NURSING ACTIVITIES SCORE (NAS): Cross-cultural adaptation and validation to Portuguese language

NURSING ACTIVITIES SCORE (NAS): ADAPTAÇÃO TRANSCULTURAL E VALIDA-ÇÃO PARA A LÍNGUA PORTUGUESA

NURSING ACTIVITIES SCORE (NAS): ADAPTACIÓN TRANSCULTURAL Y VALIDACIÓN PARA EL PORTUGUÉS

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ABSTRACT

The study aimed to adapt to the Portuguese language and to evaluate the psychometric properties of the Nursing Activities Score (NAS), an instrument for measuring the nursing workload in ICUs. After the process of cross-cultural adaptation, the NAS was applied to a sample of 200 adult ICU patients. The analysis of internal consistency by Cronbach's alpha coefficient revealed that the NAS has 23 independent measures that do not allow for either consolidation or reduction. Assessment of inter-rater reliability showed high concordance level (99.8%) and a Kappa index average of 0.99. The concurrent validity was demonstrated by statistically significant correlation between the TISS-28 and NAS (r=0.67, p<0.0001), and by multivariate regression analysis (R^2 = 94.4%, p<0.0001). The convergent validity was supported by the statistically significant association between the NAS and the SAPS II, when adjusted for age (R^2 = 99.8%, p <0.0001). These results indicate that the NAS is a valid and reliable instrument to measure nursing workload of Brazilian ICUs.

KEY WORDS

Intensive Care Units.
Workload.
Nursing.
Validation studies.

RESUMO

O estudo teve como objetivos adaptar para o português e avaliar as propriedades de medida do Nursing Activities Score (NAS), instrumento de medida de carga de trabalho de enfermagem em UTI. Após o processo de adaptação cultural, o NAS foi aplicado em uma amostra de 200 pacientes adultos internados em UTIs. A análise da consistência interna pelo coeficiente Alfa de Cronbach revelou que o NAS possui 23 medidas independentes que não comportam consolidação ou redução. A avaliação da confiabilidade interobservadores demonstrou alta concordância (99,8%) e índice Kappa médio de 0,99. A validade concorrente foi demonstrada pela correlação estatisticamente significativa entre o TISS-28 e o NAS (r=0,67; p<0,0001), assim como pela análise de regressão multivariada (R^2=94,4%; p<0,0001). Na avaliação da validade convergente, a regressão multivariada mostrou associação estatisticamente significativa entre o NAS e o SAPS II, quando ajustada pela idade (R^2=99,8%; p<0,0001). Pelos resultados obtidos, o NAS mostrou-se um instrumento confiável e válido para mensurar carga de trabalho de enfermagem em UTIs brasileiras.

DESCRITORES

Unidades de Terapia Intensiva.
Carga de trabalho.
Enfermagem.
Estudos de validação.

RESUMEN

El estudio tuvo como objetivos adaptar al portugués y evaluar las propiedades psicométricas de el Nursing Activities Score (NAS), un instrumento para medir la carga de trabajo de enfermería en UCI. Tras el proceso de adaptación cultural, el NAS se aplicó a una muestra de 200 pacientes adultos ingresados en las UCIs. El análisis de consistencia interna por el coeficiente alfa de Cronbach reveló que el NAS cuenta con 23 medidas independientes que no permiten consolidación o reducción. La evaluación de la fiabilidad interobservador mostró alta concordancia (99,8%) y el índice Kappa media de 0,99. La validez concurrente se demostró por la correlación estadísticamente significativa entre el TISS-28 y NAS (r=0,67, p<0,0001), y por análisis de regresión multivariante (R^2=94,4%, p<0,0001). Al evaluar la validez convergente, la regresión multivariante mostró asociación estadísticamente significativa entre el NAS y el SAPS II, cuando ajustada por la edad (R^2=99,8%, p<0,0001). Los resultados obtenidos indican que el NAS es un instrumento válido y fiable para medir la carga de trabajo de enfermería de UCIs brasileñas.

DESCRIPTORES

Unidades de Cuidados Intensivos.
Carga de trabajo.
Enfermería.
Estudios de validación.

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INTRODUCTION

The use of indicators that objectively assess the patient's clinical condition and required care in the current context is now an indispensable instrument towards improving the cost-benefit correlation in healthcare assistance models. Particularly in the nursing field, healthcare demand indicators are more and more necessary as requisites to safeguard quality assurance and to subsidize the amount of employees in different hospital units; a similar status can be applied to Intensive Care Units (ICUs).

Hence, the assessment of the nursing workload is a critical issue, as oversized staff incurs higher costs. On the other hand, it is also clear that reduced one tend to determine the loss of efficiency/quality in the assistance process, increasing the length of stay (LOS) and generating higher costs in the patient's treatment[1].

National and international literature shows that the existence of instruments aimed at measuring nursing workloads is not a recent event ; however, several of these methods[2-5] were developed within a broader perspective that included the ICU, although not geared specifically to it. Thus, the need to characterize nursing work demands in these units levered the development of measuring instruments that focused on this objective throughout time[6]. Among these, the Therapeutic Intervention Scoring System (TISS), a pioneer in the international literature, is applied to measure the nursing workload in the ICU.

the assessment of the nursing workload is a critical issue

The TISS was originally created by Cullen and collaborators, from the Massachusetts General Hospital of Boston, in 1974, with the dual goal of measuring patient's health profiles and calculating the corresponding nursing workload in the ICU(7). The system's first version was composed of a total number of 57 therapeutic interventions determined by a group of specialists who assigned scores from one to four, in accordance with the necessary time and effort required to perform the nursing activities.

The index was reviewed in 1983 and updated to include 76 therapeutic intervention items that quantified the complexity, invasiveness degree, and time spent by nursing staff and doctors to perform a given procedure. In this version, patients were still assigned to four classification groups (I through IV) according to the highest and the lowest surveillance needs and intensive care status[8].

After 16 years of existence of the TISS-76 and its worldwide application, Miranda and collaborators, from the University Hospital of Groningen, Holland, recognized the need to update and make the application of the TISS-76 more practical; they widely transformed the model, using statistical analyses for the determination of therapeutic intervention categories, items and sub-items, and respective values. This new version, known as the TISS-28[9], defined 28 items distributed into seven categories: basic activities, ventilatory support, cardiovascular support, kidney support, neurologic support, metabolic support, and specific interventions. The total score, ranging from 1 through 78, allows for the determination of the nursing workload, since one TISS-28 point equals 10.6 minutes of work time of a nurse in an ICU work shift.

The TISS-28 then started being internationally employed, bringing relevant subsidies to the sizing of personnel and the allocation of nursing human resources in ICUs, among other support and administrative activities. However, in its practical implementation, several criticisms were made by nurses; they affirmed that the instrument did not encompass the whole set of activities encompassed by nursing activities, such as those related to assisting patients, and also those based on family support, as well as all managerial-related tasks .

In order to adjust the index, so that the workload in ICUs was defined in a more reliable way, the TISS-28 underwent new alterations, resulting in the Nursing Activities Score (NAS)[10].

The first stage of the NAS development included the description of a series of nursing activities related to the clinical conditions of patients admitted into ICUs; this phase was performed by 25 professionals (15 doctors and 10 nurses) from 15 countries. In the second stage, a panel composed of eight professionals prepared the selection and description of the item list, where five specific nursing activities were identified: monitoring and control, cleaning procedures, mobilization and positioning, family and patient support and care, and administrative and managerial activities. The list of activities was thereafter combined with the TISS-28 items, and resulted in 30 items, counting on some grouping processes.

After these proceedings, the instrument's validity was assessed by means of a sample of 99 ICUs located in 15 countries. For one whole week, two types of data were collected: the daily record of the 30 items of the instrument within a sample of 2,041 patients admitted into the ICUs, based on the 24-hour information report; and the record of the activities individually performed by the assisting nursing team members throughout 30 specific moments of the day, resulting in 127,951 records, in accordance with the MultiMoment Recordings (MMR), or the Multiple Observation Moment (MMO) techniques. After the collection, the values and the reduction of items were statistically calculated by crossing data from both recording groups mentioned above.

As a final result, the NAS is divided into seven large categories, and presents a total number of 23 items whose values range from a minimum of 1.2 to a maximum of 32.0. The major change regarding the TISS-28 took place in the *basic activities* category, which has become a sub-category

1002 **Rev Esc Enferm USP**
2009; 43(Spe):1001-8
www.ee.usp.br/reeusp/

NURSING ACTIVITIES SCORE (NAS): Cross-cultural
adaptation and validation to Portuguese language
Queijo AF, Padilha KG

in monitoring and control, cleaning procedures, mobilization and positioning, family and patient support and care, and administrative and managerial tasks. Within this new framework, the NAS now encompasses 80.8% of all nursing activities, outperforming the 43.3% scope of the TISS-28, and describing nearly twice as much of the time spent by the nursing team in caring for critical patients in comparison with the TISS-28. The achieved total score represents the percentage of time spent by nurse, by shift, in direct assistance to the patient, and can reach a maximum value of 176.8%[10].

Hence, considering the attributes of the instrument and its capacity for measuring the nursing workload in ICUs, the application of the model to the Brazilian reality was viewed in light of the limiting factor that it was originally developed in the English language. Therefore, keeping in mind the interest of making it available nationwide, the authors of this study chose to carry out this research aimed at ensuring a transcultural adaptation of the NAS in the Portuguese language.

PROCEDURES FOR THE TRANSCULTURAL ADAPTATION

In a general perspective, the transcultural adaptation complied with the one advocated by Guillemin, Bombardier and Beaton[11], which utilizes the following phases: translation, back-translation, assessment of original and back-translated versions, pre-test (Figure 1), and assessment of psychometric properties.
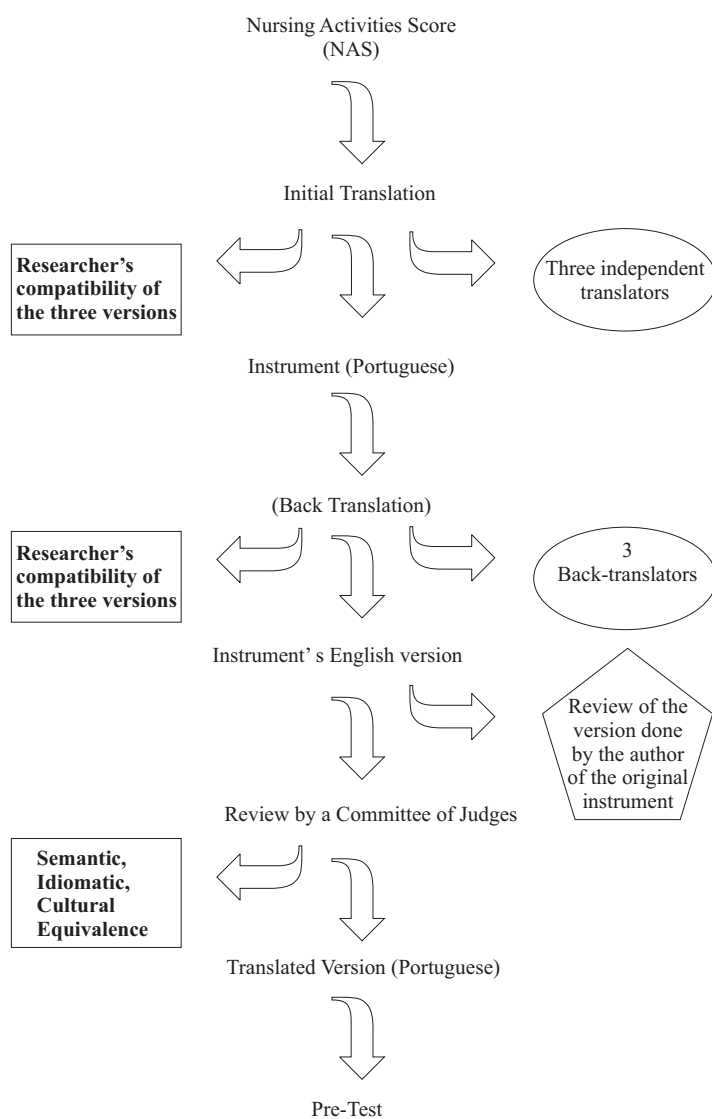

Figure 1 - Translation and Adaptation of the Nursing Activities Score (NAS) into Portuguese - Sao Paulo - 2002

NURSING ACTIVITIES SCORE (NAS): Cross-cultural
adaptation and validation to Portuguese language
Queijo AF, Padilha KG

Rev Esc Enferm USP
2009; 43(Spe):1001-8
www.ee.usp.br/reeusp/

1003

After the completion of the above-mentioned phases, the final Portuguese version of the instrument - called Escore de Atividades de Enfermagem (EAE) - was tested in order to evaluate its measuring properties. It is worth highlighting that the acronym NAS, from the English title, was kept in order to make easier the communication with foreign authors.

As for the assessment of the instrument's reliability, the stability (a measurement achieved by the agreement between two observers) and the internal consistency (measured by the Cronbach's Alpha Coefficient) were taken into account. The simultaneous application of the adapted Portuguese version of the NAS by two independent nurses in a sample of 100 patients admitted into ICUs, after the statistical analysis, showed an average agreement of 99.8%, and an average Kappa of 0.99. Results showed an almost perfect correlation, very close to 1. From the total amount of 23 items composing the NAS, excluding items 6 and 12 that presented 97.5% and 99.5% agreement respectively, all others displayed 100.0% agreement.

Thus, bearing in mind the high agreement values found (99.8%) and an almost perfect Kappa (0.99), we concluded that the NAS is a reliable measurement instrument to assess the nursing workload in the ICU[12].

The NAS reliability was also estimated by means of the analysis of the internal consistency of items and categories that comprise it, using the Cronbach's Alpha Coefficient[13-15]. The final result achieved for the total amount of 23 items was 0.36, considered as very low[16]; a similar condition was found in some individual items. Such results allowed us to infer that the items seemed to represent phenomena that could not be reduced to more synthetic measurements in the face of their relevance whenever any given measurement of nursing workloads in ICUs are taken into account. For this reason, in spite of the low Cronbach's Alpha values, no item was excluded from the instrument.

Two types of validities were assessed: concurrent and convergent.

The concurrent validity was observed by the positive and statistically significant correlation (r=0.67; p<0.0001) between the NAS and the TISS-28. The multivariate regression analysis also pointed to a statistically significant association between both instruments (R^2=94.4%; p<0.001).

The convergent validity was observed by the statistically significant association (R^2= 99.8%; p<0.001) between the NAS and the SAPS-II, when the multivariate regression analysis was adjusted to the *age* variable.

Conclusions of this research pointed to satisfactory reliability indexes, as well as concurrent and convergent validities, opening the way for its application as a reliable and valid indicator towards measuring the nursing workload in ICUs.

The final Portuguese version of the NAS is presented in Appendix.

NAS-BASED STUDIES

Five years after the publication of the NAS, we noticed that its application as an instrument for measuring nursing workload in ICUs is still quite recent in the national and international literature. In Brazil, nonetheless, despite the scarcity of publications, the development of applicable studies has been enhancing interest in the tool , generating a growing interest in nurses towards incorporating it into ICUs. Investigative results, as will be presented in this article, have pointed to variable nursing workload, in accordance with studied samples. Such evidence is relevant whenever the allocation of nursing human resources is necessary, in order to adjust nursing teams to meet patient's care demands.

A specific study that analyzed the nursing workload in a general ICU of a mid-sized university hospital, the majority of whose patients were admitted from Emergency Services, were over 60 years of age, and remained an average of 3.5 days in the ICU, presented an average NAS of 66.5% (minimum = 47.6%; maximum = 82.4%). The study revealed that the nursing workload was maintained at the level of over 50% throughout the whole admittance process in the Unit[17].

An investigation carried out on a sample of 500 patients, admitted into the general ICUs of two public hospitals and two non-governmental hospitals in the city of Sao Paulo, concluded that the average NAS for the patients admitted reached 62.13%. This sample displayed the predominance of elderly patients coming from Emergency Services who remained in the ICU for around 7.64 days, on average. Patients' health profiles assessed by the SAPS II at the time of admittance revealed a score of 37.41, and mortality reached 20.60%[18].

Aimed at analyzing the nursing team workload in a general ICU of a Brazilian private, tertiary-level hospital, a longitudinal study carried out for 14 days in a sample of 33 patients found an average NAS of 65.5%, ranging from 22.30% and 127.90%[19].

Another methodological study developed in a general ICU, which is part of a private hospital in the municipality of Sao Paulo, composed of a sample of 104 patients, revealed an average NAS of 52.7% (minimum 32.2%; maximum 75.2%) in a sample of predominantly elderly patients with an average SAPS II of 31.8 and mortality rate of 14.3% [20].

An additional research study performed in a general ICU of a university public hospital, which associated leader-

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ship styles and nursing workload while applying the NAS, showed that the average NAS score reached 80.09% and ranged from 62.40% to 101.80%[21].

As per the nursing workload in specialized ICUs, one single research study is found in the Brazilian literature; the study applied the NAS to a cardiac surgery ICU with 65 beds, located in a teaching public hospital specializing in cardiac disease . In that study, encompassing a sample of 100 patients, the average NAS reached 96.79% on the first post-surgery day[22].

The international literature displays only two works that apply the NAS; both of them were developed by the same Spanish group[23-24]. One of them[23] was aimed at verifying the workload in a general ICU. The research analyzed a sample composed of 350 patients, for a total number of 1,800 NAS records collected daily for three months in 2004, presenting an average NAS of 40.8 + 14.1 on the first admittance day in the ICU, indicating the workload of one nurse who cared for 2.5 patients in the unit.

Regarding the influence of the demographic and clinical data of patients requiring nursing care in ICUs that applied the NAS, only a handful of studies that utilized this type of approach were found. However, two investigations carried out in a general adult ICU of a Brazilian university hospital show that there was no statistically significant difference between age and nursing workload[17,25].

A Brazilian research study carried out in a general ICU of a public hospital proved a good correlation with the APACHE II in a sample of 148 patients. In that investigation, researchers concluded that mortality levels were higher in patients with higher NAS values[26].

Although there is still a long investigative way ahead regarding the use of the NAS, it is possible to say that these studies underscore the fact that the instrument's adaptation to the Brazilian culture was extremely important to intensive nursing care in Brazil. In addition, a broader knowledge of the instrument originating from performed research and the growing dissemination of its use has also been placing Brazilian nurses as references to professionals in other countries who have increasingly requested advising processes for the application of the instrument. This dialogue is not only desirable, but is also necessary, especially when the world's problem-solving nursing demands require the combination of assistance quality, intensive assistance costs, and professionals' well-being.

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NURSING ACTIVITIES SCORE (NAS): Cross-cultural
adaptation and validation to Portuguese language
Queijo AF, Padilha KG

Rev Esc Enferm USP
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www.ee.usp.br/reeusp/ **1005**

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1006 **Rev Esc Enferm USP**
2009; 43(Spe):1001-8
www.ee.usp.br/reeusp/

NURSING ACTIVITIES SCORE (NAS): Cross-cultural
adaptation and validation to Portuguese language
Queijo AF, Padilha KG

APPENDIX

Escore de Atividades de Enfermagem

ATIVIDADES BÁSICAS	Pontuação
1. MONITORIZAÇÃO E CONTROLES	
1a. Sinais vitais horários, cálculo e registro do balanço hídrico.	4,5
1b. Presença à beira do leito e observação ou atividade contínua por 2 horas ou mais em algum plantão por razões de segurança, gravidade ou terapia, tais como: ventilação mecânica não invasiva, desmame, agitação, confusão mental, posição prona, procedimentos de doação de órgãos, preparo e administração de fluidos ou medicação, auxílio em procedimentos específicos.	12,1
1c. Presença à beira do leito e observação ou atividade contínua por 4 horas ou mais em algum plantão por razões de segurança, gravidade ou terapia, tais como os exemplos acima.	19,6
2. INVESTIGAÇÕES LABORATORIAIS: bioquímicas e mircrobiológicas.	4,3
3. MEDICAÇÃO, exceto drogas vasoativas.	5,6
4. PROCEDIMENTOS DE HIGIENE	
4a. Realização de procedimentos de higiene tais como: curativo de feridas e cateteres intravasculares, troca de roupa de cama, higiene corporal do paciente em situações especiais (incontinência, vômito,' queimaduras, feridas com secreção, curativos cirúrgicos complexos com irrigação), procedimentos especiais (ex. isolamento), etc.	4,1
4b. Realização de procedimentos de higiene que durem mais do que 2 horas, em algum plantão.	16,5
4c. Realização de procedimentos de higiene que durem mais do que 4 horas em algum plantão.	20,0
5. CUIDADO COM DRENOS - Todos (exceto sonda gástrica)	1,8
6. MOBILIZAÇÃO E POSICIONAMENTO incluindo procedimentos tais como: mudança de decúbito, mobilização do paciente; transferência da cama para a cadeira; mobilização do paciente em equipe (ex. paciente imóvel, tração, posição prona).	
6a. Realização do(s) procedimento(s) até 3 vezes em 24 horas.	5,5
6b. Realização do(s) procedimento(s) mais do que 3 vezes em 24 horas ou com 2 enfermeiros em qualquer freqüência.	12,4
6c. Realização do(s) procedimento(s) com 3 ou mais enfermeiros em qualquer freqüência.	17,0
7. SUPORTE E CUIDADOS AOS FAMILIARES E PACIENTES incluindo procedimentos tais como telefonemas, entrevistas, aconselhamento. Freqüentemente, o suporte e cuidado, sejam aos familiares ou aos pacientes permitem a equipe continuar com outras atividades de enfermagem (ex: a comunicação com o paciente durante procedimentos de higiene, comunicação com os familiares enquanto presente à beira do leito observando o paciente).	
7a. Suporte e cuidado aos familiares e pacientes que requerem dedicação exclusiva por cerca de uma hora em algum plantão, tais como: explicar condições clínicas, lidar com a dor e angústia, lidar com circunstâncias familiares difíceis.	4,0
7b. Suporte e cuidado aos familiares e pacientes que requerem dedicação exclusiva por 3 horas ou mais em algum plantão, tais como: morte, circunstâncias trabalhosas (ex. grande número de familiares, problemas de linguagem, familiares hostis).	32,0
8. TAREFAS ADMINISTRATIVAS E GERENCIAIS	
8a. Realização de tarefas de rotina tais como: processamento de dados clínicos, solicitação de exames, troca de informações profissionais (ex.passagem de plantão, visitas clínicas).	4,2
8b. Realização de tarefas administrativas e gerenciais que requerem dedicação integral por cerca de 2 horas em algum plantão, tais como: atividades de pesquisa, aplicação de protocolos, procedimentos de admissão e alta.	23,2
8c. Realização de tarefas administrativas e gerenciais que requerem dedicação integral por cerca de 4 horas ou mais de tempo em algum plantão, tais como: morte e procedimentos de doação de órgãos, coordenação com outras disciplinas.	30,0

NURSING ACTIVITIES SCORE (NAS): Cross-cultural
adaptation and validation to Portuguese language
Queijo AF, Padilha KG

Rev Esc Enferm USP
2009; 43(Spe):1001-8
www.ee.usp.br/reeusp/

1007

ATIVIDADES BÁSICAS	Pontuação
SUPORTE VENTILATÓRIO	
9. Suporte respiratório: Qualquer forma de ventilação mecânica/ventilação assistida com ou sem pressão expiratória final positiva, com ou sem relaxantes musculares; respiração espontânea com ou sem pressão expiratória final positiva (ex. CPAP ou BiPAP), com ou sem tubo endotraqueal; oxigênio suplementar por qualquer método.	1,4
10. Cuidado com vias aéreas artificiais. Tubo endotraqueal ou cânula de traqueostomia.	1,8
11. Tratamento para melhora da função pulmonar. Fisioterapia torácica, espirometria estimulada, terapia inalatória, aspiração endotraqueal.	4,4
SUPORTE CARDIOVASCULAR	
12. Medicação vasoativa independente do tipo e dose.	1,2
13. Reposição intravenosa de grandes perdas de fluídos. Administração de fluídos >$31/m^2$/dia, independente do tipo de fluído administrado.	2,5
14. Monitorização do átrio esquerdo. Cateter da artéria pulmonar com ou sem medida de débito cardíaco.	1,7
15. Reanimação cardiorrespiratória nas últimas 24 horas (excluído soco precordial).	7,1
SUPORTE RENAL	
16. Técnicas de hemofiltração. Técnicas dialíticas.	7,7
17. Medida quantitativa do débito urinário (ex. Sonda vesical de demora).	7,0
SUPORTE NEUROLÓGICO	
18. Medida da pressão intracraniana	1,6
SUPORTE METABÓLICO	
19. Tratamento da acidose/alcalose metabólica complicada.	1,3
20. Hiperalimentação intravenosa.	2,8
21. Alimentação enteral. Através de tubo gástrico ou outra via gastrintestinal (ex: jejunostomia).	1,3
INTERVENÇÕES ESPECÍFICAS	
22. Intervenções específicas na unidade de terapia intensiva. Intubação endotraqueal, inserção de marca-passo, cardioversão, endoscopia, cirurgia de emergência no último período de 24 horas, lavagem gástrica. Intervenções de rotina sem conseqüências diretas para as condições clínicas do paciente, tais como: Raio X, ecografia, eletrocardiograma, curativos ou inserção de cateteres venosos ou arteriais não estão incluídos.	2,8
23. Intervenções específicas fora da unidade de terapia intensiva. Procedimentos diagnósticos ou cirúrgicos.	1,9

Os sub-itens dos itens 1, 4, 6, 7 e 8 são mutuamente exclusivos.