

The Analysis of the Application of Nursing Activities Score in an Intensive Care Unit

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Abstract

Introduction: Nursing activities score (NAS) has been earning ground worldwide as the nursing workload measurement tool in intensive care. Despite the growing number of studies applying NAS, it remains some misunderstandings in its use in nursing practices. Furthermore, it is slightly used to support management decisions.

Aim: To analyze the Nursing Activities Score (NAS) application during 2018 in an adult Intensive Care Unit (ICU) of a Brazilian university hospital.

Methodology: Qualitative descriptive-exploratory study was conducted with the NAS data fulfilled in an ICU during 2018. All data were submitted to a descriptive analysis.

Results: All NAS data reports had an average of 26 days fulfilled per month in 2018, although the average of a valid NAS fulfillment was 3.1 days. Items 1C, 4C e 7C in the nursing basic activities category were the least chosen in the group, items 2 and 3 remained constant, and items 5 and 7 were regularly missed. Items 1, 4 and 8 had frequently more than one of self-excluding subitems selected.

Conclusion: Despite the significant NAS use, it remains somewhat misunderstood in its use in nursing everyday practice, contributing to the lack of the tool's legitimacy as a nursing workload measurement tool to support health managers' decisions.

Keywords: Nursing; Workload; Intensive Care Unit; Nursing Activities Score; Nursing Management

Abbreviations

NAS: Nursing Activities Score; ICU: Intensive Care Unit; ICU: Intensive Care Units; TOSS: Time-Oriented Score System; TISS-28: Therapeutic Intervention Scoring System; NEMS: Nine Equivalentents of Nursing Manpower Use Score

Introduction

In the intensive care unit's (ICUs), tools and procedures were improved according to the evolution of clinical, technological, and organizational dimensions as well as the nursing work and role in this setting [1,2]. All these changes have been increasing the nursing workload despite providing changes in nursing staffing requirements. The scientific literature presents diverse types of tools for measuring nursing

workload and patient complexity, such as time-oriented score system (TOSS), therapeutic intervention scoring system (TISS-28), the nine equivalents of nursing manpower use score (NEMS) and the Nursing Activity Score (NAS) and others [2-4].

NAS is considered the most frequent tool applied for measuring nursing workload in the hospital setting, especially in ICU worldwide, which has been validated through a study of 99 ICUs in 15 countries, translated into many languages and used in 12 countries [1,4-7]. This tool has been earned ground in other settings besides ICU, such as post-anaesthesia units and high dependency patient care units, because of the feasibility to account for the nurse activities [8,9].

NAS tool was developed in 2003 to measure nursing workload based on activities selected by a consensus of experts composed of nurses and doctors [10]. Its format consists of 23 items that cover seven categories, as presented in Chart 1. Time attributed to each activity was measured in an observational study method, and results were compared with the TISS-28 score system. However, it is essential to highlight that TISS-28 relates the nursing workload to patient severity of illness and the number of therapeutic interventions performed in an ICU [10-11]. On the other hand, NAS considers nursing activities directly related to patient care and some other activities not directly related to the patient, but still necessary to ensure continuity of their care [1,10]. NAS feasibility accounts for 81% of the nursing time spent compared to 43% measured by TISS-28 due to the former taking into consideration the nursing activities instead of medical intervention [1,4,11].

Categories	Items and subitems
Basic activities	1. Monitoring and Titration 1A. Hourly vital signs, regular registration, and calculation of fluid balance (4.5) 1B. Present at the bedside and continuous observation or active for 2 hours or more in any shift, for reasons of safety, severity, or therapy, such as non-invasive mechanical ventilation, weaning procedures, restlessness, mental disorientation, prone position, donation procedures, preparation and administration of fluids and/or medication, assisting specific procedures. (12.1) 1C. Present at the bedside and active for 4 hours or more in any shift for reasons of safety, severity or therapy, such as those examples above (1B). (19.6) 2. Laboratory: Biochemical and microbiological investigations. (4.3) 3. Medication: Vasoactive drugs excluded. (5.6) 4. Hygiene procedures 4A. Patients who were submitted, in a NORMAL frequency (ICU routine), to one of the hygiene procedures mentioned above in at least one shift in 24 hours. Also, including dressings closed in vascular catheter once a day. (4.1) 4B. The performance of hygiene procedures took more than 2 hours in any shift. Patients were submitted in HIGHER-THAN-NORMAL frequency to one of the hygiene procedures mentioned above in at least one shift in 24 hours. (16.5) 4C. The performance of hygiene procedures took more than 4 hours in any shift. Patients were submitted in MUCH MORE THAN NORMAL frequency to one of the hygiene procedures mentioned above in at least one shift in 24 hours. (20) 5. Care of drains. All (except gastric tube). (1.8) 6. Mobilization and positioning 6A. Performing procedure(s) (Including procedures such as: turning the patient; mobilization of the patient; moving from bed to chair; team lifting (e.g. immobile patient, traction, prone position) up to three times per 24 hrs. (5.5) 6B. Performing procedure(s) more frequently than 3 times per 24 hrs, or with two nurses, in any frequency. (12.4) 6C. Performing procedure with three or more nurses in any frequency. (17) 7. Support and care of relatives and patient 7A. Support and care of either relatives or patient requiring full dedication for about 1 hr in any shift such as to explain the clinical condition, dealing with pain and distress, difficult family circumstances. (4) 7B. Support and care of either relatives or patient requiring full dedication for 3 hrs or more in any shift such as death, demanding circumstances. (32) 8. Administrative and managerial tasks 8A. Performing routine tasks such as processing of clinical data, ordering examinations, professional exchange of information. (4.2) 8B. Performing administrative and managerial tasks requiring full dedication for about 2 hrs in any shift such as research activities, protocols in use, admission, and discharge procedures. (23.2) 8C. Performing administrative and managerial tasks requiring full dedication for about 4 hrs or more of the time in any shift such as death and organ donation procedures, coordination with other disciplines. (30)
Ventilatory support	9. Respiratory support. (1.4) 10. Care of artificial airways. (1.8) 11. Treatment for improving lung function. (4.4)

Cardiovascular support	12. Vasoactive medication. (1.2) 13. Intravenous replacement of large fluid losses. (2.5) 14. Left atrium monitoring. (1.7) 15. Cardiopulmonary resuscitation. (7.1)
Renal support	16. Hemofiltration techniques. (7.7) 17. Quantitative urine output measurement. (7)
Neurological support	18. Measurement of intracranial pressure. (1.6)
Metabolic support	19. Treatment of complicated metabolic acidosis/alkalosis. (1.3) 20. Intravenous hyperalimentation (2.8) 21. Enteral feeding. (1.3)
Specific interventions	22. Specific interventions inside the intensive care unit. 23. Specific interventions outside the intensive care unit.

Chart 1: NAS' categories and items.

Adapted by Padilha, *et al.* [1] version of the NAS translated for Portuguese (10).

The sum of the items scored reflects the amount of time spent by nursing staff in an ICU on performing nursing care during a particular 24 hours. The weight of each item varies from 1.2 to 32, and the highest score reached is 176.8, as shown in table 1 [1,9]. This score can be converted into hours, multiplying it by 14.4 minutes or 0.24 hours [1,9]. It is supposed that a patient with a score of 100 will demand one exclusive professional in his/her bedside in 24 hours [1,4-8]. However, the relationship between the critical patient's seriousness and the use of nursing time is not entirely linear in the 24 hours.

Despite NAS' well-known importance and international recognition, there is limited use of its results for everyday decisions in Brazil. Also, it is not mentioned as recommended for ICU by the Federal Nursing Council resolution for nursing staffing calculation in the country [1,3,12]. Health and nursing managers do not recognize it as a tool to negotiate and adequate nursing staff sizing in a way to reduce the overload and provide better care in intensive care [12,13,14,15]. In this sense, it remains a lack of studies about the NAS used in nurses' everyday practices considering fulfilment of the report with the work data. Thus, to go further on the ways NAS has been being applied in nursing daily practice, an audit was done in the NAS forms applied in 2018 in a University Hospital Adult ICU, and research was done by online form about its use.

Due to the importance of the adequate use of the NAS tool and its data for recognizing and balancing the nursing workload in ICU, this study aimed to analyze the NAS' application during 2018 in an adult intensive care unit of a Brazilian university hospital.

Methodology

A quantitative descriptive exploratory study was developed in the Adult ICU in a general university hospital in the southeast of Brazil. The unit has 14 mixed ICU beds (surgical, medical), although only ten beds were active during the research period. According to the unit databases, the most frequent diagnoses admitted in the unit were sepsis, septic shock, stroke, upper gastrointestinal bleeding, status epilepticus, acute myocardial infarction, and post-cardiorespiratory arrest syndrome. In 2018, the average bed occupancy rate was 90%, and the average length of stay was four days.

The unit nursing team had a total of 37 nursing professionals, of which 27 were nurses, nine licensed practitioner nursing (LPN) and one nursing care aid. The length of the dayshift was 6 hours and the nightshift 12 hours. The everyday work demands were distributed

between the nursing professionals available trying to maintain the N/P ratio of 1:2 and one nurse as a manager of the nursing care team, per shift. Frequently, there are not enough nurses for all beds, and they need to work as a nursing team in a mix of nursing personnel with nurses and LPNs.

According to the Brazilian federal nursing council, the nursing care aid is not allowed to provide direct care to ICU patients. The afternoon shift’s nurse manager is responsible for filling the NAS prospectively in the excel spreadsheets previously developed in the NAS format. The NAS was fulfilled with the data collected from the information registered between 7 am to 7 pm in the nursing report used for their transition of care time and sometimes in the patient record.

This study data was the NAS excel spreadsheets along 2018 despite being partial or completely fulfilled. The NAS recorded with incomplete scores were also included in the final sample, and only the blank reports were excluded. The number of beds occupied and the unit census were compared to identify the validity of the bed’s numbers’ days.

The data gathered was submitted to descriptive analysis. Results were organized in a table and presented according to the elements analyzed. The data analysis, critics, and suggestions were based on the literature, such as the Brazilian Guidelines and legislation about ICU functioning and nursing practices. The Ethics Committee of the Federal University of Minas Gerais approved the study under report number 3059.907/2018.

Results

During 2018, the NAS was completed for an average of 26 days per month, with a significant number of filling days in May and the fewest days in November. The average bed occupancy in the year was 9.3 in 10 beds available, with the most significant occupancy in March and the smallest in April (Chart 2).

Month 2018	Sum of days collected	Average of beds occupancy	Items most selected between 1 and 8	Items least selected between 1 and 8	Items fewer times selected in general	Items between 1 to 8 more times not selected	Items between 1 to 8 with more than 1 subitem more selected	Days in the week when the NAS was more frequent undone
January	27	9,5	1C, 4C, 7B	3	13 e 14	7	8	Friday
February	25	9,2	1C, 4C, 7 (A e B)	1A e 3	7 e 14	7	0	Monday, Tuesday and Sunday
March	21	10	4C	2	20	7	1 e 8	Saturday
April	29	8,6	1C, 4C e 6C	2	15, 18	7	1,4 e 8	Wednesday
May	31	9,7	1C, 4C, 6C e 7C	2	14,18,19 e 20	7	1	none
June	25	9,2	4C, 7B	3	14,18 e 20	7	1	Wednesday
July	28	9,1	4C, 7B	3	14	7	0	Thursday, Friday and Sunday
August	30	8,9	4C, 7B	2	18 e 20	7	0	Saturday
September	23	9,9	4C	2	14 e 18	7	1 e 4	Wednesday and Friday
October	22	9,9	1C, 4C	2	14 e 18	7	1 e 8	Wednesday
November	17	8,9	4C, 7B e 8C	3	13,14, 15, 18 e 20	5 e 7	0	All days
December	30	9,3	4C	2	14 e 18	7	0	Friday
Average	26	9,3						

Chart 2: The analysis of the NAS recorded in 2018.

NAS records evaluated in chart 2 show that only an average of 3.1 days in 2018 had the NAS recorded without mistakes or missing items or beds. However, these days had the score NAS average per 24h of 482 scores (115.7 hours) in the unit or 51.8 scores (12.4 hours) per bed. The average score including all days collected was 495.4 score (118.9 hours) or 53.3 (12.8 hours) per bed. Applying the Brazilian recommendation of nursing staffing calculation [12], these data correspond to 28 nursing professionals, and 15 of them nurses.

Discussion

In a recent Brazilian study, most nurses asked about NAS said they knew it. However, only 4% of them reported using the tool at some point in their intensive care professional trajectory [17]. In another study, nurses, which established a relation between the workload experienced in an ICU and the patient care provided, said they know NAS and its importance to the personnel downsizing [15]. However, they emphasize its application as an underused management tool to ensure the adequacy of the quantitative nursing required, reduced workload, and better care provided [15].

An important issue about the NAS use is being filled in Excel Program or manually in paper forms, most times once a day, after 24 hours of care, which means the data was provided retrospectively. Additionally, it is not necessarily done by professionals who have provided the care, which implies some data could be missing or misunderstood. They retrospectively collected data through professionals' annotations in printed records of monitoring and control and patient's records. Manually filled forms make the process slow and laborious as well as it makes the instrument likely to errors, which, with time-wasting and necessity to fix it [18].

On the other hand, authors [5,18,19] argued that the NAS became questionable when it is completed with retrospective data because care routines may not correspond to the care required by the patients after that moment, which might set up a limitation in this use for distributing the nursing professionals per patient per shift.

Regarding the fulfilment of NAS, items 1, 4, 7, and 8 were the most problematic ones in the basic activities' category. In the updated NAS guideline [1], it was pointed out that five items cause doubts - items 8, 14, 15, 24, 19 and 22, and in item 8 was mentioned an inquiry about the inclusion or not of follow-up students' activities in the ICU in subitem C. This study was conducted in a university hospital, where there are frequently nursing students or other students in the unit, but it was not shown in the data.

Nevertheless, we argued about the nurse's comprehension of the weight of their managerial tasks. Item 7 is one of the least selected, which makes it possible to argue the understanding of the activity by the professionals and the time setting up to perform it in the item description or the way the activity is described. It is important to highlight that item 8 – concerned about administrative and managerial tasks – and its subitems were also considered difficult to evaluate as the times' score could change in different realities according to the structural resources available like other professionals' support and informatics systems. It is also possible to argue that the routine tasks inside the first eight items are an essential part of nurses' work. It includes articulation of work and resources' organization to provide appropriate care conditions for patients and professionals.

Again, the uncertainty in accounting for the accurate weight of nurses' work is observed between items 1 and 8, which have multiple-choice gradually increasing weight subitems. The 'extranormal weight items' 1C (monitoring and control at the bedside for four hours or more), 4C (Hygiene procedures for more than four hours) and 7B (Administrative and managerial tasks for four hours or longer) were rarely chosen. It was also observed in another study [4] that in the multiple-choice items, "normal" items were chosen in 70% of the situations except for item 6 that were encoded "more than normal" usually, and the choice "much more than normal" was rarely recorded (5%). Other studies [6,13] added that length of stay in the unit, the admission, and the discharge may interfere in those items because the low level indicates an everyday care routine in the ICU. However, in this study, the average unit length of stay was 4 days which is not considered an extended length of stay.

Items 14, 18 and 20 were less scored, but item 20 was the least of all items. Thus, it is worth considering that it may have an unusual filling of these items in the nurses' daily routine as well as the relation of these items with the type of ICU, the profile and characteristics of patients admitted to the unit. As the setting of this study is linked to the emergency room, it has an average hospital stay of 4 days and often admits post-surgical cardiovascular or neurological patients from the theatre. In another study, item 14 was mentioned with doubt regarding the consideration or not of new monitoring of the left atrium than the pulmonary catheter procedures [1].

In general, the items with the highest scores were 1, 2 and 3, which is similar to a study carried out in two ICUs of a public hospital in the Northeast of the country, where items of laboratory investigations and use of medications are scored more than routine care (99,1%) [20]. Another Brazilian study showed that 100% of patients were scored in items 2 and 3 [21], like in another study in which all articles reviewed about the NAS measuring ICU workload [6]. However, items 1, 4, 6 and 8 were performed in 100.0% of the patients in public and private Brazilian ICUs [13]. These differences may be explained because these interventions correspond to a pattern of ICU routine adopted for practices in the ICU units. Furthermore, in Brazil, some private hospital has a private lab personal for collecting lab samples.

On the other hand, despite carrying out these activities on a daily basis, items 1, 4 and 8 of the basic care activities category, in the analyzed forms, were mistakenly filled out, with regular occurrence, disregarding the self-exclusion characteristic between the subdivisions of the items of 1 to 8. The filling with retrospective information and the mixed composition of the nursing team are factors that can make it difficult to determine the activities performed and the time spent on care. In addition, changes in the time reference of the items may increase the complexity of completing the tool since some activities are measured by time and others by the number of times they were performed [22].

The authors [1] argue that some items misunderstanding is due to a lack of clarity in the original manual or concerning new processes and interventions that did not exist when the instrument was first established in 2003. It affects the slight difference between the NAS mean scored in all days collected and the days considered valid. The mean nursing workload was similar to the value reported [1] about the Spanish ICU, which scored 44.5%, and the scores ranged from 51.0% to 57.1% in the Netherlands, Brazil and Egypt. Also, an integrative review [23] about the application of NAS in the ICU presented that the high workload in the ICU is a NAS score > 50 both in general and in specialized units except for trauma units.

Thus, because of the diversity of Brazilian scenarios of nursing care and work, these certainly directly influence the experience of applicability and feasibility of NAS, as well as the reliability of this as a management tool capable of supporting the adoption of objective measures in response to the demands of nursing work and nursing staffing. Also, it is clear that computer employment/utilization can increase ease, agility and practicality in the execution of the tool fulfilment, even though some technical and operational aspects may limit its use [18].

Limitation that should be considered in this study is data were collected from a single ICU, so caution should be used in extrapolating the results to other institution with other characteristic.

Conclusion

In this study, it was verified that still having gaps in NAS everyday use in the ICU. This tool is not yet used homogeneously by nursing professionals and health managers. There is still a remarkable difficulty in filling out the instrument, and it is noticeable the permanence of doubts regarding its application, which directly interferes with the way nurses make efforts to fill the NAS. Since the NAS data do not produce reliable information for the decision-making process, the nurse team cannot see the instrument's efficiency as a management tool to improve the quality of patient care. We recommended more studies about the NAS usage and how it has been applied in different hospital contexts of nursing practice, as well as how the data can be used to organize the nursing care demands in each shift in a way to balance the everyday overload of nursing work.

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Conflict of Interest

All authors declare do not have any financial interest or any conflict of interest.

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