Nursing Workload and care required by older adults in intensive care

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Abstract

Objective: To analyze the workload and nursing care requirements of elderly people admitted to the intensive care unit (ICU) compared to adults. *Method*: Cross-sectional study carried out in two ICUs of two hospitals (public and private) in the metropolitan region of São Paulo. The following variables were extracted from the electronic medical records of patients admitted to the units in 2019: age, gender, length of ICU stay, Simplified Acute Physiology Score (SAPS 3) and Nursing Activities Score (NAS). The data was analyzed using descriptive statistics. Means were compared using Student's t-test and the association between the frequencies of interventions required by the participants using Fischer's exact test. *Results*: The study included 495 patients, 56.6% of whom were elderly with a mean age of 74.9± 9.5 years. The length of stay of the elderly in the ICU was 6.0±7.7 days. It was found that the average SAPS3 score on admission was 48.3±13.7 points and the NAS score, also on admission, was 71.0±10.4 points, being higher among older people than adults, both for severity (p<0.001) and workload (p=0.007). *Conclusion*: Older age is associated with a greater workload for intensive care unit nurses and a greater chance of interventions, associated with greater severity on admission and longer ICU stays for this population compared to adults.

Keywords: Intensive Care Unit. Aged. Nursing Care of Hospitalized Elderly. Workload.

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INTRODUCTION

The global demographic dynamic directly impacts health systems because population aging is accompanied by an increasing incidence and prevalence of comorbidities which, in turn, are associated with greater hospitalization and mortality in the older population[1].

Data collected up to late March 2023 show that the mean age of patients admitted to the Intensive Care Unit (ICU) in Brazil was 62.63 years, with a median of 65 years. Moreover, by age group, the older population aged 60-80 years occupy the majority of ICU beds (39.90%), followed by younger adults (39.05%), and the oldest-old aged >80 (21.06%)[2].

In addition to the worsening of chronic diseases, particularly for cardiovascular causes - responsible for increasing admissions of older individuals in the ICU[3] - the aging process, even when healthy, is typically accompanied by specific physiological changes involving functional loss and requiring different care support from that of younger adults, irrespective of severity[4].

Evidence confirms that providing care to older ICU patients is associated with a higher nursing workload compared to young adults, with age representing a factor associated with greater care demands.[5] In this respect, treatment of individuals aged over 60 years in ICU beds requires qualified nurses that are aware of the specificities inherent to senescence and senility[3]. In this context, the Nursing Activities Score (NAS) serves as a tool for measuring nursing workload and gauging level of staffing[6].

Although the characteristics of nursing associated with workload have been described in the literature comparing public and private care facilities[7], no studies analyzing this association in older versus younger adults were found. The nursing activities most required by older patients, and the odds of their occurrence in this population, remains unclear. This knowledge can help inform planning of specialized care in ICUs.

Therefore, the objective of the present study was to analyze the workload of the nursing team and the activities required by older adults compared with younger adults in the ICU.

METHOD

A cross-sectional study based on a previous investigation (*The impact of Nursing Activities Score on predictive ability of the Simplified Acute Physiology Score 3: a comparative cohort study of public and private ICUs*) between June and September 2020 in two ICUs of 2 large hospitals (1 public and 1 private) located in the metropolitan region of São Paulo was conducted. The public hospital assessed is a referral center for urgent and emergency care of medium-to-high complexity with 24 active ICU beds, whereas the private facility is a general hospital with around 50 active intensive care beds. Both of these hospitals are administrated by the Sociedade Beneficente de Senhoras – Hospital Sírio Libanês.

For the present study, the sample size calculation was performed using the following parameters: α error of 0.05; β of 0.20; and effect size of 0.30. This calculation yielded an estimated sample of 220 individuals per age group for a total of 440 participants. This total was increased by 10% to allow for potential losses, giving a final estimated sample of 484 participants. Post-hoc analysis for determining power attained revealed a study power (probability 1 – β error) of 0.999, calculated for an effect size of 0.30 in a sample of 495 participants.

The study population consisted of all patients admitted to the general ICUs of the facilities assessed, between January and December 2019, aged ≥18 years, with an ICU stay of ≥24 hours. Individuals with missing information on the variables related to the outcome (nursing workload) in electronic medical records, and the charts of patients who required readmission during the data collection period, were excluded.

The data were collected retrospectively via a search of the electronic medical records held on the EPIMED system. Sociodemographic data were collected (sex, age, length of ICU stay), together with scores for severity on admission determined within 1 hour of admission using the prognostic index Simplified Acute Physiology Score (SAPS 3)[8], and nursing workload (Nursing Activities Score - NAS) measured during the first 24 hours of ICU care[6].

The SAPS 3 individually measures the severity of ICU patients based on 20 variables split into 3 groups: patient chronic health status and previous therapy; circumstances related to ICU admission; and presence and degree of physiological derangement. The assessment yields a score ranging from 16 to 217, where score and patient severity are directly proportional. This instrument uses as parameters, data collected at the time of ICU admission or within 1 hour of this process, increasing its sensitivity relative to other models given that the physiological data are less distorted by the therapy delivered after admission[8].

The NAS is designed to measure workload of the nursing team, comprising 23 nursing interventions grouped into 7 categories: Basic activities, Ventilatory support, Cardiovascular support, Renal support, Neurologic support, Metabolic support, and ICU-specific interventions. Thus, each item measured is attributed a score of 1.2-32.0 for a total maximum score of 176,8%. A score of 100 indicates the patient required 100% care from a nursing professional within the last 24 hours. Scores exceeding 100 show that the patient required the care of more than 1 full-time professional[6].

In order to reduce data collection bias, the marking and summing of NAS item scores were carried out retrospectively by the leading author of the present study at the 2 participating facilities by analyzing the medical records. This was achieved by examining the medical notes, progress reports and multi-professional assessments, as well as both medical and nursing prescriptions.

For data analysis, the final sample was divided into 2 groups: G1 - comprising young adults (18-59 years); and G2 - older adults (≥60 years). Data normalness was checked using the Kolmogorov-Smirnov test. Continuous variables were expressed as mean ± standard deviations, while categorical variables were expressed as absolute and relative frequencies. The means of the groups were compared using Student´s *t*-test with analysis of variance performed by the Levene test. Fisher´s exact test was used to investigate the association between the frequency of interventions required by the participants in the two groups.

To analyze the odds of older age (≥60 years) impacting the occurrence of each of the NAS interventions, logistic regression models were built (with stepwise forward entry method), defining age as the independent variable and each intervention as the dependent variables. To this end, a model was constructed for each intervention with results pooled into a single table. The models were presented without adjustment of covariables, presenting the measure of association (odds ratio of the occurrence), together with their respective confidence interval and p-value. In cross-sectional studies, odds ratio can be employed as a method for estimating the chance of occurrence of a condition in one group relative to another[9].

All statistical data were analyzed using the software SPSS v.22 and the level of significance adopted in two-tailed tests was 0.05.

The study was approved by the research ethics committee of the Sírio Libanês institute under permit no. 4.084.423.and observed the prevailing regulations for studies in humans performed in Brazil (Resolution 466/2012). The study also complied with the clauses stipulated in the General Data Protection Law (Law no. 13.709 of 2018).

RESULTS

Of the 495 participants included, 280 were men (56.6%) and 215 women (43.4%). Of the overall sample, 56.6% (n=280) of participants were older adults. Mean age in the older group was 74.9± 9.5 years. By gender, average age was slightly higher for females (75.7±9.8 years) than males (74.3±9.1 years). The difference in mean age between genders was not statistically significant (p=0.253).

No group difference in length of ICU stay (5.0±6.2 days *vs.* 6.0±7.7 days, p=0.117) was found between older and young adults. However, severity on the SAPS3 (36.5±13.4 *vs.* 48.3±13.7, p<0.001) and workload on the NAS (68.3±11.6 *vs.* 71.0±10.4, p=0.007) were both higher in older adults than young adults (Table 1).

Table 1. Mean length of stay, severity, and admission workload of young and older adult ICU patients. São Paulo city, São Paulo state, 2020.

	Total (mean±SD))	Young Adult (mean±SD)	Older Adults (mean±SD)	*p*-value*
Length of ICU stay	5.6±7.1	5.0±6.2	6.0±7.7	0.117
SAPS3	44.3±14.7	36.5±13.4	48.3±13.7	<0.001
NAS	69.8±11.0	68.3±11.6	71.0±10.4	0.007

SD – standard deviation; SAPS3 – Simplified Acute Physiological Score 3; NAS – Nursing Activities Score. *Student´s *t*-test with Levene´s correction of equality of variances.

Comparison of NAS score items revealed a significant difference in frequency of interventions for the items: Monitoring and titration (66.5% *vs.* 33.5%, $p<0.001$; Mobilization and positioning (59.2% v*s.* 40.8%, $p=0.009$); Support and care of relatives or patient (67.0% *vs.* 33.0%, $p<0.001$); Treatment for improving lung function (62.9% *vs.* 37.1%, $p=0.005$); Quantitative urine output measurement (57.9% *vs.* 42.1%, $p=0.012$); and Specific ICU interventions (62.0% *vs.*38.0%, $p=0.018$), in the older adult versus the young adult group (Table 2).

The results of the assessment of the distribution of older patients according to frequency of activities required shows that administration of medications, hygiene care and urinary output procedures were the most frequently performed activities in this group (Figure 1).

The multivariate analysis revealed that age >60 years influenced the interventions performed and almost doubled the odds of Monitoring and titration (item 1a) (OR: 1.970, 95CI%: 1.360-2.850, $p<0.001$) and of Mobilization and positioning (item 6b) (OR: 1.926, 95%CI: 1.178-3.149, $p=0.009$). The odds of Support and care of relatives and patient (7a) more than doubled in the older adults group (OR: 2.210, 95CI%: 1.535-3.182, p<0.001), while the chances of Quantitative urine output measurement more than tripled in the older group (OR: 3.425 95%CI: 1.306-8.982, p= 0.012). Moreover, the odds of Specific ICU interventions (item 22) was 1.5 times greater in the older group (OR: 1.546, 95%CI: 1.081-2.211, $p=0.007$) (Table 3).

Table 2. Frequency of NAS item scores in first 24hs after ICU admission, by age group. São Paulo city, São Paulo state, 2020.

NAS Item at Admission	Total	Older Adults	Young Adults	*p*-value*
	n (%)	n (%)	n (%)	
1a. Hourly vital signs, registration, and calculation of fluid balance.	203 (100.0)	135 (66.5)	68 (33.5)	**<0.001**
1b. Present at bedside and continuous observation or active for 2 hrs or more in any shift.	292 (100.0)	145 (49.7)	147 (50.3)	**<0.001**
1c. Present at bedside and active for 4 hrs or more in any shift.	-	-	-	-
2. Laboratory, biochemical and microbiological investigations.	459 (100.0)	261 (56.9)	198 (43.1)	0.860
3. Medication, vasoactive drugs excluded.	490 (100.0)	275 (56.1)	215 (43.9)	1.000
4a. Performing hygiene procedures.	481 (100.0)	271 (56.3)	210 (43.7)	0.409
4b. Performance of hygiene procedures took >2 hrs in any shift.	11 (100.0)	6 (54.5)	5 (45.5)	1.000
4c. Performance of hygiene procedures took >4 hrs in any shift.	-	-	-	-

to be continued

Continuation of Table 2

NAS Item at Admission	Total	Older Adults	Young Adults	*p*-value*
	n (%)	n (%)	n (%)	
5. Care of drains, all (except gastric tube).	84 (100.0)	46 (54.8)	38 (45.2)	0.717
6a. Performing mobilization and positioning procedure(s) up to three times per 24 hrs.	69 (100.0)	29 (42.0)	40 (58.0)	**0.009**
6b. Performing mobilization and positioning procedure(s) more frequently than 3 times per 24 hrs, or with two nurses, any frequency.	417 (100.0)	247 (59.2)	170 (40.8)	**0.009**
6c. Performing mobilization and positioning procedure(s) with three or more nurses, any frequency.	4 (100.0)	1 (25.0)	3 (75.9)	0.321
7a. Support and care of either relatives or patient requiring full dedication for about 1 hr in any shift.	233 (100.0)	156 (67.0)	77 (33.0)	**<0.001**
7b. Support and care of either relatives or patient requiring full dedication for 3 hrs or more in any shift.	3 (100.0)	1 (33.3)	2 (66.7)	0.581
8a. Performing routine administrative and managerial tasks.	76 (100.0)	38 (50.0)	38 (50.0)	0.210
8b. Performing administrative and managerial tasks requiring full dedication for about 2 hrs in any shift.	419 (100.0)	242 (57.8)	177 (42.2)	0.258
8c. Performing administrative and managerial tasks requiring full dedication for about 4 hrs or more of the time in any shift.	4 (100.0)	2 (50.0)	2 (50.0)	1.000
9. Respiratory support: any form of mechanical ventilation/assisted ventilation; spontaneous breathing; supplementary oxygen by any method.	295 (100.0)	168 (56.9)	127 (43.1)	0.926
10. Care of artificial airways: endotracheal tube or tracheostomy cannula.	140 (100.0)	67 (47.9)	73 (52.1)	**0.016**
11. Treatment for improving lung function: thorax physiotherapy, incentive spirometry, inhalation therapy, intratracheal suctioning.	256 (100.0)	161 (62.9)	95 (37.1)	**0.005**
12. Vasoactive medication, disregard type and dose.	185 (100.0)	109 (58.9)	76 (41.1)	0.454
13. Intravenous replacement of large fluid losses. Fluid administration >3 L/m^2/day, irrespective of type of fluid administered.	3 (100.0)	1 (33.3)	2 (66.7)	0.582
14. Left atrium monitoring: pulmonary artery catheter with or without cardiac output measurement.	-	-	-	-
15.Cardiopulmonary resuscitation after arrest, in the past period of 24 hrs (single precordial thump not included).	1 (100.0)	0 (0.0)	1 (100.0)	0.433
16. Hemofiltration techniques, dialysis techniques.	36 (100.0)	13 (36.1)	23 (63.9)	**0.014**
17. Quantitative urine output measurement (e.g., by indwelling urinary catheter).	473 (100.0)	274 (57.9)	199 (42.1)	**0.012**
18. Measurement of intracranial pressure	6 (100.0)	3 (50.0)	3 (50.0)	1.000
19. Treatment of complicated metabolic acidosis/alkalosis.	6 (100.0)	2 (33.3)	4 (66.7)	0.410
20. Intravenous hyperalimentation.	8 (100.0)	6 (75.0)	2 (25.0)	0.476
21. Enteral feeding through gastric tube or other gastrointestinal route (e.g., jejunostomy).	45 (100.0)	26 (57.8)	19 (42.2)	1.000
22. Specific intervention(s) in the intensive care unit.	155 (100.0)	158 (62.0)	97 (38.0)	**0.018**
23. Specific interventions outside the intensive care unit: surgery or diagnostic procedures.	85 (100.0)	44 (51.8)	41 (48.2)	0.337

*Fisher´s exact test

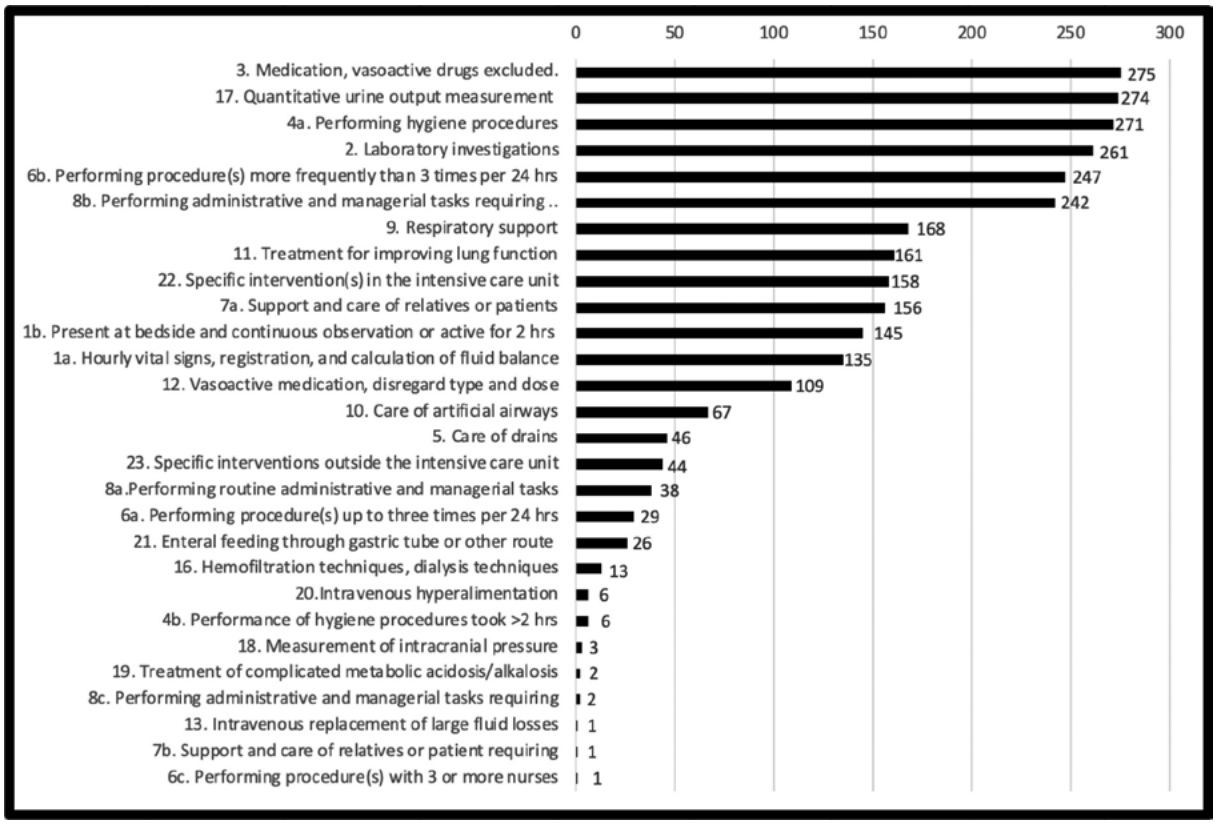

Figure 1. Distribution of frequency of activities required by older adult group. São Paulo, 2020.

Table 3. Multivariate analysis of chance of occurrence of NAS interventions in older adult ICU patients – São Paulo city, São Paulo state, 2020.

NAS Category	Activity		OR	95%CI	*p*-value
Basic Activity	1a	Hourly vital signs, registration, and calculation of fluid balance	1.970	1.360-2.850	**<0.001**
	1b	Present at bedside and continuous observation or active for 2 hrs or more in any shift.	0.497	0.343-0.720	0.720
	1c	Present at bedside and active for 4 hrs or more in any shift.	-	-	-
	2	Laboratory, biochemical and microbiological investigations.	1.104	0.554-2.202	0.778
	3	Medication, vasoactive drugs excluded.	1.043	0.277 – 3.930	0.951
	4a	Performing hygiene procedures.	0.571	0.173-1.879	0.356
	4b	Performance of hygiene procedures took >2 hrs in any shift.	0.923	0.278-3.066	0.896
	4c	Performance of hygiene procedures took >4 hrs in any shift.	-	-	-
	5	Care of drains, all (except gastric tube).	0.882	0.552-1.411	0.600
	6a	Performing mobilization and positioning procedure(s) up to three times per 24 hrs.	0.505	0.302-0.846	**0.009**
	6b	Performing procedure(s) more frequently than 3 times per 24 hrs, or with two nurses, any frequency.	1.926	1.178-3.149	**0.009**
	6c	Performing procedure(s) with three or more nurses, any frequency	0.253	0.026-2.452	0.236

to be continued

Continuation of Table 3

NAS Category	Activity		OR	95%CI	*p*-value
Basic Activity	7a	Support and care of either relatives or patient requiring full dedication for about 1 hr in any shift.	2.210	1.535-3.182	**<0.001**
	7b	Support and care of either relatives or patient requiring full dedication for 3 hrs or more in any shift.	0.382	0.340-4.238	0.433
	8a	Performing routine administrative and managerial tasks.	0.731	0.448-1.193	0.211
	8b	Performing administrative and managerial tasks requiring full dedication for about 2 hrs in any shift.	1.324	0.809-2.166	0.264
	8c	Performing administrative and managerial tasks requiring full dedication for about 4 hrs or more of the time in any shift.	0.766	0.107-5.484	0.791
Ventilatory Support	9	Respiratory support: any form of mechanical ventilation/assisted ventilation; spontaneous breathing; supplementary oxygen by any method.	1.039	0.724-1.493	0.834
	10	Care of artificial airways: endotracheal tube or tracheostomy cannula.	0.615	0.415-0.912	0.015
	11	Treatment for improving lung function: thorax physiotherapy, incentive spirometry, inhalation therapy, intratracheal suctioning.	1.709	1.194-2.446	**0.003**
Cardiovascular Support	12	Vasoactive medication, disregard type and dose.	1.166	0.806-1.685	0.415
	13	Intravenous replacement of large fluid losses. Fluid administration >3 L/m2/day, irrespective of type of fluid administered.	0.383	0.035-4.253	0.435
	14	Left atrium monitoring: pulmonary artery catheter with or without cardiac output measurement.	-	-	-
	15	Cardiopulmonary resuscitation in past period of 24 hrs (single precordial thump not included).	0.000	0.000	0.995
Renal Support	16	Hemofiltration techniques, dialysis techniques.	0.406	0.201-0.823	**0.012**
	17	Quantitative urine output measurement (e.g., by indwelling urinary catheter).	3.425	1.306-8.982	**0.012**
Neurologic Support	18	Measurement of intracranial pressure.	0.765	0.153-3.830	0.745
Metabolic Support	19	Treatment of complicated metabolic acidosis/alkalosis.	0.379	0.069-2.091	0.266
	20	Intravenous hyperalimentation.	2.332	0.466-11.670	0.303
	21	Enteral feeding through gastric tube or other gastrointestinal route (e.g., jejunostomy).	1.056	0.568-1.963	0.863
Specific Interventions	22	Specific intervention(s) in the intensive care unit.	1.546	1.081-2.211	**0.017**
	23	Specific interventions outside the intensive care unit: surgery or diagnostic procedures.	0.791	0.495-1.264	0.327

Independent variable entered into model (age ≥ 60 years). # items not required by older participants in the sample

DISCUSSION

The present study compared the workload of the nursing team in older adult versus young adult patients in the intensive care unit (ICU), identifying the care activities most required by the group of older patients, together with the odds ratio of the occurrence of these activities in this group.

The results revealed that severity on the SAPS3 and workload on the NAS were significantly greater in the group of older adults compared to the group of young adults. No difference in length of ICU stay between the two age groups was found.

For NAS items, a significant group difference in frequency of interventions was identified for the items: Monitoring and titration; Mobility and positioning; Support and care of relatives or patient; Treatment for improving lung function; Quantitative urine output measurement; and Specific intervention in the intensive care unit. The interventions involving medications, hygiene care and urinary output procedures were more frequently required by the older adults group.

Given that prognostic indexes measure the severity of the population treated at a given unit, identifying acute and chronic physiological disarrangement on admission, coupled with the greater physical frailty of the older population which has specificities inherent to senescence and senility that contribute to higher disease severity, it follows that older individuals will typically have higher SAPS3 scores.

In the present study, a positive correlation between disease severity and consequent increased nursing workload was found, impacting length of ICU stay in the group of older adults. Similar SAPS 3 results were found in previous studies of older populations, reporting mean severity scores of 48.9[10] and 50.9[11], respectively. However, earlier studies investigating the relationship between workload and patient severity employed the SAPS2,[5,7,12], precluding meaningful comparison of results.

The NAS items (1a) measuring vital signs and (2) laboratory, biochemical and microbiological investigations, were more frequent in the older adult group than the young adult group. It is important to bear in mind that the aging process is accompanied by morphological and physiological changes in all systems of the body, with progressive loss of functioning. Thus, performing more targeted monitoring of biochemical and microbiological tests in older people can show lower levels of decline in the clinical condition[13].

The item administration of Medication, vasoactive drugs excluded, was performed more frequently in the older group. These findings were similar to those of another casuistic, in which the most frequently scored activities among the NAS categories were Medications use, Quantitative urine output measurement, and Hygiene procedures[14]. The role of medications in hospitalized older people regarding the aspects cited can be explained by the fact that polypharmacy is common in these individuals[15].

The greater frequency of performing Hygiene procedures in older patients is explained by the multimorbidity commonly seen in this population and contributing to progressive loss of autonomy in performing basic and instrument activities of daily living. Consequently, when older individuals are hospitalized in ICUs, they have higher demand for Hygiene procedure and Care of drains and catheters[13].

The greater consumption of nursing time for Care of relatives by older patients is explained by the previous dependence on care provided by caregivers and relatives, corroborating the results of a previous study showing this NAS item was required by 100% of the participants assessed[16].

A similar result was found for items related to Mobilization and Ventilatory support. This situation can be attributed to the growing global burden of disability in older people due to biological decline, posing major care challenges[13] . These conclusions are supported by other studies. A study performed at a university hospital in the city of São Paulo investigating the correlation of nursing workload with body mass index in critical patients, found probabilities of $p<0.007$ and $p<0.047$ for Mobilization and Ventilatory support, respectively. In another study, the item Ventilatory support was cited by 90% of the total study sample[14,17,18].

The statistically significant group difference in Specific interventions in the ICU between the older and young adult patients can be explained by advancements in technology, with a broader therapeutic arsenal available for care delivery, particularly with regard to monitoring vital signs and replacement therapies administered, ultimately extending life expectancy. A study comparing workload using the NAS in a sample of critical older patients who experienced adverse events during the hospital stay found that 73.4% of all participants underwent these same interventions[19].

Regarding renal support care, there is generally a higher prevalence of renal injury in ICU patients, as demonstrated in a study conducted at a university hospital in Rio de Janeiro, where 87% of participants required renal support interventions. This evidence highlights age as a risk factor for development of acute renal injury, with a major impact on morbidity-mortality in this patient group[20].

Patients presenting with greater severity, comorbidities and organ dysfunctions at admission tended to have longer ICU stays and were more prone to readmission, according to associated clinical conditions and risk factors identified. Older age proved a relevant factor predicting higher nursing workload. The use of the NAS score provides an analysis of care indicators which helps promote effective targeted quality nursing care while also safeguarding the health of staff[21].

To achieve this, it is important to maintain nursing team staffing levels in the ICU so as to ensure quality and safety in care delivery, tailored to the specificities of each age group. This is especially the case In meeting the demands arising from the aging process, with its specificities in terms of autonomy and independence.

Many studies are underway to help control the demands placed on the nursing team for more targeted intervention-based procedures where, in the not-so-distant future, technologies such as Humanoid Nursing Robot (HNRs) will become available, reducing nursing workloads as measured by the NAS. Currently, technology providers are developing robots that can meet the universal demands for health technology, making way for human care that centers on human relations allied with technological care that provides measurements, such as vital signs, rehabilitation and exercises, alert to the ethical and safety issues of the individual as critical factors involved in the new precepts being researched[22].

Thus, the results of the present study add to the body of evidence, showing that nursing workload was high for care delivered to older patients compared to younger individuals. Moreover, as measured by the NAS, there was no statistical group difference in the use of therapeutic resources between older and younger patients. This suggests that calibrating the nurse team both qualitatively and quantitatively, using the NAS as an indicator of workload, is key to providing healthcare that is both safe and beneficial for patients.

Assuring quality care requires knowledge of the profile of the patient and the main risks and complications, particularly in the older population, given the high probability of this group presenting significant physiological changes in a short timeframe within ICUs[23]. Consistent with this observation, the present analysis of these probabilities revealed that nursing workload for the items Basic activities, Support of relatives and other activities commonly associated with a greater level of dependence, were more likely to be performed in the older patient group.

This study has some limitations, such as not controlling for covariables in the results of the multivariate analysis, the retrospective approach for NAS completion, and involvement of a patient population with a mixed disease profile, potentially leading to selection bias. Nevertheless, this factor was minimized by the multi-center nature of the study and uniform data collection by the same researcher.

Lastly, study strengths include the results and discussion sections, which add to the knowledge in clinical practice and research, providing evidence on the nursing workload dedicated to ICU patients of different age groups in hospitals from both public and private sectors. This evidence can help inform health care management, provide continued Improvement in services, and promote care delivery with an emphasis on patient safety through adequate nursing team staffing, underpinning the practice of evidence-based nursing.

CONCLUSION

Taken together, the study results show that the older patient population is associated with a higher workload for nursing teams in ICUs. This correlation is evidenced by scores on the NAS items, with significantly higher care requirements in the Basic activities category, associated with greater severity at admission and longer ICU stay in the older population compared with young adults. A similar profile was identified in the calculation of odds of occurrence of nursing activities in this older population group, with emphasis on Quantitative urine output measurement and Intravenous hyperalimentation. Studies analyzing the care requirements and workload in older individuals stratified into different age groups are important to validate the quality of care and to implement improvements in the care delivered.

AUTHOR CONTRIBUTIONS

- Joathan B. Ribeiro – conception and design; data analysis and interpretation; writing of article or its critical review; approval of final draft for publication; overseeing all aspects of the study; and vouching for any issues related to the accuracy or integrity of any part of the study.
- Francine J. Lopes – conception and design; data analysis and interpretation; and writing of article or its critical review.
- Ana Carolina de L. Barbosa – data analysis and interpretation; and writing of article or its critical review.
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