care for serious life-threatening and more technically complex patients who require adequate scientific knowledge and the ability to make immediate decisions.²¹ In this way, ICU patients should be cared for by a larger number of nurses. Yet, the literature, together with the results of this study, shows the predominance of mid-level nursing professionals in this sector.^{6,20,22}

It is important to remember that the context of this study does not focus on the analysis of impact of the different categories of the nursing team, and therefore it is not possible to state that the performance of the professionals of medium level at the ICU-A investigated compromises the quality of the care. What was investigated was the correspondence or not of the qualitative and quantitative aspect of the sector with the workload measured by the NAS and adjusted by the current COFEN Resolution.⁵

We observed that the proportion of nursing technicians available is higher than estimated. This should also serve as a

warning to leaders because the overload for nurses can contribute to the fact that mid-level professionals perform tasks that are exclusive to higher level professionals and thus influence the quality of care or even, and not least, distort the attributions of mid-level nursing, thus compromising the organizational and social view of nurses as care managers.^{4,20}

It is necessary to consider, then, that the proportion of nurses below the recommended level can generate an accumulation of tasks to these professionals, preventing them from planning care, conducting educational activities for their staff and for the relatives of hospitalized patients, as well as to carry out various managerial actions and thereby compromise the quality of care.²⁰ The probable accumulation of tasks may be a product of the rooted thinking of purely rational management present in health institutions that may be a barrier to the adequacy of nursing human resources, even because this would imply the increase with the payroll of personnel. However, improvements in direct care have already been observed in the adjustment of nursing human resources in the hospital context²³, a fact that should boost the overcoming of the anachronistic view of management focused solely on productivity.

Considering that the inadequate sizing of the nursing personnel has a direct influence on care,¹⁻³ and possibly in the definition of the work of nurses, the quantitative and qualitative adequacy of this team in health institutions, especially in ICUs, is a necessity to be supplied in the shortest time possible. For this, we believe that the use of management tools is indispensable, as well as commitment of the higher authorities to the fulfillment of the requirements.

CONCLUSION

The conclusion is that the nursing staff of the ICU is undersized, especially in the category of nurses. The general number of professionals available to the work demonstrates dissonance with the sizing framework, reinforcing the deficiency of qualitative and quantitative human capital that provides the intensive care. This scenario reflects worrying possibilities, especially the weakening of care management activities by nurses, work overload of the whole staff and, consequently, possible negative repercussions on the quality and safety of care.

The study is limited to the reality of a single adult ICU, but the linking of the concrete results to the pertinent literature indicates that this research contributes to reinforce the need to review the provision of intensive care personnel. For future investigations, we suggest to identify the difficulties that permeate the adequacy of nursing professionals, either in terms of number and/or category, and also the analysis, through indicators, of the real impact of undersizing on the care quality and health of workers.

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