Pattern of nursing interventions performed on trauma victims according to the Nursing Activities Score

Padrão de intervenções de enfermagem realizadas em vítimas de trauma segundo o *Nursing Activities Score*

Patrón de las intervenciones de enfermería realizadas en víctimas de trauma según el *Nursing Activities Score*

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ABSTRACT

Objective: To identify the pattern of nursing interventions performed on trauma victims in the Intensive Care Unit (ICU). **Method:** Prospective study performed in the ICU of a hospital in São Paulo, Brazil. Nursing interventions were identified using the Nursing Activities Score (NAS). **Results:** The sample consisted of 200 patients, most of them male, with a mean age of 40.7, victims of transport accidents. The NAS mean was 71.3%. The pattern of nursing interventions identified included monitoring and titration, laboratory investigations, medication (with the exception of vasoactive drugs), hygiene procedures, caring for drains, mobilization and positioning, support and care of relatives and patient, administrative and managerial tasks, respiratory support, care of artificial airways, treatment for improving lung function, and quantitative urine output measurement. The monitoring and mobilization interventions required care beyond what is normally required by ICU patients. **Conclusion:** The results of this study provide important contributions to plan training activities and to size ICU nursing team.

DESCRIPTORS

Workload; Nursing, Team; Nursing Care; Intensive Care Units.

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INTRODUCTION

Every trauma victim requires a fast, correct and systematic assessment to immediately identify and treat life-threatening injuries. Ultimately, treatment of a severe trauma patient may include transfer to a specialized hospital, emergency surgery and/or monitoring and support in an Intensive Care Unit (ICU)[1].

We stress the importance of the critical unit specificity, and the complexity of care provided to these victims, who present with diverse clinical conditions as a result of the severity of the trauma suffered. The magnitude of the intensive care will reflect directly on the nursing workload, requiring strategies to ensure optimum use of human resources, the correct size of the team, the quality of care and patient safety[2-4].

Numerous tools that would enable an analysis of the nursing workload have been proposed by researchers in different countries. Though all have limitations, such as the fact that the range of items analyzed is subject to subjective assessment and is created based on local policies, these tools provide valuable information about how the need for care on the part of critical care patients evolves[5]. Among the main indicators used to measure ICU nursing workload are the *Nursing Activities Score* (NAS), created by Miranda et al. in 2003, which expresses the percent time a nursing professional actually spent on patient care[6].

A number of studies have described aspects of nursing care of trauma victims hospitalized in the ICU[7-10]. An analysis of the time spent by nurses on caring for burn patients included administrative tasks related directly to patient care, and other activities such as cleaning the unit, rest and meals. Researchers found that about 30% of the nursing workload was spent on administrative tasks, one third of which could have been performed by other, less qualified professionals[7]. Another study that analyzed the burn population showed that therapeutic interventions related to monitoring, laboratory investigations, hygiene procedures, mobilization and positioning, administrative tasks, treatments to improve lung function and measuring urinary output were the most frequent (>90.0%)[8].

In the neurological ICU, one of the main nursing interventions routinely performed on victims of head injuries was monitoring hemodynamic parameters, with control of intracranial pressure and brain perfusion requiring 50% of the time of such professionals[9].

The only study that used NAS for trauma victims hospitalized in the ICU used a sample of 32 patients, and found a large nursing workload on admission of the patient to the unit (mean NAS of 85.0%) and a high frequency (>90%) of interventions related to laboratory investigations, medication, measuring urinary output and support for the patient and his/her family[10].

Although these studies identified aspects of nursing interventions, the literature has no studies that analyze a possible pattern in the interventions required by trauma victims in ICUs, in particular on the first day of hospitalization, when professionals believe the demand for nursing care is highest.

It is essential to understand this pattern, as it will provide important data for nurses and managers to enable planning actions and investments in care and training, which will certainly have a positive impact on the quality of the nursing care provided, and on patient safety[10]. Thus, the aim of this study was to identify the pattern of nursing interventions performed on trauma victims in the first 24 hours following hospitalization in the ICU.

METHOD

This is a prospective cross-sectional study conducted at the ICU of a hospital that is a reference in the care of trauma victims in the city of São Paulo, Brazil. This is a 22-bed unit that specializes in trauma.

The study includes patients admitted to the ICU in 2010 and 2011 that met the following eligibility criteria: the victim suffered blunt, penetrating or mixed (blunt and penetrating) trauma, aged 18 or over, remained in the ICU for at least 24 hours and agreed to participate in the study by signing a Free and Informed Consent Form. In cases where the patient's clinical status made it impossible for him/her to sign the consent form, consent was obtained from family members or legal representatives.

The nursing workload and nursing interventions were measured using NAS and the data for the patient's first 24 hours in the ICU. This tool is comprised of seven major categories (basic activities, ventilatory, cardiovascular, renal, neurological and metabolic support, and specific interventions). It analyzes and quantifies 23 nursing interventions performed in intensive care. Each of them is weighted by a different number of points. The score obtained by adding up the points is the percent time spent by nursing professionals in direct patient care each shift. The maximum score is 176.8%[6].

The NAS score was used based on analyses of whether or not each nursing intervention described in the tool had been performed during the course of the three patient-care shifts. Items were included if they had been performed at least in one of the shifts. For nursing interventions made up of sub-items (items 1, 4, 6, 7 and 8) we always considered the highest score activity according to the weights described for categories a, b or c.

The following variables were collected to characterize the study sample: age, gender, external cause according to the International Classification of Diseases and Health Related Problems (ICD 10)[12], origin, severity of trauma according to the *Injury Severity Score*[13], severity of patient according to the risk of death calculated using the *Simplified Acute Physiology Score* II (SAPS II)[14], length of stay in the ICU, condition of discharge from the ICU (survivor or non-survivor).

The pattern of nursing interventions performed on these patients was initially identified using the hierarchical cluster approach according to the required nursing interventions. Hierarchical clusters rank distance between victims in relation to this variable, enabling the creation of clusters. The results are graphically shown in a dendogram created using the *Single Linkage* approach, leading to cut-

off points to better identify clusters of victims with similar interventions. A description of the group containing the majority of the victims according to interventions performed enabled a description of the pattern observed. In other words, the more frequent interventions performed in a cluster with similar interventions.

Descriptive statistics were performed for all study variables in order to characterize the sample and the pattern of nursing interventions.

This study was approved by the institution's Research Ethics Committee (Protocol n. 1220/09).

RESULTS

The study population was made up of 200 trauma victims admitted to the ICU. Most were men (82.0%), in a male/female ratio of 4.5:1. Most of the victims had suffered blunt trauma (94.5) and were admitted from the Surgical Center (70.0%). The predominant causes of the trauma were falls (31.0), followed by motorcycle accidents (27.5%). However, if we add up all of the victims of transportation accidents we found that they made up the majority (57.5%) of the victims. (Table 1).

Table 1 - Descriptive statistics of the nominal variables - São Paulo, SP Brazil 2010/2011.

Variable	Categories	#	%
Gender	Male	164	82.0
	Female	36	18.0
External cause	Pedestrian or cyclist injured in a transport accident (V01-V19)	40	20.0
	Motorcyclist injured in a transport accident (V20-V29)	55	27.5
	Car, pickup truck or heavy transportation vehicle occupant injured in a transport accident (V40-V69).	20	10.0
	Falls (W00-W19)	62	31.0
	Other*	23	11.5
Nature of trauma	Blunt	189	94.5
	Penetrating	9	4.5
	Blunt and penetrating	2	1.0
Condition of discharge	Survivor	162	81.0
	Non-survivor	38	19.0

* W20-W49, X80, X99, Y00, Y04, Y09 or unknown cause

The data in Table 2 shows that the mean age was 40.7 (dp=18.6), and the severity of trauma according to the ISS ranged from 9 to 50. The distribution of the victims into three groups, ISS<16 (mild trauma), ISS≥16 and <25 (moderate trauma) and ISS≥25 (severe trauma), showed that the most patients (59.0%) had ISS greater than 16 points.

Table 2 - Descriptive statistics of the numerical variables - São Paulo, SP Brazil 2010/2011.

Variable	Mean (dp)	Median	Min	Max
Age (years)	40.7 (18.6)	36	18	86
ISS (score)	19.3 (9.1)	17	9	50
Risk of death according to SAPS II (%)	22.9 (22.6)	15.3	0.1	92.5
Length of stay in ICU (days)	13.6 (14.6)	8	1	92

The likelihood of death according to SAPS II (mean risk of death of 22.9%) was close to the actual death in the ICU (19.0%) (Tables 1 and 2)

Regarding the nursing workload in the first 24 hours in the ICU, measured according to the NAS, we found a mean of 71.3% (sd=16.9%), a median of 69.5% and a variation of between 35.9% and 131.5%.

Figure 1 shows the hierarchical clustering of the victims according to nursing interventions performed in the first 24 hours of hospitalization in the ICU.
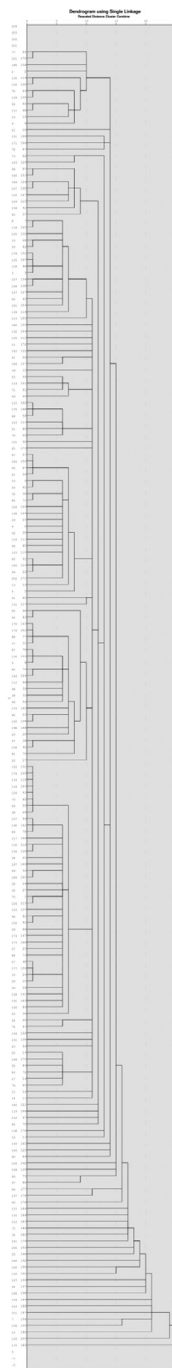

Figure 1 - Dendogram of the victims according to nursing interventions performed in the first 24 hours following admission to the ICU - São Paulo, SP Brazil 2000/2011.

Based on an analysis of the dendogram and determination of the best cut-off point (vertical dotted black line), we found 44 clusters of trauma victims with similar nursing interventions: 38 clusters of 1 patient each, 3 clusters of 3 patients each, and 3 clusters with 8, 12 and 136 patients.

Considering that one cluster makes up the majority of the patients in the sample (n=136, 68.0%), and that the other patients are dispersed among numerous clusters with only a few elements each, we selected this larger cluster to identify the pattern of interventions performed on trauma victims on admission to the ICU. Table 3 shows a descriptive analysis of these nursing interventions.

Table 3 - Descriptive statistics of the nursing interventions performed on trauma victims (n=136) in the first 24 hours after admission to the ICU - São Paulo, SP Brazil 2010/2011.

Nursing Activities Score	Categories	n	%
Basic activities			
1. Monitoring and titration			
Hourly vital signs, calculation and registration of fluid balance	1a	28	20.6
Present at bedside and continuous observation or active for 2 hours or more	1b	91	66.9
Present at bedside and continuous observation or active for 4 hours or more	1c	17	12.5
2. Laboratory, biochemical and microbiological investigations	Yes	136	100.0
3. Medication, except vasoactive drugs	Yes	136	100.0
4. Hygiene procedures			
Performing hygiene procedures	4a	87	64.0
Performing hygiene procedures lasting more than 2 hours in any shift	4b	48	35.3
Performing hygiene procedures lasting more than 4 hours in any shift	4c	1	0.7
5. Caring for drains - all (except gastric tube), including urinary catheter	Yes	135	99.3
6. Mobilization and positioning			
Performing procedures up to 3 times in 24 hours	6a	-	-
Performing procedures more than 3 times in 24 hours or with 3 nurses at any frequency	6b	99	72.8
Performing procedures with 3 or more nurses, any frequency	6c	37	27.2
7. Support and care of relatives and patient			
Support and care of either relatives and patient requiring dedicated attention for about an hour in any shift	7a	132	97.1
Support and care of either relatives and patient requiring dedicated attention for 3 hours or more in any shift	7b	4	2.9
8. Administrative and managerial tasks			
Performance of routine tasks	8a	136	100.0
Performance of administrative and managerial tasks requiring full dedication for about 2 hours in any shift	8b	-	-
Performance of administrative and managerial tasks requiring full dedication for about 4 hours in any shift	8c	-	-
Ventilatory support			
9. Respiratory support	Yes	133	97.8
10. Care of artificial airways	Yes	122	89.7
11. Treatment for improving lung function	Yes	128	94.1
Cardiovascular support			
12. Vasoactive medication, disregard type or dose	Yes	88	64.7
13. Intravenous replacement of large fluid losses	Yes	22	16.2
14. Left atrium monitoring	Yes	-	-
15. Cardiopulmonary resuscitation after arrest, in the past 24 hours	Yes	1	0.7
Renal support			
16. Hemofiltration techniques. Dialytic techniques	Yes	1	0.7
17. Quantitative urine output measurement	Yes	136	100.0
Neurological support			
18. Measurement of intracranial pressure	Yes	17	12.5
Metabolic support			
19. Treatment of complicated metabolic acidosis/alkalosis	Yes	16	11.8
20. Intravenous hyperalimentation	Yes	-	-
21. Enteral feeding	Yes	18	13.2
Specific interventions			
22. Specific interventions in the Intensive Care Unit	Yes	26	19.1
23. Specific interventions outside the Intensive Care Unit	Yes	40	29.4

Note: (n=136).

Table 3 shows that all of the trauma victims required monitoring and titration activities (item 1), laboratory investigations (item 2), medication except for vasoactive drugs (item 3), hygiene procedures (item 4), mobilization and positioning (item 6), support and care of relatives and patient (item 7), administrative and managerial tasks (item 8) and measurement of quantitative urine output (item 17) on the first day of hospitalization in the ICU. Regarding nursing interventions ranked according to complexity (items 1, 4, 6, 7 and 8), results show that often pa-

tients score in sub-items b and c of monitoring and titration (79.4%) and mobilization and positioning (100.0%), showing that they require care beyond that normally required by ICU patients.

Regarding other interventions, we found a high frequency (80.0%) of the following activities: care of drains (item 5), respiratory support (item 9), care of artificial airways (item 10) and treatment for improving lung function (item 11). Considering these analyses it is fair to state that the interventions described above make up the pattern of activities performed on trauma victims in the ICU.

It is also worth mentioning the frequency of specific interventions within (19.1%) and outside (29.4%) the ICU in the first day of hospitalization of the study patients.

DISCUSSION

An analysis of the sociodemographic profile of the trauma victims admitted to the ICU in this study shows a preponderance of adults, with a mean age of 40.7, most of them males. In fact, this is a global trend in trama victims, corroborated by the findings of other studies[4,10,15-16].

Other studies analyzing patients put in the ICU also found a majority of transport accident vicitm[15.7], also finding blunt trauma (94.5%)[4,16], trauma severity (mean ISS of 19.3)[15-16], physiological severity (SAPS II 22.9%)[18-19] and mortality (19.0%)[10,17-18] of the patients in this study.

The length of stay of the trauma victims in the ICU was considered long compared to international studies[15,18]. It is possible that the absence of semi-intensive care beds in the study institution contributed to a longer stay of these patients in the ICU.

Regarding the nursing workload, the mean NAS score (71.3%) calculated for the first day of patient hospitalization in the ICU was higher than that found by other researchers[2,20-24], and lower than the score found by a study that also included trauma victims[10].

A descriptive analysis of the group of trauma victims submitted to similar nursing interventions showed that, for interventions made up of sub-items, patients scored highly in sub-items "b" and "c" of the activities listed in item 1 - monitoring and titration (79.4%) and item 6 - mobilization and positioning (100.0%), showing the need for care beyond the care normally required by ICU patients in these interventions.

In the NAS, activities in items 1, 4, 6, 7 and 8 are shown as sub-items that indicate the degree of complexity of the task, and an estimated adjusted time required to perform the task. These sub-items have a hierarchy of dedicated levels, where level "a" represents routine intervention in any ICU, sub-item "b" describes situations where the patient activity is more complex and takes more time, meaning it is beyond the normal routine, and "c" indicates even greater complexity and longer time[6].

Publications that analyze nursing interventions performed in general ICUs show that the frequency of sub-items "b" and "c" of monitoring and titration varies quite a bit 13.6%[22], 49.5%[24] and 100.0%[23]. Thus, the frequency of this activity (76.4%) performed on trauma victims is

within the range of these studies. Considering that this analysis was performed in an ICU that specializes in burn victims, this number was higher - 96.5%[8].

However, when we analyze mobilization and positioning (item 6), we found that all trauma victims required care beyond that normally required for this activity (sub-items b and c), and that the scoring frequency for these sub-items (100.0%) exceeded that described in other studies[8,20,22-24].

Regarding other nursing interventions that do not require other professionals, we found a higher frequency of sub-item "a" in hygiene procedures (item 4), Support and care of relatives and patient (item 7) and administrative and managerial tasks (item 8), showing that these activities are routine in the ICU, similar to the findings of other studies[8,20,22-24].

Nevertheless, frequencies above 80% were found in laboratory investigations (item 2), medication except vasoactive drugs (item 3), care of drains (item 5), respiratory support (item 9), care of artificial airways (item 10), treatment for improving lung function (item 11) and quantitative urine output measurement (item 17). With the exception of care of drains, these interventions were also perfomed quite often on other populations[8,20,22-23].

Regarding the large number of patients in this study requiring care of drains (99.3%), it is important to remember that 70% had been subjected to surgery, and certainly drains were positioned during the operation, given the type of surgery and the techniques used. One must also take into consideration that many trauma victims are fitted with chest drains to treat pneumothorax, hemothorax or other chest injuries. This was also found in a study analyzing interventions in trauma patients in the ICU, where 78% required care with drains[10].

Regarding specific interventions, we found that the frequency of interventions performed on trauma victims inside (19.1%) and outside (29.4%) the ICU was higher than in other studies[20,22-24]. It is also worth pointing out that in the initial assessment and care of trauma victims, the focus is on diagnosis and treatment of injuries that are life-threatening. Many of the less serious injuries are identified later in a detailed physical exam, X-Rays and lab tests, at which points measures are instituted for their treatment[1]. Therefore, the frequency of specific interventions performed inside and outside the ICU on the victims in this study may be related to identifying these less serious injuries.

The results of this study show that even though the trauma victims cared for in the ICU were submitted to 12 (52.2%) of the 23 activities in the NAS, the demand for care was high, implying in a large workload for the nursing team, resulting in an NAS of 71.3%.

When applying the results of this study, a number of limitations should be kept in mind. The sample included patients in a single institution, which is a center of reference for the treatment of trauma victims, thus imposing limitations on generalizing the results. One should also consider that the nursing workload is not made up exclusively of patient care, as it can be influenced by the pro-

fessional's emotional and personal situation and the work environment, factors that this study did not analyze.

However, the results of this study offer a valuable contribution to intensive care nursing, as it identifies a pattern of nursing interventions. It provides subsidies to help plan care and training to ensure a high standard of excellence and safety in patient care, and improved survival and quality of life of the trauma victim.

CONCLUSION

This study found that trauma victims require an average nursing workload of 71.3% in the first day of hospitalization in the ICU. The pattern of nursing interventions performed during this period included 12 of the 23 nursing interventions in the NAS: monitoring and titration, laboratory investigations, medication (except for vasoactive drugs), hygiene procedures, caring for drains, mobilization and positioning, support and care of relatives and patient, administrative and managerial tasks, respiratory support, care of artificial airways, treatment for improving lung function, and quantitative urine output measurement. The monitoring and mobilization interventions required care beyond what is normally required by ICU patients.

In short, the results of this study offer an important contribution, not only to plan patient care, but also for the management of the unit, in terms of actions to training the team and the size of the nursing team providing care to trauma victims hospitalized in the ICU.

RESUMO

Objetivo: Identificar o padrão de intervenções de enfermagem realizadas em vítimas de trauma nas primeiras 24 horas de internação na Unidade de Terapia Intensiva (UTI). **Método:** Estudo prospectivo, realizado na UTI de um hospital em São Paulo, Brasil. O instrumento *Nursing Activities Score* (NAS) foi utilizado para identificar as intervenções de enfermagem. **Resultados:** A casuística foi composta por 200 pacientes, a maioria homens, com idade média de 40,7 anos, vítimas de acidentes de transporte. A média do NAS foi de 71,3% e o padrão de intervenções de enfermagem identificado incluiu as atividades de monitorização e controles; investigações laboratoriais; medicação, exceto drogas vasoativas; procedimentos de higiene; cuidados com drenos; mobilização e posicionamento; suporte e cuidado aos familiares e pacientes; tarefas administrativas e gerenciais; suporte respiratório; cuidado com vias aéreas artificiais; e tratamento para melhora da função pulmonar. Nas intervenções de monitorização e mobilização, houve a necessidade de cuidados além do normalmente requerido por pacientes de UTI. **Conclusão:** Os resultados desta pesquisa trazem importantes contribuições para o planejamento de ações que visem a capacitação e o dimensionamento da equipe de enfermagem na unidade crítica.

DESCRITORES

Carga de Trabalho; Equipe de Enfermagem; Cuidados de Enfermagem; Unidades de Terapia Intensiva.

RESUMEN

Objetivo: Identificar el patrón de las intervenciones de enfermería en víctimas de trauma en las primeras 24 horas en la Unidad de Cuidados Intensivos (UCI). **Método:** Estudio prospectivo, realizado en la UCI de un hospital de São Paulo, Brasil. Se utilizó el *Nursing Activities Score* (NAS) para identificar las intervenciones de enfermería. **Resultados:** La muestra fue de 200 pacientes, en su mayoría hombres, edad media 40,7 años, víctimas de accidentes de tráfico. El promedio NAS fue de 71,3% y el patrón de las intervenciones de enfermería incluye las actividades de monitoreo y valoración; investigaciones de laboratorio; medicación, excepto fármacos vasoactivos; procedimientos de higiene; cuidar de los drenajes; movilización y posicionamiento; apoyo y cuidado de familiares y pacientes; tareas administrativas y de gestión; apoyo respiratorio; cuidado de las vías aéreas artificiales; y tratamiento para mejorar la función pulmonar. Las intervenciones de monitoreo y movilización hubo la necesidad de atención más allá de la que normalmente exigen los pacientes de la UCI. **Conclusión:** Los resultados de este estudio aportan importantes contribuciones a la planificación de las acciones encaminadas a la creación de capacidades y el diseño del equipo de enfermería en la unidad de críticos.

DESCRIPTORES

Carga de Trabajo; Grupo de Enfermería; Atención de Enfermería; Unidades de Cuidados Intensivos.

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