

Nursing care time and quality indicators at a pediatric and neonatal Intensive Care Unit

Tempo de assistência de enfermagem e indicadores de qualidade em Unidade de Terapia Intensiva pediátrica e neonatal

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Keywords

Quality indicators in health care; Intensive care units, pediatric; Intensive care units, neonatal; Nursing administration of human resources

Descritores

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Abstract

Objective: To analyze the correlation between the mean time of nursing care and care quality indicators in Pediatric and Neonatal Intensive Care Units (PNICU).

Methods: Quantitative, documentary, correlational research with retrospective data collection, developed at the UTIPN of the University Hospital at the Universidade de São Paulo. The relation between the mean care time spent and the care indicators for the period from January 2008 till July 2013 was verified by means of Spearman's and Pearson's Correlation tests.

Results: The mean time of nursing care spent on the patients corresponded to the recommendation by Cofen (17.9 hours), but with a lower percentage of nurses than indicated. The correlation between the time of nursing care and the indicator unplanned removal of oral/nasogastric/enteral tube indicates that the availability of time influences the reporting or underreporting of these events.

Conclusion: The results evidenced no change in the quality indicators in function of the mean care time, but suggest possible relations with professional experience, nursing team training and educational actions for the ongoing improvement of care processes.

Resumo

Objetivo: Analisar a correlação entre tempo médio de assistência de enfermagem e indicadores de qualidade assistencial em Unidades de Terapia Intensiva Pediátrica e Neonatal (UTIPN).

Métodos: Pesquisa quantitativa, documental, correlacional com coleta retrospectiva de dados, realizado na UTIPN do Hospital Universitário da Universidade de São Paulo Hospital Universitário da Universidade de São Paulo. A relação entre o tempo médio de assistência dispensado e os indicadores assistenciais do período de janeiro de 2008 a julho de 2013 foi verificada pelos testes de Correlação de Spearman e de Pearson.

Resultados: O tempo médio de assistência de enfermagem dispensado aos pacientes correspondeu ao preconizado pelo Cofen (17,9 horas), porém com percentual de enfermeiros menor que o indicado. A correlação entre tempo de assistência de enfermagem e indicador saída não planejada de sonda oro/nasogastroenteral indica que a disponibilidade de tempo influencia as notificações ou subnotificações desses eventos.

Conclusão: Os resultados não evidenciaram alteração nos índices dos indicadores de qualidade em função do tempo médio de cuidado, mas sugerem poder estar relacionados à experiência profissional, capacitação da equipe de enfermagem e ações educativas para melhoria contínua dos processos assistenciais.



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Introduction

In the global context, the quantitative and qualitative adaptation of nursing professionals for safe and effective care delivery has turned into a great challenge.

Nevertheless, the high cost of health care continues to strongly influence the provision of these professionals, limiting the number of professionals hired, even at the intensive care units (ICU), which demand high technology and a larger proportion of human resources to attend to the critical patients' therapeutic needs, with a view to promoting and maintaining the quality of the care delivered.

The objective of high-quality nursing care is to deliver services that safely attend to the patients' needs. In this respect, planning actions are fundamental, which include the supply of appropriate physical structure and material resources, the search for new technologies and the prevision of qualified and sufficient professionals.⁽¹⁾

In recent decades, health institutions and professionals started to aim for the delivery of damage-free and high-quality care, discussed in a comprehensive and ongoing manner.⁽¹⁾

At Pediatric and Neonatal Intensive Care Units (PNICU), the lack of studies, parameters and indicators that translate the mean care time required to specifically attend to patients hospitalized at those units, the planning and the determination of the work force make it difficult to assess the existing nursing staff.

According to Gaidzinski⁽²⁾ and the Canadian Nurses Association,⁽³⁾ the identification of the workload, represented by the mean care time required to attend to the patients is the main variable in the dimensioning methods and key to determine the nursing professionals.

In practice, however, gaps exist in the indication and validation of parameters that translate the care time required to specifically attend to patients hospitalized at PNICU.⁽⁴⁾

Thus, the managers of these services face difficulties to appropriately plan and assess the nursing staff in quantitative and qualitative terms, often us-

ing parameters established for adult patients, which may not cover the characteristics of pediatric and neonatal patients.⁽⁴⁾

In the international literature, studies are found that intend to demonstrate the relation between the mean care time in hours and the care quality indicators, evidencing that a higher nursing/patient relation and a higher proportion of nurses positively influence the outcomes of care delivery to patients and their families.⁽⁵⁻⁷⁾

In this perspective, it is considered that the mean time of nursing care is an objective measure to assess and monitor the number and quality of the nursing professionals, as it permits assessing the existing human resource conditions in view of the quality and safety of the nursing care offered.⁽⁸⁾

Thus, the goal in this study is to identify the mean time of nursing care spent on patients hospitalized at a Pediatric and Neonatal ICU, as well as to verify its correlation with the care quality indicators.

Methods

A quantitative, documentary correlation study was undertaken with retrospective collection of the data, at the PNICU of the University Hospital at the Universidade de São Paulo (HU-USP).

The PNICU offers 16 beds, distributed in two distinct environments, being six for the Neonatal ICU, which attends to infants of up to 18 days of life, and ten beds for the Pediatric ICU, where children under 15 years of age are attended.

The variable mean time of nursing care spent on PNICU patients (between January 2008 and July 2013) was obtained by consulting the electronic worksheet used to calculate equation 1:⁽⁹⁾

$$h_k = \frac{q_k \cdot p_k \cdot t_k}{n(1)}$$

Where:

h_k = mean time of nursing care per patient spent by workers in the professional category k ;

q_k = mean number of active nursing staff members in professional category k ;

p_k = mean productivity of professional category k (85%);

t_k = work journey of professional category k (six hours);

k = professional category;

n = mean daily number of patients attended.

The quality indicators used in the research were obtained from the nursing head of the Unit, who uses the equations indicated in the Manual of Nursing Indicators of the Hospital Management Support Center (NAGEH) for the purpose of calculation.⁽¹⁰⁾

In this study, the following quality indicators were used, validated and recommended in the Brazilian⁽¹⁰⁾ and international literature:⁽¹¹⁾ Incidence of non planned loss of oro / nasogastric tube (NGT) for nutritional intake; Incidence of Non Planned Extubating (NPE); Incidence of loss of central venous catheter (CVC).

For the correlation analysis, Spearman's Correlation Coefficient was used - for the variables that did not follow a normal distribution and Pearson's Correlation Coefficient - in case of normal distribution of the variables.

The data of the present study were collected from worksheets that integrate the monthly reports of the nursing head of the Unit after approval of the Committee of Ethics in Research (CEP) of the University of São Paulo (USP) and registered in the Brazil Platform under the number CAAE: 17121913.5 .3001.0076).

Results

The mean nursing care time spent on the patients at the PNICU of the HU-USP between January 2008 and June 2013 has been described in table 1.

During the period, on average, 15.23 hours of care were spent on hospitalized patients, being 32% attributed to the nurses and 68% to the nursing technicians/auxiliary nurses.

As observed, the mean time spent on the patients hospitalized at the PNICU varied over the years analyzed (minimum 3.0 hours and maximum 7.0 hours for the nurses and minimum 7.1 hours

Table 1. Mean nursing care time spent per patient

Period 2008 till 2013	Mean time		Total n(%)
	Nurses n(%)	Nursing Technicians n(%)	
Mean	4.86 (32.0)	10.39(68.0)	15.23 (100)
Standard deviation	0.81	1.65	2.39
Maximum	7.0 (32.5)	14.5 (67.5)	21.4 (100)
Minimum	3.0 (29.8)	7.1 (70.2)	10.1 (100)
CV*	17%	16%	16%

*VC - Variation coefficient

and maximum 14.5 hours for the nursing technicians), due to the variation in the occupancy rate of the Unit.

Table 2 shows the existence of a statistically significant negative correlation (p-value <0.001) between the care hours and the occupancy rate, demonstrating that, as the occupancy rate increases, the number of care hours spent drops and vice-versa.

Table 2. Correlation analysis between mean care time spent on patients according to professional category of nursing and occupancy rate

Period 2008 till 2013	Occupancy rate	
	Pearson correlation	p-value
Time spent Nurses	-0.905	< 0.001*
Time spent Technicians	-0.926	< 0.001*
Time spent Team	-0.946	< 0.001*

*Significance level for p-value <0.05

The performance of the care quality indicators at the PNICU of the HU-USP between January 2008 and June 2013 revealed a mean incidence of 2.27 for Non Planned Extubating (NPE), 6.61 for incidence of non planned loss of oro / nasogastric tube (NGT) for nutritional intake and 1.30 for central venous catheter loss (CVC). Great variation was found in the sample, as evidenced by the variation coefficients found: 72%, 56% and 113% for NPE, Removal NGT and Loss CVC, respectively.

In table 3, it is verified that the nursing care time in all professional categories and the quality indicator Incidence of unplanned removal of NGT present a positive and statistically significant correlation (p-value ≤ 0.001). For the other variables, no statistically significant correlations were found.

Table 3. Correlation analysis between mean care time spent on patients according to professional category of nursing and care quality indicators

Period 2008 till 2013	Loss CVC		NPE		Removal NGT	
	Spearman Correlation	p-value	Spearman Correlation	p-value	Spearman Correlation	p-value
Time spent Nurses	0.138	0.284	0.241	0.060	0.433	0.001*
Time spent Technicians	0.156	0.227	0.226	0.078	0.468	< 0.001*
Time spent Team	0.154	0.233	0.243	0.049	0.485	< 0.001*

*Significance level for p-value <0.05; Central Venous Catheter (CVC); Non Planned Extubating (NPE); Nasogastric Tube (NGT)

Discussion

The occupancy rate varied from 40% to 93.5%, the highest rates being found in March, April and July.

The mean nursing care time at the PNICU of the HU-USP between January 2008 and July 2013 corresponded to 15.23 hours per patient every 24 hours. The lack of studies developed at PNICU considering the identification of the nursing care hours makes comparisons difficult.

When confronting the results found with those in a research⁽¹²⁾ developed at the same hospital, including the PNICU, between 2001 and 2005, it is observed that less nursing care hours were spent on PNICU patients than in the years analyzed (mean 21.62 hours). This fact can be due to the lower occupancy rate (56.6%) and the higher mean number of professionals working (31.3) during the period the author assessed when compared to the present study (61.8% and 29.1, respectively).

Although the mean nursing care hours spent on patients hospitalized at the PNICU seem lower than the time proposed by Cofen⁽¹³⁾ (17.9 hours) and by the Brazilian Association of Intensive Care Medicine - AMIB⁽¹⁴⁾ (16.8 hours), the care hours these entities recommended do not include the productivity losses of the nursing workers, which correspond to breaks for rest or activities not related to specific professional tasks, which were considered in the calculation of the mean care time used in this study.

At the PNICU, the mean care time spent on the patients is estimated based on an 85% productivity index, which is considered excellent, according to the productivity assessment criteria proposed in the literature.^(15,16) Hence, if the calculation of the mean care times at the PNICU considers a productivity rate of 100%, this results

in 17.91 hours of care, which corresponds to the Cofen recommendation (17.9 hours), surpassing the time proposed by AMIB⁽¹⁴⁾ (16.8 hours) and by the Brazilian National Health Surveillance Agency - Anvisa⁽¹⁷⁾ (14.4 hours).

In this study, no differences could be established between the nursing care hours spent at the Pediatric ICU and Neonatal ICU, as the team available in each work shift is distributed between the two areas and, according to the care dynamics and demand, the professionals allocated to one area can deliver care in the other.

The percentage distribution of the nursing team working during the study period corresponded to a mean 32% for nurses and 68% for nursing technicians/auxiliary nurses, in line with the data found in a study⁽¹²⁾ that demonstrated that, at the same Unit, between 2001 and 2005, on average, the composition of the nursing team corresponded to 31.2% of nurses and 68.8% of nursing technicians/auxiliary nurses.

This proportion differs from the distribution recommended by Cofen though,⁽¹³⁾ which establishes the proportion of 52 to 56% of nurses to assist the intensive care patients.

A study⁽¹⁸⁾ that described the composition and distribution of the nursing team at 17 ICUs from six hospital institutions in the Northwest of São Paulo found an average 13.1% of nurses, 11.2% of nursing technicians and 75.7% of auxiliary nurses. Specifically for the pediatric ICUs, this rate ranged from 10.5% to 44.4% for nurses, with a large share for auxiliary nurses, reaching 89.5%, as opposed to the Cofen recommendation.⁽¹³⁾

A study developed to estimate the nursing staff needed at inpatient units of a hospital in São Paulo⁽¹⁹⁾ found a statistically significant difference

(p -value < 0.05) when the nurse and nursing technician/auxiliary nurse relation recommended by Cofen⁽¹³⁾ was compared with the existing nursing staff at three hospitals in the state of São Paulo. This statistical difference was greater at the ICU. At the pediatric ICU, the proportion ranged between 17.2 and 20.1% for nurses and 79.9 to 82.8% for nursing technicians-auxiliary nurses; at the neonatal ICU, the rates ranged between 15.7 and 22.2% of nurses and 77.8 and 84.3% of nursing technicians-auxiliary nurses.

Various studies emphasize the need for an appropriate number and level of nursing professionals to guarantee high-quality and damage-free care. These studies demonstrate that there exists an inverse relation between the number of nurses and the skills mix (competency, experience, training) and the occurrence of adverse events in patients.^(5-7,19-24)

Nevertheless, the fact that the targets of the public health administrators in Brazil are focused on productivity instead of the quality of care may be influencing the proportion nurse/nursing technician. Thus, as a product of the country's socioeconomic and political conditions, there is difficulty to insert the clinical nurse at the ICU, that is, it is common to hire auxiliary nurses and nursing technicians to deliver care to patients at the ICU, considering that their remuneration is lower than that of the nurses.^(19,25)

The statistical analysis demonstrates a negative correlation between the occupancy rate and the care hours spent, that is, as the occupancy rate increases, the number of care hours spent on the patients drops.

This information is important for the Unit manager to distribute the number of active professionals more appropriately, avoiding periods of idleness when the occupancy rate is low or work overload when the occupancy rate is high. This is made possible by intensifying the relocation of professionals among the units of the institution, and also by programming the employees' holidays to minimize the lag in the care time spent on the patients during these months when the occupancy rate increases.

As regards the analysis of the care quality indicators at the PNICU, a mean incidence rate of 2.27 was found for NPE (number of non planned extubations divided by number of intubated patients/day multiplied by 100); 6.61 for non planned NGT loss (number of tubes lost divided by number of patients with tubes/day multiplied by 100); 1.30 for CVC loss (number of catheter losses divided by number of patients/day with catheter multiplied by 100).

The comparative analysis of these results was difficult because there are few reports in the literature on the incidence of accidental removal of these devices and that the data found on the indices of these events vary due to the use of different methods and patient profiles.

Concerning the relation between the nursing care time in all professional categories and the quality indicator Incidence of Non Planned Loss of Oro / Nasogastric tube (NGT) for Nutritional Intake, the Spearman correlation coefficient corresponded to (0.433-0.485), with a p -value ≤ 0.001 . For the other quality indicators, no statistically significant correlations were evidenced.

The positive correlation between the nursing care time and the incidence of unplanned NGT removal could not be discussed due to the lack of studies for comparison. It can be inferred that, when more time is available, the nurse reports more and underreporting may occur in case of a high workload.

The lack of studies that correlate the staff with the care indicators analyzed in this research suggests that there may be other factors intervening in the indices of these indicators, such as training hours, competences and nursing team skills.

In a systematic review⁽²⁰⁾ published in 2005, 22 international studies were analyzed, which indicate that a larger nursing staff, accompanied by more competent and skilled professionals, is associated with better outcomes for the patient.

Thus, as the care indicators at the PNICU figure within the rates found in the literature and do not drop when the available care hours decrease, it can be inferred that the maintenance of the indicators may be related with the length of professional experience and the training of the nursing team at the Unit.

In addition, the Unit has an Educational Support Service which, in combination with the Group of Indicators, monitors the care indicators used at the Institution, continuously implementing preventive, educational and corrective actions to improve the quality of care, for the sake of greater safety for the patients.

It should be highlighted that the results discussed represent the reality of one Unit, from a single Institution, representing a limitation in this study. In addition, the lack of studies about the care indicators can also be considered limitations in the present research.

In that perspective, the need for further research is evidenced, considering not only the care time, but also aspects related to the skills and competences of the nursing team and the influence of continuing education programs on the patients' care outcomes, with a view to improving the quality and safety of the pediatric patients.

Conclusion

The development of this research revealed that the mean nursing care time corresponds to the recommendation by Cofen (17.9 hours), surpassing the times indicated by Anvisa and by the Ministry of Health. It was verified, however, that the proportion allocated to the nurses was lower than the minimum percentage recommended by the Cofen Resolution and higher than the proportion indicated by Anvisa and by the Ministry of Health. Based on the positive correlation found between the nursing care time and the incidence of non planned NGT removal, it could be inferred that the availability of time can influence the reporting or underreporting of these events, but does not sustain the hypothesis that the rates of the care quality indicators change in function of the mean care time spent on the patients hospitalized at the PNICU. For the other quality indicators, no statistically significant correlations were evidenced.

Collaborations

Vieira FPC, Garcia PC and Fugulin FMT contributed to the conception of the project, analysis and interpretation of the data, relevant critical review of intellectual content and final approval of the version for publication.

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