

Nursing workload in the post-anesthesia care unit

Carga de trabalho de enfermagem em unidade de recuperação pós-anestésica

Luciana Bjorklund de Lima¹

Eneida Rejane Rabelo¹

Keywords

Nursing staff; Nursing care;
Perioperative nursing; Workload;
Severity of illness index

Descritores

Recursos humanos de enfermagem;
Cuidados de enfermagem; Enfermagem
perioperatória; Carga de trabalho;
Índice de gravidade de doença

Submitted

October 17, 2011

Accepted

February 21, 2013

Corresponding author

Eneida Rejane Rabelo
São Manoel street, 963, Porto Alegre,
RS, Brazil. Zip Code: 90620-110
eneidarabelo@gmail.com

Abstract

Objectives: To assess nursing workload in the post-anesthesia care unit and its potential correlations with a surgical severity index, length of stay, magnitude of surgery, and patient age.

Methods: Cross-sectional study conducted at a university hospital. Workload was assessed by the Nursing Activities Score, and severity of illness, by the Simplified Acute Physiology Score II. Both were assessed at the time of discharge from the unit.

Results: The study sample comprised 160 patients (mean age, 57 ± 15 years). The median nursing workload was 45.6 minutes per hour, i.e. 50% of patients required 45.6 minutes of nursing care per hour spent in the post-anesthesia care unit. There was no association between workload and severity index. However, there were positive correlations among workload, length of stay, and magnitude of surgery. The severity of illness was correlated with age.

Conclusion: Nursing workload in the post-anesthesia care unit is influenced by length of stay and magnitude of surgery.

Resumo

Objetivos: Avaliar a carga de trabalho de enfermagem em unidade de recuperação pós-anestésica e relacionar com o índice de gravidade cirúrgico, tempo de permanência, porte cirúrgico e idade.

Métodos: Estudo transversal conduzido em hospital universitário. A carga de trabalho foi avaliada pelo *Nursing Activities Score* e o índice de gravidade pelo *Simplified Acute Physiology Score II* aplicados na alta da unidade de recuperação.

Resultados: Foram incluídos 160 pacientes, idade média 57 ± 15 anos. A carga de trabalho para 50% dos pacientes foi de 45,6 minutos a cada hora de permanência na unidade. Não houve relação entre carga de trabalho e índice de gravidade. Contudo, houve correlações positivas entre carga de trabalho, tempo de permanência e porte cirúrgico. O índice de gravidade apresentou correlação com a idade.

Conclusão: A carga de trabalho de enfermagem em unidade de recuperação pós-anestésica sofre influência do tempo de permanência e do porte cirúrgico.

¹Escola de Enfermagem, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil.

Conflicts of interest: the authors have no conflicts of interest to declare.

Introduction

The purpose of the post-anesthesia care unit is to provide immediate postoperative care to patients who have received general and/or regional anesthesia. During this time, nursing care focuses on monitoring the return of consciousness, the recovery of airway protective reflexes and the stability of vital signs. The post-anesthesia care unit has a series of unique characteristics and routines, and often hosts patients requiring high-complexity care.⁽¹⁾

The profile of patients admitted to the post-anesthesia care unit determines the degree of surveillance required to prevent or mitigate complications. In a study designed to identify the most prevalent complications at a post-anesthesia care unit and their potential correlations with nursing interventions and the presence of nurses in the unit, pain and hypothermia were found to be among the most common complications. The nursing interventions correlated with pain were routine care (cardiac rhythm and vital signs monitoring, safety surveillance, monitoring and assessment of physical and emotional state), oxygen therapy, medication administration, and wound care. Presence of a nurse at the unit was associated with immediate detection of pain, nausea, vomiting, agitation, anxiety, and bleeding. The results of this study highlight the importance of the nursing team in the prevention and management of postoperative complications and provides insight into the nursing activities carried out in the post-anesthesia recovery setting.⁽¹⁾

Surgical complications may be associated with clinical variables, the complexity of surgery, or operative time;⁽¹⁻³⁾ these aspects may, in turn, lead to an increase in nursing workload. Studies confirm that the nursing workload in the post-anesthesia care unit is greater when more severely ill patients are present and when the number of adverse events is higher.^(2,3)

Although the postoperative needs of surgical patients are well known, there has been little research into the time spent on provision of postoperative care. In the Brazilian context, knowledge

of the adequacy of nursing workload as a function of patient needs in the post-anesthesia care unit is still incipient. A greater knowledge of this topic by nurses can play a relevant role in care planning, nurse staffing, and use of technological resources so as to ensure delivery of safe, proactive postoperative care. From this perspective, the present study sought to assess nursing workload at a post-anesthesia care unit and its potential correlations with a surgical severity index, length of stay, magnitude of surgery, and patient age.

Methods

This was a cross-sectional study conducted at the post-anesthesia care unit of a public teaching hospital in Porto Alegre, state of Rio Grande do Sul, Brazil, between July 2008 and September 2009.

Sample size was calculated for a significance level of 0.05, a statistical power of 95%, and an alpha of 5%. These parameters were based on previous studies of the Nursing Activities Score (NAS) in an intensive care unit setting,⁽⁴⁻⁶⁾ and yielded a sample size of 160 patients.

The sample comprised adult patients (age ≥ 18 years) who had undergone elective surgical procedures requiring anesthesia. Patients who underwent outpatient surgery, required local anesthesia and/or sedation alone, or had a length of post-anesthesia care unit stay ≤ 1 hour were excluded. Patients were recruited by simple random sampling of the hospital's surgical schedule. Patients were selected from the schedule by age and procedure and assessed for the inclusion and exclusion criteria. After this screening stage, patients were randomly selected by chart number (or initials when the chart number was absent). Data collection was carried out every other day, Monday through Friday, throughout the study period.

The instrument used for assessment of nursing workload per patient was the NAS,⁽⁷⁾ in its validated Brazilian Portuguese version.⁽⁶⁾ The NAS instrument covers a set of 23 activities with predefined scores, and the final score represents the percentage of time spent on nursing care of

a particular patient over a 24-hour period. Each point corresponds to 14.4 minutes of nursing care, and the total NAS score may range from 0% to 100% or more. A score of 100% means that the patient requires the exclusive attention of one nurse per shift.^(5,7) For use of the NAS instrument at the study unit, we developed a tutorial for scoring of the nursing activities carried out in a post-anesthesia care unit setting.^(5,8,9)

The Simplified Acute Physiology Score II (SAPS II) was used for assessment of surgical severity. The SAPS II uses 34 physiological variables (not considering primary diagnosis) to assess the risk of in-hospital mortality, and has been widely used in clinical research to assess risk of death in intensive care unit patients.⁽⁹⁾

Data was collected on patient age, sex, American Society of Anesthesiologists (ASA) class, type of anesthesia, surgical service, magnitude of surgery, length of post-anesthesia care unit stay, and patient disposition after post-anesthesia care unit discharge.

Clinical and demographic data were collected by the lead investigator and by a trained nurse intern. The nursing workload and severity instruments were administered by the lead investigator.

The first stage of data collection was sample identification and characterization. Information on ASA class was obtained from anesthesia records completed by the anesthesiologist. Data for nursing workload and severity index calculation were obtained at the time of patient discharge from the study unit. Data were obtained by a review of laboratory test results in electronic medical records, analysis of nursing notes completed in the immediate postoperative period, and direct observation of each patient at the time of instrument administration.

All analyses were performed in the SPSS® (Statistical Package for the Social Sciences) 17.0 software environments. Categorical variables were expressed as absolute or relative frequencies, and continuous variables, as mean \pm standard deviation or median and interquartile range as appropriate. Pearson's correlation coefficient was used to test for correlation between NAS scores and

SAPS II severity index, patient age, magnitude of surgery, and length of post-anesthesia care unit stay. P-values < 0.05 were considered significant.

All study procedures were carried out in accordance with Brazilian and international ethical standards for human subjects research.

Results

The study sample comprised 160 patients, with a mean age of 57 ± 15 years, 81 (50.6%) of whom were female and 79 (49.4%) male; 103 (64.4%) were classified as ASA class 2. The most common type of anesthesia was general ($n=97$, 60.6%). The most prevalent surgical services were urology, general surgery, digestive system surgery, and thoracic surgery, in this order. The mean SAPS II score was 14.3 ± 7.7 , and the most common magnitude of surgery was class 2. The median length of PACU stay was 4.83 (3.43 – 6.72) hours, and 99.4% of patients were discharged to inpatient units or wards. These results are summarized in table 1.

The nursing workload per patient was calculated proportionally according to length of stay at the post-anesthesia care unit. The median nursing workload per patient was 76.2 (interquartile range, 70.47 – 84.6) points, corresponding to a median 3.68 hours of nursing care to meet the needs of up to 50% of the sample. There was no correlation between workload per patient and severity index.

Table 2 shows correlations between the variables of interest – age, length of post-anesthesia care unit stay, magnitude of surgery – and nursing workload and severity score. Nursing workload was strongly correlated with length of stay, whereas disease severity was strongly correlated with age. Magnitude of surgery was moderately correlated with nursing workload.

Discussion

The present study was designed to assess nursing workload in a post-anesthesia care unit and its po

Tabela 1. Características clínicas e demográficas

Characteristics	n(%)
Sex	
Female	81(50.6)
Male	79(49.4)
American Society of Anesthesiologists (ASA) class†(n%)‡	
ASA 1	20(12.5)
ASA 2	103(64.4)
ASA 3	36(22.5)
Not classified	1(0.6)
Type of anesthesia	
General	97(60.6)
Regional (epidural and/or subarachnoid blockade)	26(16.3)
General + regional (epidural and/or subarachnoid blockade)	37(23.1)
Surgical service	
Urology	26(16.2)
General surgery	23(14.4)
Digestive system surgery	21(13.1)
Thoracic surgery	16(10)
Orthopedic surgery	14(8.8)
Ear/nose/throat	14(8.8)
Obstetrics/gynecology	13(8.0)
Colorectal surgery	11(6.9)
Breast surgery	8(5)
Vascular surgery	7(4.4)
Neurosurgery	4(2.5)
Plastic surgery	3(1.9)
Magnitude of surgery	
1	33(20.6)
2	85(53.1)
3	35(21.9)
4	7(4.4)
Patient disposition after PACU discharge	
Inpatient unit/ward	159(99.4)
Intensive care unit	1(0.6)

Legend: n=160; Age (years) 57±15; Mean ± standard deviation; †No patients were classified as ASA 4, 5 and 6; ‡Median (interquartile range); Simplified Acute Physiology Score II (SAPS II) 14.3±7.7; Severity index SAPS II±1.7% (0.6% – 3.7%); Length of stay at PACU (hours)± 4.83(3.43 – 6.72)

Tabela 2. Correlação entre variáveis do estudo e instrumentos selecionados

Variable	NAS		SAPS severity index II	
	R*	p-value	R*	p-value
Age	0.133	0.094	0.508	<0.001
Length of stay	0.797	<0.001	0.165	0.037
Magnitude of surgery	0.419	<0.001	-0.019	0.814

Legend: Pearson's correlation coefficient

tential correlations with severity score, length of stay, magnitude of surgery, and age.

The severity scores found herein were lower than those reported elsewhere. A study of nursing workload and severity in patients status post cardiac surgery reported SAPS II scores of 26±11 points, with a severity index of 10.65%.⁽⁵⁾ In the post-anesthesia care unit of a Greek hospital, the mean severity index as measured by the SAPS II was 29.7%±18.8.⁽²⁾ In both studies, there was a statistically significant association between severity and nursing workload.^(2,5)

In the present study, there was no correlation between nursing workload as measured by the NAS and SAPS II severity index. These findings are consistent with the collected data, in that most patients remained clinically stable and were transferred to inpatient units. We infer that these results reflect the specificity of the post-anesthesia recovery room as a unit for the transition period between awakening from anesthesia and recovery of normal vital parameters, with a view to transfer to admission units/wards or hospital discharge.

Although nearly 100% of patients were discharged to inpatient units, the mean length of post-anesthesia care unit stay was quite prolonged. The need for clinical management of postoperative adverse events (such as nausea, vomiting, pain) and situations such as waiting for reassessment by the surgical team prior to post-anesthesia care unit discharge may have contributed to these findings. All adverse event management activities have an impact on nursing workload, as nursing interventions must be reassessed for effectiveness.^(1,10)

In the present study, there was no significant correlation between workload and patient age. Sim-

ilar findings have been reported by other investigators.^(11,12) Conversely, there was a strong correlation between age and severity score. A study conducted at the intensive care unit of a nonprofit hospital in the state of Paraná assessed patient severity by means of the APACHE II score. The results showed that patients over the age of 60 years were more likely to have comorbidities.⁽¹³⁾

A study conducted at the intensive care unit of a university hospital in São Paulo assessed differences in nursing workload (NAS) and severity (SAPS II) among elderly and non-elderly patients. The authors found that nursing workload was no different among elderly patients of different age ranges, but patients aged 80 or older had the highest severity indices (66.7%). One may conclude that these patients exhibited more severe clinical instability, as most were admitted to the ICU for management of respiratory conditions.⁽¹⁴⁾

Furthermore, the need for intensive or high-dependency care to restore patient stability entails a greater number of nursing interventions⁽¹⁾ and, consequently, a heavier workload. It bears stressing that, in the immediate postoperative period, older adults require closer surveillance of vital signs (particularly respiratory parameters), more intensive pain management, and are more dependent on the nursing staff for positioning and emotional support.

The present investigation revealed a strong correlation between requiring longer nursing care hours and length of post-anesthesia care unit stay. The results of a study that assessed the daily progression of nursing workload in the intensive care unit of a teaching hospital in São Paulo with the NAS instrument showed that patients with longer unit stays are more demanding in terms of nursing workload.⁽¹¹⁾

A previous Brazilian study assessed the level of dependence on nursing care and its association with patient severity in the post-anesthesia care unit of a general university hospital. The results showed a high prevalence of patients classified as requiring intermediate or high-dependency care. The median length of stay was 4.08 (3.00 – 4.91) hours for minimally dependent patients, 4.26 (3.19 – 6.00) for patients requiring intermediate care, 5.50 (4.10 –

12.58) hours for patients requiring high-dependency care, and 16.91 (8.58 – 18.79) hours for those requiring intensive care.⁽¹⁵⁾

These results corroborate the findings of the present study, showing that, even after the critical first hour after surgery has passed, patients still require surveillance and other nursing interventions.⁽¹⁾ Once airway protective reflexes and consciousness have returned, patients require verbal management to establish a therapeutic relationship with their care providers. The purpose of verbal contact in this setting is to provide emotional support. Patients also require pharmacological and non-pharmacological management of acute pain, care of bodily functions (feeding and excretion), and mobilization in accordance with postoperative restrictions.

The moderate correlation between magnitude of surgery and nursing workload identified in this study suggests that patients who undergo prolonged surgical procedures and prolonged anesthesia require more time-intensive nursing care in the postoperative period. In this study, magnitude of surgery was classified according to the duration of operating room use.⁽¹⁶⁾ Class 1, 0–2h; class 2, 2h01min–4h; class 3, 4h01min–6h; and class 4, >6h01min.⁽¹⁶⁾

A study conducted at a United States hospital assessed dependent factors for post-anesthesia care unit length of stay, with a focus on operative time and duration of anesthesia. Of 340 patients assessed, 35% had an operative time of >2 hours, and 38% had a duration of anesthesia of >3 hours. Duration of anesthesia correlated significantly with delays in patient discharge from the post-anesthesia care unit, and, consequently, had an impact on length of unit stay and nursing workload.⁽¹⁷⁾

Prolonged anesthesia and operative time predispose patients to hypothermia, pain and cutaneous lesions associated with surgical positioning and increase the risk of hemodynamic and respiratory instability due to exposure to higher doses of anesthetic agents.⁽¹⁾ On detection of these instabilities, nursing staff must immediately attempt to minimize complications. One highly time-intensive intervention is inspection of the patient's skin for areas of hyperemia, burns, or loss of cutaneous

sensation that may be associated with surgical or anesthetic complications. Furthermore, these patients require strict monitoring and surveillance of vital signs, as events such as hypothermia and pain trigger major physiological changes, with the potential for hypoventilation and heart failure.^(1,18) Furthermore, recording of vital signs and nursing notes requires discipline and responsibility, as these records enable monitoring of patient progress in the postoperative period.

Data on workload will enable planning of nurse staffing levels for this specialized setting. The post-anesthesia care unit has a number of specificities as compared with other hospital units. Post-anesthesia care unit processes and procedures are distinguished – particularly as compared with those of the intensive care unit – by the high patient turnover of post-anesthesia care and by the need for extremely agile decision-making to address postoperative complications.^(1,18)

In the present study, workload was calculated proportionally in relation to length of post-anesthesia care unit stay. This calculation may differ from mean NAS score over a 24-hour period, but the findings obtained are nevertheless indicative of a substantial nursing workload.

In spite of the differences between intensive care and post-anesthesia care, the present study showed, that, with each hour in the unit, 50% of patients will require 45.6 minutes of nursing care. For a length of stay of 3 to 6 hours, 2.28 to 4.56 hours of nursing care will be expended on a single patient respectively; this information is highly relevant to planning and management of nursing care in the post-anesthesia setting. These results, taken together with other useful data – such as degree of patient dependence, safe staffing requirements, and productive time – enable quantitative calculation of optimal nurse staffing levels for the post-anesthesia care unit.

From the results of this study, we infer that nursing workload per patient in the post-anesthesia care unit setting is influenced by length of stay and magnitude of surgery. Knowledge of these factors by nursing teams may help apportion human and technological resources for better care of postoperative patients.

Conclusion

The median nursing workload (for 50% of patients) at the post-anesthesia care unit where this study was conducted was 45.6 minutes per hour of unit stay.

Nursing workload did not correlate with surgical severity index. However, there was a strong correlation between nursing workload and length of stay at the post-anesthesia care unit, and a moderate correlation between nursing workload and magnitude of surgery. Severity scores correlated moderately with age.

In short, nursing workload in the post-anesthesia care unit setting is influenced by length of stay and magnitude of surgery.

Acknowledgements

Financial support for this study was provided by Fundo de Incentivo à Pesquisa e Eventos (FIPE) do Hospital de Clínicas de Porto Alegre, RS, Brazil.

Collaborations

Lima LB and Rabelo ER contributed equally to study conception and design, data analysis and interpretation, manuscript preparation, and critical revision of the manuscript for important intellectual content. Both authors gave final approval of the version to be published.

References

1. Popov DC, Peniche AC. Nurse interventions and the complications in the post-anesthesia recovery room. *Rev Esc Enferm USP*. 2009;43(4):946-54.
2. Kiekkas P, Pouloupoulou M, Papahatzis A, Androutsopoulou C, Maliouki M, Prinou A. Workload of postanesthesia care unit nurses and intensive care overflow. *Br J Nurs*. 2005;14(8):434-8.
3. Cohen MM, O'Brien-Pallas LL, Copplestone C, Wall R, Porter J, Rose DK. Nursing workload associated with adverse events in the postanesthesia care unit. *Anesthesiology*. 1999;91(6):1882-90.
4. Conishi RM, Gaidzinski RR. Evaluation of the Nursing Activities Score (NAS) as a nursing workload measurement tool in an adult ICU. *Rev Esc Enferm USP*. 2007;41(3):346-54.
5. Dias MC. Aplicação do Nursing Activities Score – N. A. S. – como instrumento de medida de carga de trabalho em enfermagem em UTI cirúrgica cardiológica [dissertação]. São Paulo: Universidade de São Paulo, Escola de Enfermagem; 2006 [citado 2013 Feb 20]. Disponível em: <http://www.teses.usp.br/teses/disponiveis/7/7131/tde-17102006-131800/pt-br.php>.

6. Queijo AF, Padilha KG. Nursing Activities Score (NAS): cross-cultural adaptation and validation to portuguese language. *Rev Esc Enferm USP*. 2009;43(Esp):1018-25.
7. Miranda DR, Nap R, de Rijk A, Schaufeli W, Iapichino G; TISS Working Group. Therapeutic Intervention Scoring System. Nursing activities score. *Crit Care Med*. 2003;31(2):374-82.
8. Nursing Activities Scores: instructions for use. *Crit Care Med* [Internet] [cited 2009 Dec 28]. Available from: http://download.lww.com/wolterskluwer_vitalstream_com/PermaLink/CCM/A/00003246-920030200-00001.pdf
9. Bochembuzio L. Avaliação do instrumento Nursing Activities Score (NAS) em neonatologia [tese]. São Paulo: Universidade de São Paulo, Escola de Enfermagem; 2007. [citado 2013 Mar 5]. Disponível em: <http://www.teses.usp.br/teses/disponiveis/7/7136/tde-23012008-134656/pt-br.php>
10. Kiekkas P, Pouloupoulou M, Papahatzi A, Androutsopoulou C, Maliouki M, Prinou A. Nursing activities and use of time in the postanesthesia care unit. *J Perianesth Nurs*. 2005;20(5):311-22.
11. Gonçalves LA, Garcia PC, Toffoleto MC, Telles SC, Padilha KG. The need for nursing care in Intensive Care Units: daily patient assessment according to the Nursing Activities Score (NAS). *Rev Bras Enferm*. 2006;59(1):56-60.
12. Gonçalves LA, Padilha KG. Factors associated with nursing workload in adult intensive care units. *Rev Esc Enferm USP*. 2007;41(4):645-52.
13. Freitas ER. Profile and severity of the patients of intensive care units: prospective application of the APACHE II index. *Rev Latinoam Enferm*. 2010;18(3):317-23.
14. Sousa CR, Gonçalves LA, Toffoleto MC, Leão K, Padilha KG. Predictors of nursing workload in elderly patients admitted to intensive care units. *Rev Latinoam Enferm*. 2008;16(2):218-23.
15. Lima LB, Borges D, Costa S, Rabelo ER. Classification of patients according to the degree of dependence on nursing care and illness severity in a post-anesthesia care unit. *Rev Latinoam Enferm*. 2010;18(5):881-7.
16. Possari JF, Gaidzinski RR. Dimensionamento de pessoal de enfermagem em centro cirúrgico no período transoperatório: estudo das horas de assistência, segundo o porte cirúrgico. *Rev SOBECC*. 2003;8:16-25.
17. Waddle JP, Evers AS, Piccirillo JF. Postanesthesia care unit length of stay: quantifying and assessing dependent factors. *Anesth Analg*. 1998;87:628-33.
18. Cunha AL, Peniche AC. Content validity of an instrument to document recovery of patients in post anesthesia care unit. *Acta Paul Enferm*. 2007;20(2):151-60.