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Como o instrumento Nursing Activities Score tem sido utilizado na prática clínica: revisão integrativa

Cómo el instrumento Nursing Activities Score se ha utilizado en la práctica clínica: revisión integradora

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ABSTRACT

Objective: analyze how studies have approached the results obtained from the application of the Nursing Activities Score (NAS) based on Donabedian's model of healthcare organization and delivery. **Method:** CINAHL and PubMed databases were searched for papers published between 2003 and March 2015. **Results:** 36 articles that met the inclusion criteria were reviewed and double-coded by three independent coders and analyzed based on the three elements of Donabedian's health care quality framework: structure, process and outcome. The most frequently addressed, but not always tested, variables were those that fell into the structure category. **Conclusion:** variables that fell into the process category were used less frequently. Beside NAS, the most frequently used variables in the outcome category were mortality and length of stay. However, no study used a quality framework for healthcare or NAS to evaluate costs, and it is recommended that further research should explore this approach.

DESCRIPTORS

Workload; Nursing Staff; Intensive Care Units; Quality of Health Care; Review.

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INTRODUCTION

Intensive care units (ICUs) are constantly evolving and in recent decades have had to deal with an increasing number of old patients and comorbidities. This in turn leads to a greater number of complex procedures[1], which calls for closer monitoring and a greater need for nursing interventions, resulting in increased nurse workload and higher costs.

In fact, nursing resources are the largest single component of direct ICU costs, accounting for nearly 50% of the ICU budget[2]. Thus, the use of more objective strategies to evaluate nursing activities is essential to optimize the use of ICU resources and ensure appropriateness, efficacy and cost-effectiveness[3]. Besides this, in the current global context, marked by resource constraints and nursing shortages, it is imperative to portray a more accurate and comprehensive picture of nursing and the value and benefits of the services they provide in line with preestablished objectives and standards[4]. The use of tools for nursing workload measurement serves as a starting point for the analysis, comparison, and processing of data related to nursing activities and can provide important inputs to promote the optimization of the use of resources and establish a more adequate nurse-patient ratio[3].

Many attempts have been made to characterize nursing activities in ICUs[3]. Beginning with the Therapeutic Intervention Scoring System (TISS)[5], a number of different tools have been developed, such as the Italian *Time-oriented Score System* (TOSS), the Canadian *Project Research in Nursing* (PRN), the TISS-28[6] and the *Nine Equivalents of Nursing Manpower* use score (NEMS)[7]; the latter two of which evaluate severity of illness and complexity of therapeutic procedures. However, it is known that the relationship between severity of illness and the time spent on nursing interventions is not linear, since severity accounts for only part of the variability of nursing activities. Therefore, in 2003, the Nursing Activities Score (NAS) was developed to provide an overall description of all nursing activities in ICUs, not only those correlated to the severity of illness[2]. It has been shown that NAS represents about 80% of the work activities of nurses in ICUs, which is substantially more representative that the 43% obtained using TISS-28[2]. NAS has been used in over a dozen countries[8] and a number of papers have been published regarding its clinical application. Some studies have demonstrated a relationship between NAS and outcomes such as mortality and adverse events; however, this association is not constant throughout all studies and this inconstancy is yet to be explained.

Nursing care performance involves "the analysis of multiple interacting elements that relate to the diverse aspects of nursing services, their antecedents and their results", reflecting "nursing care as a complex, aggregate entity, comprised of multiple interrelated and interdependent subsystems and components that are logically coordinated and oriented toward the achievement of common goals"[4]. In this sense, Donabedian's model of healthcare organiza-tion and delivery guides understanding on how inputs are acquired from the (nursing) care environment and fed into the service production cycle, where transformation of resources results in changes in patient conditions[9].

In light of the above, this integrative review assesses how studies have approached the results obtained using this tool based on Donabedian's model of healthcare organization and delivery and aims to contextualize the use of NAS across the healthcare continuum to gain further insight into the interpretation of its results.

METHOD

The review included the following steps: problem identification, literature search, data extraction, and data analysis and reporting[10]. The PICO strategy was used to formulate the question, whereby the population was defined as "Intensive Care Units" and intervention as "application of the Nursing Activities Score - NAS". Comparison criteria were not applied and outcome was analyzed from an exploratory perspective, in accordance with Donabedian's model[9].

Problem identification: the central question of this integrative review was: "what are the main purposes for using NAS in ICU settings? The following aspects were analyzed: study objective, the context in which NAS was used, sample size (for patient and NAS application), the strategy used for applying the tool, and the purpose of using NAS, according to the SPO elements of Donabedian's model: structure/process/outcome.

Search strategy: a search was conducted of the CINAHL and PubMed databases of articles produced between 2003, which was when the first article on NAS was produced, and March 2015, using the following concepts: 1) "Nursing Activities Score" or "Nursing Activity Score" and "scale"; 2) "intensive care units" or "critical care"; 3) "workload measurement" or "workload". This search strategy was adapted to the terminology of the databases. In addition, the bibliographies of potentially eligible studies were analyzed manually to identify studies not brought up by the search strategy.

Eligibility: the following inclusion criteria were used - 1) fully peer-reviewed papers published in English, French, Italian, Portuguese or Spanish; 2) papers should demonstrate the use of NAS in a clinical setting; and 3) papers should indicate the context in which the tool was used (for example type of ICU - adult, pediatric, general, clinical); 4) papers should specify the method of NAS application; and 5) specify the purpose for using the tool. Both exploratory and correlational studies were included since they met the mentioned criteria. Studies addressing cross-cultural adaptation, conceptual aspects of the tool, and the measurement properties of NAS were excluded; as were published abstracts or papers without abstracts found to be lacking information on the context in which the NAS was used, methods of application, or the purpose for using the tool during data extraction. Articles reporting the use of NAS in settings other than ICUs were excluded, considering that the original focus of the tool were ICUs[2].

The studies were sorted by title and abstract by JL in order to select the articles that met the inclusion criteria. Duplicated articles were discarded. Thereafter, the full text of the articles that met the inclusion criteria were inde- pendently screened by JL, FD and MCG and compared. A total of 36 papers were selected. Details of the method- ological steps are shown in a flowchart developed in accor- dance with the PRISMA Statement[11] (Figure 1).
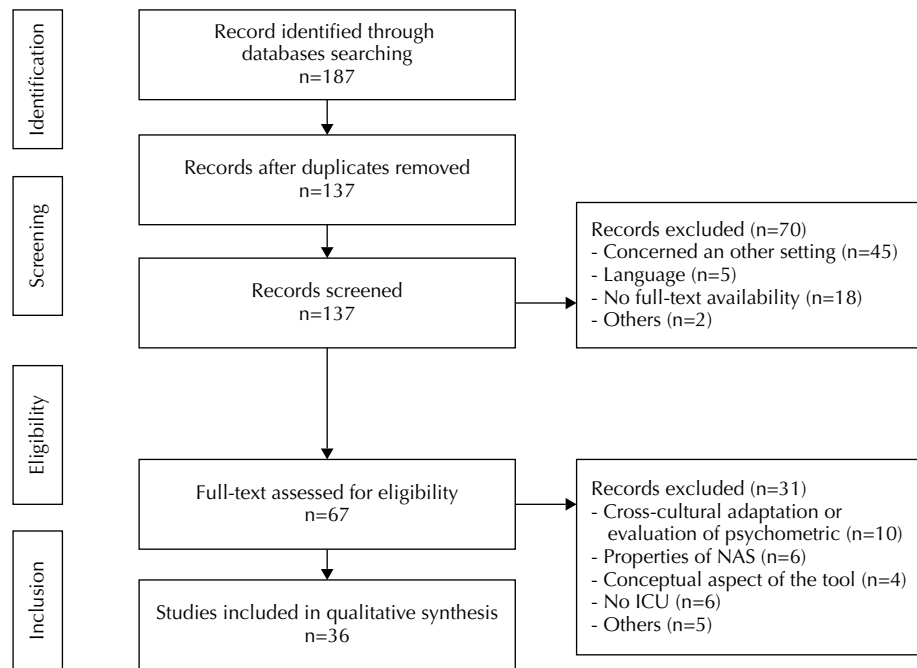

Figure 1 - Flowchart showing the methodological steps of the integrative review.

Data extraction: first coding was carried out with papers to check agreement of data extraction and to confirm the quality of the coding sheet. Where there was disagreement between the two reviewers, the final decision was taken after discussion with reviewer MCG for language reasons.

Data analysis: NAS serves to assess the percentage of time spent on nursing interventions delivered to an ICU patient. Thus, the results obtained with NAS could serve as one of the means to evaluate the quality of health ser- vices provided by nurses in ICU. A multitude of models or frameworks were developed for health services quality improvements such as Donabedian[9] and more recently[4]. Since Donabedian framework is already largely used in nursing studies to evaluate quality of care[12-13], this model was chosen to analyze the retained studies.

Donabedian's framework evaluates three elements of the quality of health service delivery: structure, process and out- come, whereby each component is interdependent and in- fluenced by the other components[9]. Structure refers to all technical, human and organizational resources related to the service or institution, and stable patient characteristics, such as age and gender. In this study, other patient characteristics at the time of admission that affect process and cannot be influenced by the nurse were included in the structure cat- egory, such as clinical severity, patient origin, and reason for admission to ICU. Process includes all activities carried out by professionals involved in direct patient care, care coordi- nation, and the interaction between and response to these activities. Outcome includes changes in the health status of a patient after direct contact with the health system such as

healing, survival, mortality and adverse events. It should be noted that this analysis of the SPO does not imply a sep- aration between means and ends, but rather an unbroken care process chain continuum[9]. Thus, NAS can be seen as a connecting element between the structure and process com- ponents, since it enables the quantification of the nursing activities that characterize the process.

RESULTS

A large majority of the articles reviewed by this study were published in nursing journals (86.1%), while 9.3% were published in multidisciplinary journals[14-49] (Chart 1). With regard to the nursing journals, 24% were journals specifically focusing on critical care or cardiac nursing, while the rest were general nursing journals. Year of publi- cation varied from 2005 to 2014, with a major concentra- tion (81.4%) in the period 2010 to 2014, indicating that the use of NAS for clinical purposes is a more recent phenom- enon. Most articles were produced in Brazil (69.4%), fol- lowed by Europe (27.8%) and one publication (2.8%) from China. Patient sample size varied from 34 to 5,856; only one paper failed to mention the number of patients who participated in the study. Sixteen articles did not clearly state the number of NAS applications. Those articles that stated the number of applications reported between 34 and 28,390 applications including patient follow-up. The large amount of variability between the samples made it impos- sible to compare study data. All studies indicated the con- text in which NAS was used, the application method, and the purpose for using the tool.

Chart 1 - Summary of the studies of the application of NAS in clinical settings analyzed by the present study.

Author, year/country Journal	Aim	Sample (application of NAS)	Context (type of ICU)	Strategy used for applying the tool	Evaluating the Quality of Care (Donabedian, 1978)		
					Structure	Process	Outcome
Adell et al.[14], 2005/Spain Enferm Intensiva.	To evaluate NAS results throughout the hospitalization.	$N_{patient}$=250 N_{NAS}=1,880	General adult ICU	3 times/day (per shift) and then average NAS/day	-Age -Gender -Special clinical conditions -Origin*	-NAS	-Mortality* -LOS
Altafin et al.[15], 2014/ Brazil Rev Bras Ter Intensiva.	To evaluate nursing workload.	$N_{Patient}$=437 N_{NAS}=NS	Adult ICU	Every 24h at 7a.m.	-Age* -Gender* -Reason for admission* -Origin* -Severity index (APACHE II) * -Organ Failure (SOFA)*	-NAS -TISS-28*	-LOS* -Mortality*
Argibay-Lago et al.[16], 2014/Spain Enferm Clin.	To assess nursing workload among nurses providing special treatment to patients.	$N_{patient}$=46 N_{NAS}=NS	>1 ICU patients after suffering sudden cardiac arrest, with or without therapeutic hypothermia	Every 24 h	-Age -Gender -Clinical data	-NAS -TISS 28 -NEMS	-Mortality* -Neurological evolution*
Camuci et al.[17], 2014/Brazil Rev Latino Am Enfermagem.	To evaluate nursing workload in a burns intensive care unit.	$N_{patient}$=50 N_{NAS}=1,221	Burns ICU	Every 24h	-Age -Gender -Burn data	-NAS	
Carmona-Monge et al.[18], 2013/Spain Rev Esc Enferm USP.	To compare the NAS in two ICUs.	$N_{patient}$=103 N_{NAS}=941	Two Clinical adult ICUs	Every 24h	-Age -Gender -Reason for admission -2 types of ICU	-NAS	-LOS -Mortality
Carmona-Monge et al.[19], 2013/Spain Rev Esc Enferm USP.	To assess nursing workload from admission to discharge among 3 groups of ICU patients.	$N_{patient}$=563 N_{NAS}=5,704	Medical ICU	Every 24h	-Age -Gender -Reason for admission* -Ratio 1: 2, 1: 3,	-NAS -Invasive procedure	-LOS -Mortality
Ciampone et al.[20], 2006/Brazil Acta Paul Enferm.	To compare nursing care needs of elderly and non-elderly patients.	$N_{patient}$=50 N_{NAS}=NS	Adult ICU	Every 24h	-Age* -Gender -Comorbidities	-NAS -Type of treatment	-LOS -Destination -Mortality
Coelho et al.[21], 2011/Brazil Texto Contexto Enferm.	To identify nursing workload and its association with demographic and clinical patient's data.	$N_{patient}$=100 N_{NAS}=100	Cardiac Intensive Care Unit	Once, 24 h after admission	- Age* -Gender* Origin* -Reason for admission* -Organic dysfunction (LODS)* -Severity index (SAPS II)* -Mortality risk*	-NAS	-LOS* -Mortality*
Cremasco et al[22], 2013/Brazil J Clin Nurs.	To verify the association between nursing workload and pressure ulcer risk and illness severity.	$N_{patient}$=160 N_{NAS}=NS	University ICU	Every 24h	-Age -Gender -Severity index (SAPS II)* -Pressure ulcer risk (Braden Scale)* -Reason for readmission	-NAS	-PU Development* -LOS*
Cyrino et al.[23], 2012/Brazil Esc Anna Nery.	To analyze the impact of the Patient Classification System on the care process and nosocomial infection.	$N_{patient}$=214 N_{NAS}=NS	Adult Medical-Surgical ICU	Every 24 h	-Age* -Gender -Reason for readmission -Patient classification System* -Bed occupancy rate	-NAS	-Nosocomial infection* -Mortality* -LOS*
Silva et al.[24], 2010/Brazil Rev Latino Am Enfermagem.	To identify factors related to discharge of ICU patients in hospitals with intermediate care units.	$N_{patient}$=600 N_{NAS}=NS	4 General ICUs	Twice Every 24h After admission to discharge	-Age -Gender -Comorbidities -Severity index (SAPS II) -Beds ratio ICU : IU -Risk of death (SAPS II) -Organ dysfunction	-NAS	-Mortality * -LOS
Silva et al.[25], 2011/Brazil Rev Latino Am Enfermagem.	To identify factors associated with death and readmission.	$N_{patient}$=600 N_{NAS}=1,200	2 General public and 2 private ICUs	Twice 24h Admission/ discharge	-Age -Gender -Origin -Mortality risk (SPAS II) -Organ dysfunction (LODS)	-NAS	-Mortality * Readmission* -LOS
Daud-Gallotti et al. [26], 2012/Brazil PLOS ONE.	To evaluate the association between nursing workload and HAI.	$N_{patient}$=195 N_{NAS}=NS	3 Medical ICUs and 1 step-down beds unit	Every 24h Every shift (3 times)	-Age -Gender -Origin -Severity index (APACHE II) and SAPS II) -Organ dysfunction (SOFA) -Comorbidities -Nurse-patient ratio -Absenteeism	-NAS -compliance with the nurses' care plan -Procedures -Communication failure	-HAI* -LOS -Adverse events

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Author, year/country Journal	Aim	Sample (application of NAS)	Context (type of ICU)	Strategy used for applying the tool	Evaluating the Quality of Care (Donabedian, 1978)		
					Structure	Process	Outcome
Sousa et al.[27], 2008/Brazil Rev Latino Am Enfermagem.	To compare illness severity and nursing workload and to identify predictors of nursing workload for the treatment of elderly patients.	$N_{patient}$=71 N_{NAS}=71	General	Every 24h at 8 a.m.	-Age* -Gender -Severity index (SAPS II)	-NAS	-Mortality
Feitosa et al.[28], 2012/Brazil Esc Anna Nery.	To evaluate the demand for nursing care.	$N_{patient}$=45 N_{NAS}=328	Two General Adult Clinical-Surgical ICUs	Every 24 h	-Age -Gender	-NAS -Type of treatment (related to diagnosis)	-LOS -Mortality
Giakoumidakis et al.[29], 2011/Greece Nurs Crit Care.	To identify the factors affecting the length of stay in hospital.	N_{patien}t=313 N_{NAS}=313	Cardiac surgery ICU	Every 24h Once	-Age -Gender -Comorbidities -Perioperative and mortality risk (EuroSCORE)	-NAS -Type of surgery -Procedure	-LOS*
Gerasimou-Angelidi et al.[30], 2014/Greece J Nurs Manag.	To study the association between family satisfaction and nursing workload.	$N_{patient}$=106 N_{NAS}=NS	Adult ICU	Three times/day (per shift)	-Age, -Severity index (SAPS II) (covariables)	-NAS	-Family Satisfaction ICU 24 (FS ICU-24)* -LOS*
Giakoumidakis et al.[31], 2012/Greece Eur J Cardiovasc Nurs.	To identify the risk factors for increased in-hospital mortality.	$N_{Patient}$=313 N_{NAS}=313	Cardiac surgery	Every 24h Once at admission	-Age -Gender -Comorbidities -BMI -Surgery and Mortality risk (EuroScore)	-NAS -Type of surgery	-Mortality* -LOS
Gonçalves et al.[32], 2006/Brazil Rev Bras Enferm.	To determine the daily nursing care needs.	$N_{patient}$=50 N_{NAS}=NS	Adult ICU	Every 24h	-Age* -Gender -Reason for admission -Origin*	-NAS -Type of treatment	-Mortality* -LOS*
Gonçalves et al.[33], 2007/Brazil Rev Esc Enferm USP.	To analyze nursing workload on the first day of admission and associated factors.	$N_{patient}$=214 N_{NAS}= 214	5 Adult private ICUs -3 general and 2 neurological	Once, 24 h after admission	-Age -Gender -Diagnosis	-NAS -Type of treatment	-Mortality* -LOS*
Inoue et al.[34], 2010/ Brazil Acta Paul Enferm.	To analyze nurse-patient ratios based on NAS.	$N_{patient}$=107 N_{NAS}=NS		Every 24 h	-Age -Gender -Reason for admission -Nurse-patient ratio*	-NAS -Type of treatment	-Destination -LOS
Kakushi et al.[35], 2014/Brazil Rev Latino Am Enfermagem.	To identify direct and indirect nursing-care time.	$N_{patient}$=NS N_{NAS}=24,886	Children and adult private ICU	Every 24 h,	-Age -Reason for admission -Categories of nursing team -Bed occupancy rate	-NAS (direct care) -Indirect care*	-LOS
Lago et al.[36], 2011/ Brazil Int J Palliat Nurs.	To evaluate the provision of medical and nursing care to children in the last 24 hours of life	$N_{patient}$=34 N_{NAS}=34	Pediatric ICU	Every 24 h Once in the last 24h of life before death	-Age, -Gender -Ratio 1: 1-2	-NAS -Decision making -Procedure -Type of treatment* (RCR or not RCR)	-LOS
Lucchini et al.[37], 2011 /Italy Assist Inferm Ric.	To assess the association between adverse events, nurse staffing levels and workload.	$N_{patient}$=240 N_{NAS}=NS	Adult Clinical and Surgical ICU	Every 24 h	-Age -Ratio nurse-patient* -Bed occupancy rate*	NAS	-Adverse events*
Lucchini et al.[38], 2012 /Italy Assist Inferm Ric.	To detect the impact of ventilation mode on nursing workload.	$N_{patient}$=200 N_{NAS}=NS	General adult ICU	Every 24 h		-Ventilation mode* -NAS	
Lucchini et al.[39] 2014/Italy Intensive Crit Care Nurs.	To analyze the application of the Nursing Activities Score in an intensive care department.	$N_{patient}$=5,856 N_{NAS}=28,390	General, Neurologic and Cardiothoracic Surgery ICU (adult and pediatric)	Every 24 h in the morning (retrospectively)	-Age* -Severity index (SAPS II and SAPS III)* -Pressure ulcer risk* (Braden scale)	-NAS -Level of sedation (RASS)*	-LOS*
Nogueira et al.[40], 2007/Brazil Rev Bras Ter Intensiva.	To explore the correlations between NAS, severity index and mortality.	$N_{patient}$=148 N_{NAS}=NS	Adult ICU	Every 24h	-Age -Gender -Reason for admission -Severity index (APACHE II)*	-NAS	-Mortality* -LOS
Nogueira et al.[41], 2013 \ Brazil Rev Bras Ter intensiva.	To compare nursing workloads in public and private ICUs	$N_{Patient}$=600 N_{NAS}=1,200	2 Public and 2 Private ICUs	Every 24 h Twice Admission and discharge	-Age -Gender -Organ dysfunction (LODS) -Severity index (SAPS II) -Type of ICU*	-NAS	-LOS -Mortality*

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Author, year/country Journal	Aim	Sample (application of NAS)	Context (type of ICU)	Strategy used for applying the tool	Evaluating the Quality of Care (Donabedian, 1978)		
					Structure	Process	Outcome
Nogueira et al.[42], 2014/Brazil PLOS ONE.	To identify the factors related to the high nursing workload demanded in the treatment of trauma victims.	$N_{patient}$=200 N_{NAS}=200	Trauma ICU	After the first 24h	-Age* -Gender* -AIS* -Organ dysfunction(LODS)* -ISS* -Origin* -Reason for admission* -Comorbidities* -Mortality risk * (SAPS II, APACHE II)	-NAS -Interval between ER and ICU*	
Novaretti et al.[43], 2014/Brazil Rev Bras Enferm.	To identify the influence of nursing workload on the occurrence of noninjurious incidents and adverse events.	$N_{patient}$=399 N_{NAS}=NS	2 Clinical-Surgical ICU. Patients □15 years old	Three times/day (per shift) and then, average NAS/day	-Severity index (APACHE II)	-NAS	-Mortality -LOS -Incidents without injury* -Adverse events*
Nunes et al.[44], 2013/ Brazil Rev Latino Am Enfermagem.	To analyze nursing workload related to the ideal and current nurse-patient ratio	$N_{patient}$=144 N_{NAS}=406	Neonatal ICU	Every 24 h	-Age -Weight -Type of unit*	-NAS	
Padilha et al.[45], 2008/Brazil Intensive Crit Care Nurs.	To describe nursing workload and its association with patient variables.	$N_{patient}$=200 N_{NAS}=200	2 General and 2 Neurological ICUs	Every 24h First 24h after admission	-Age -Gender -Severity index (SAPS II)*	-NAS -Therapeutic interventions (TISS-28)*	-LOS* -Mortality*
Padilha et al.[46], 2010/Brazil Int Crit Care Nurs.	To identify and analyze daily nursing workload and the adequacy of nursing staff.	$N_{patient}$=68 N_{NAS}=690	Adult ICU Private hospital	Every 6h shift, Daily	-Age -Gender -Origin -Occupancy Rate -Nurse-patient ratio*	-NAS	-LOS
Panunto et al.[47] 2012/Brazil Acta Paul Enferm.	To evaluate nursing workload	$N_{patient}$=107 N_{NAS}=574	Adult ICU	Every 24h	-Age -Gender -Reason for admission -Origin	-NAS -Type of treatment	-LOS
Peng et al.[48], 2014/ China Nurs Health Sci.	To explore the correlation between patient illness severity and nursing workload.	$N_{patient}$=229 N_{NAS}=NS	Rescue room of the Emergency Department (trauma)	Every 24 h	-Gender -Severity index (APACHE- II)* -Nurse-patient ratio -Reason for admission	-NAS	
Queijo et al.[49], 2013/Brazil Int Crit Care Nurs.	To assess nursing workload in neuro ICUs and identify independent factors associated with nursing workload	$N_{patient}$=100 N_{NAS}=NS	General, Cardiovascular and neurological ICU	The first 24 h after admission	-Age* -Gender* -Clinical history -Reason for admission* -Severity index (SAPS II) -Organ Dysfunction (LODS) -Origin*	-NAS	-LOS -Mortality*

*Variables tested against NAS; AIS: Abbreviated Injury Scale; APACHE: Acute Physiology and Chronic Health Evaluation; ER: Emergency Room; HAI: Healthcare-Associated Infections; ICU: Intensive Care Unit; ISS: Injury Severity Score; IU: semi-intensive unit; LODS: Logistic Organ Dysfunction System; LOS: Length of Stay; NAS: Nursing Activities Score; NEMS: Nine Equivalents of Nursing Manpower Use Score; NS: Not Specified; PU: Pressure Ulcer; SAPS: Simplified Acute Physiology Score; SOFA: Sepsis Related Organ Failure Assessment;TISS-28: Therapeutic Intervention Scoring System; RASS: Richmond Agitation Sedation Scale.

NAS was used in one or more ICUs and some studies compared different ICUs. The studies targeted different types of ICUs, and therefore patients: clinical, clinical-surgical, and specialized ICUs (cardiac, neurological, and burns). Five studies reported the use of NAS with pediatric or neonatal patients.

THE USE OF NAS AND THE NURSING CARE SYSTEM

The use of NAS across the unbroken care process chain continuum was analyzed[9]. The variables described in the studies were categorized into one of the three elements of the framework: structure, process and outcome.

The variables that fell into the structure category were far more frequent and were related to the stable patient characteristics (age and gender), clinical profile at admission (reason for admission, origin, associated clinical conditions, organ dysfunction, illness severity and mortality risk, ulcer pressure risk) and environmental conditions (type of unit, nurse-patient ratio, bed-occupancy rate, professional background of the nursing team, absenteeism). However, it is important to highlight that these variables were not always tested against NAS: for example, age and gender were mentioned by 33 and 29 studies, respectively, but only nine studies tested the association between NAS and age and only four tested the association between NAS and gender. Severity of illness and risk of mortality were tested against NAS in 14 and four studies respectively, and only mentioned in six and two studies, respectively. Other variables tested against NAS included: clinical condition (one study), origin (five studies), reason for admission (five studies), different types of unit or distribution (four studies), risk of pressure ulcer, and bed occupancy rate (one study).

With regard to process, besides NAS, few variables were described, and even fewer variables were tested

against NAS: TISS-28 in two studies, type of treatment (described in six studies and tested in one study), and the interval between emergency department-ICU.

With respect to outcome category, the most frequently used variables were mortality and length of stay (LOS). Mortality was mentioned in 20 papers and tested against NAS in 14 studies. LOS was measured in 28 papers, and effectively tested in 10 studies. Additionally, a range of different variables that fall into this category were used and tested against NAS by separate studies: clinical evolution, nosocomial infection, readmission, HAI, adverse events, noninjurious incidents and family satisfaction.

Finally, no study reported using a quality framework for healthcare or NAS to evaluate costs.

DISCUSSION

This literature review summarizes studies assessing the use of NAS in given contexts, application methods, and the purpose for using this tool in clinical settings.

The large majority of studies concerning the clinical use of NAS were published in nursing journals, which is to be expected given that NAS deals specifically with nursing interventions. However, some studies were published in multidisciplinary journals, which may be viewed as a strategic effort to increase the visibility of the unique role of nursing in ICUs.

The majority of studies were conducted in Brazil during the last four years, indicating that this country has contributed most to the clinical application of this tool. Considering that NAS is widely used around the world, particularly in Europe, it is very important to stimulate the application of this tool from a research perspective and the dissemination of results in Europe.

Important insights about nursing activities in ICU and their contribution to the continuum of healthcare could be gained by comparing the results of the application of NAS in different cultures. International collaborations involving multicenter studies could be an interesting way of making this possible.

NAS was applied in various types of ICUs, including neonatal and pediatric units. However, it is important to mention that NAS was developed for the adult ICU context [2] and, to date, validation studies of the NAS in these settings do not exist.

Regarding the SPO elements of Donabedian's framework, it was observed that the most frequently described, but not always tested, variables were those related to stable patient characteristics (age and gender) and severity of illness, measured using different tools (APACHE, SAPS). A wide range of variables that fall into the structure category were also mentioned; however, the lack of a minimum set of standardized variables makes it impossible to compare the different contexts in which NAS was applied. Considering the significant impact of structure on process (and thus on nursing activities) and, consequently, on outcomes, the determination of a minimum set of variables could make a particularly important contribution to improving the analysis and interpretation of NAS results. Moreover, it

is important to explore how these variables may influence NAS and outcomes.

Beside NAS, the studies mentioned few variables that fall into the process category. Type of treatment was mentioned in seven studies and tested against NAS in only one. It is important to determine which other variables in the process category influence NAS results and their effects on outcome. For example, coordination of care is a variable that potentially falls into the process category, since it is influenced by the setting and other structure variables and has a presumed causal effect on patient outcome [50].

The most frequently measured variables in the outcome category were LOS and mortality. These are key-variables in the evaluation of ICU outcomes, since these units have higher mortality rates than other hospital units. In the United States, there are approximately four million ICU admissions per year, with average mortality rates of between 8 and 19%, which is equivalent to around 500,000 deaths per year [51]. Furthermore, ICU is a costly component of the health care budget and this cost is largely accounted for by LOS. Despite the importance of these outcome variables, they should not be used in isolation from other variables to indicate the impact of nursing care since they reflect the contribution (or failure) of several systems of care and healthcare disciplines. LOS and mortality are part of a group of outcomes in the nursing care performance framework [4] that reflect the joint contribution of nursing care, health status, readmission, and complications. Other quality indicators that are more sensitive to nursing interventions include: (a) patient safety (for example patient falls, injuries, medication errors, pulmonary, intravenous and urinary tract infections, pressure ulcers); (b) patient comfort and quality of life in the care context (meeting patients' needs in relation to personal hygiene, nutrition, management of symptoms such as pain and dyspnoea, and continence, and avoiding unnecessary interventions during hospitalization, such as physical or chemical restraints, nasogastric tubes or prolonged use of urinary catheters); (c) changes in patients or families' knowledge, skills, and behaviors; (d) patients' functional status (physical, psychosocial and cognitive); and (e) patient and family satisfaction with the care experience. The systematic inclusion of such variables by studies using NAS could make a significant contribution to the evaluation of the impact of nursing activities [4].

This review also highlights the importance of a framework to guide the use of NAS in clinical practice, the elaboration of good hypotheses for studies of NAS and its implications for healthcare quality, and the interpretation of results. Furthermore, despite the fact that one of the underlying aims of NAS is to promote effective cost management and utilization of nursing resources [30], which can account for up to 50% of the total spending of an ICU [2], this review shows that there is a lack research exploring the use of NAS to evaluate and manage costs and further research in this area is therefore highly recommended [2].

The present integrative review has some limitations. Considering the absence of randomized control trials, this review did not take a systematic approach or carry out a systematic comparison of study groups. Furthermore, a

meta-analysis was not conducted due to the variability and lack of information in some studies.

CONCLUSION

This review shows that NAS has been applied in clinical settings in various types of ICUs. The analysis of the results based on Donabedian's model indicates that NAS was used to test several variables that fall into the structure category (principally age, sex and severity of illness), but few variables related to process. With regard to outcome, the most frequently tested variables were mortality and LOS, which are not nurse-sensitive variables. Further research should consider the use of a conceptual model to guide the use of NAS and the interpretation of results, and address the notion of health economics.

RESUMO

Objetivo: Analisar como os estudos têm abordado os resultados obtidos com a aplicação do Nursing Acivities Score (NAS) na perspectiva de organização do cuidado em saúde, de acordo com o modelo de Donabedian. **Método:** A pesquisa bibliográfica foi realizada a partir das bases de dados CINAHL e PubMed, no período compreendido entre 2003 e março de 2015. Os 36 artigos incluídos foram revisados e codificados duplamente por três avaliadores independentes e analisados à luz dos três elementos do modelo de qualidade de cuidados de saúde: Estrutura, Processo e Resultado. **Resultados:** As variáveis relacionadas à Estrutura foram as mais frequentes, mas nem sempre foram testadas em relação ao NAS. Além do NAS variáveis relativas ao Processo foram menos utilizadas. No que concerne à etapa Resultado, as variáveis mortalidade e tempo de hospitalização foram as mais comuns. **Conclusão:** Nenhum estudo testou a hipóteses sob a perspectiva de um modelo de cuidados de saúde, assim como de custos, uma abordagem que deve ser explorada em estudos posteriores.

DESCRITORES

Carga de Trabalho; Recursos Humanos de Enfermagem; Unidades de Terapia Intensiva; Qualidade da Assistência à Saúde; Revisão.

RESUMEN

Objetivo: Analizar cómo los estudios se han ocupado de los resultados obtenidos con la aplicación del Nursing Acivities Score (NAS) en la perspectiva de organización de cuidados en salud, de acuerdo con el modelo de Donabedian. **Método:** Una búsqueda bibliográfica se realizó a partir de las bases de datos CINAHL y PubMed para el período entre 2003 y marzo de 2015. **Resultados:** El 36 artículos retenidos fueron revisados y codificados en dos ocasiones por tres evaluadores independientes y analizados a la luz de los tres elementos del modelo de calidad cuidado de la salud de Donabedian: Estructura, Proceso y Resultado. **Conclusión:** Las variables relacionadas con la Estructura fueron el más común, pero no siempre se probaron para el NAS. Adémas del NAS, las variables relacionadas con el Proceso fueron menos recurrentes. En cuanto a la etapa de Resultado, las variables mortalidad y duración de la estancia hospitalaria fueron los más comunes. Sin embargo, ningún estudio probó hipótesis desde la perspectiva de un modelo de organisation de la atención de salud, así como de costos, un enfoque que debe ser explorado en estudios futuros.

DESCRIPTORES

Carga de Trabajo; Personal de Enfermería; Unidades de Cuidados Intensivos; Calidad de la Atención de Salud; Revisión.

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