RESEARCH | PESQUISA

Comparison of Nursing dependency levels and sizing between clinical and surgical inpatient units

Comparação do nível de dependência de Enfermagem e dimensionamento entre unidades de internação clínica e cirúrgica

Comparación del nivel de dependencia de Enfermería y dimensionamiento entre unidades clínicas de hospitalidad y quirúrgico

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ABSTRACT

Objective: to compare the level of dependence on nursing care and staffing between clinical and surgical inpatient units. **Method:** This is a descriptive, retrospective study carried out in four inpatient units of a large university hospital in southern Brazil. A total of 7,486 patient classification records were included between January and October 2022. Descriptive statistical analysis, demand for nursing hours, staff projections, and the chi-square test were used. **Results:** Intermediate care (40.2%) and semi-intensive care (40.8%) patients prevailed, with a difference between the units (p-value<0.001). There was a shortage of nurses in all the units. In one clinical unit, the projected number of nursing technicians/assistants was the same as the number available (n=46). In two units, there was a slight to moderate surplus of mid-level staff. The surgical inpatient unit with the best classification rate (92.3%) showed the greatest discrepancy between the prescribed and actual sizing. **Conclusion and implications for practice:** the units were highly dependent on nursing care. When also considering occupancy rates and adherence to patient classification, it is plausible that one of the clinical units has the highest demand for care.

Keywords: Nursing Assistance; Sizing; Nursing Team; Personnel Management; Inpatient Care Units.

RESUMO

Objetivo: comparar o nível de dependência dos cuidados de Enfermagem e o dimensionamento de pessoal entre unidades de internação clínica e cirúrgica. **Método:** estudo descritivo e retrospectivo, realizado em quatro unidades de internação de um hospital universitário de grande porte do sul do Brasil. Foram incluídos 7.486 registros da classificação dos pacientes entre janeiro e outubro de 2022. Empregou-se a análise estatística descritiva, demanda de horas de Enfermagem, projeção de pessoal e teste qui-quadrado. **Resultados:** prevaleceram os pacientes de cuidados intermediários (40,2%) e semi-intensivos (40,8%), com diferença entre as unidades (p-valor<0,001). Em todas as unidades verificou-se o *déficit* de enfermeiros. Em uma unidade clínica, o quadro de técnicos/auxiliares de Enfermagem projetado era igual ao disponível (n=46). Em duas unidades, verificou-se um discreto a moderado *superávit* de pessoal de nível médio. A unidade de internação cirúrgica que teve a melhor taxa de classificação (92,3%) apresentou maior discrepância entre o dimensionamento prescrito e o real. **Conclusão e implicações para prática:** as unidades apresentaram uma elevada dependência do cuidado de Enfermagem. Ao considerar também as taxas de ocupação e de adesão à classificação de pacientes, é plausível que uma das unidades clínicas tenha a maior demanda de cuidados.

Palavras-chave: Assistência de Enfermagem; Dimensionamento; Equipe de Enfermagem; Gestão de Recursos Humanos; Unidades de Internação.

RESUMEN

Objetivo: comparar el nivel de dependencia de los cuidados de Enfermería y el dimensionamiento de personal entre las unidades de hospitalización clínica y quirúrgica. **Método:** estudio descriptivo y retrospectivo, realizado en cuatro unidades de hospitalización de un gran hospital universitario del sur de Brasil. Se incluyeron datos de 7.486 registros de clasificación de pacientes entre enero y octubre de 2022. Se utilizaron análisis estadísticos descriptivos, demanda de horas de Enfermería y proyección de personal, además de comparación mediante la prueba de Chi-cuadrado entre unidades. **Resultados:** predominaron los pacientes de cuidados intermedios (40,2%) y semi-intensivos (40,8%), con diferencia entre unidades (p-valor<0,001). En todas las unidades había escasez de enfermeros. En una unidad clínica, el número de técnicos/auxiliares de Enfermería proyectados era igual al disponible (n=46). En dos unidades, hubo un excedente de leve a moderado de personal de nivel medio. La unidad de hospitalización quirúrgica que tuvo la mejor tasa de clasificación (92.3%) tuvo la mayor discrepancia entre el tamaño prescrito y el real. **Conclusión e implicaciones para la práctica:** las unidades mostraron alta dependencia de los cuidados de Enfermería. Sin embargo, considerando también los índices de ocupación y la adherencia a la clasificación de los pacientes, es posible que una de las unidades clínicas presente la mayor demanda de atención.

Palabras clave: Asistencia de Enfermería; Dimensionamiento; Grupo de Enfermería; Administración de Personal; Unidades de Internación.

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INTRODUCTION

In the management of nursing care and services, the use of means and instruments that rationalize the work process and have repercussions on the qualification of care is a necessity. With the increase in demand and, consequently, the dependence of patients on nursing care, it is necessary to use tools to dimension the team's staff, which determines the quantity and quality of workers expected to meet the needs of nursing care.[1]

In the context of human resource management in hospital nursing, the use of Patient Classification Systems (PCS) and/or instruments that make it possible to measure workload are indispensable to support staff sizing during the 24 hours of uninterrupted work in hospitalization units.[2-5] PCSs are understood as a systematic way of determining the degree/level of dependence of clients on the nursing team, intending to establish the time needed for (in)direct care and, consequently, providing a basis for the nursing staff planned for this demand.[6] This management tool is important so that nurses can plan the number of professionals on their team, as well as favor the management of direct and individualized care since it helps to identify the patient's care needs during hospitalization.[3]

PCSs are instruments that are commonly used among clients who are hospitalized, even though it is recognized that there is a need to overcome this scenario concerning means that can significantly determine the time needed for nursing activities.[6] Although it is undeniable that the use of PCSs is the basic basis for sizing hospital nursing staff, it is known that the differences between prescribed and actual work, in terms of planning nursing staff, still prevail in many contexts.[1,3,7]

Internationally, the measurement of nursing workload in medical-surgical inpatient units is based on patient classification tools, in addition to the patient/professional relationship and expert judgment.[8-10] This is not so different in Brazil,[1,3,7] but it is known that, unlike more developed countries, the panorama of staffing in Brazilian nursing, in addition to being potentially problematic, is also very diffuse, recognizing the undeniable continental and widely unequal characteristic of the country. In addition to discussing the situation of nursing human capital provision in contrast to the international scenario, it is important to learn more about the level of patient dependency and the relationship between nursing staff sizing and the actual availability of workers in different units of the same institution, as this can lead to improvements in the quality of care by enhancing the assertiveness of any staff reallocation processes. The aim of this study was to compare the level of dependence on nursing care and staffing levels between clinical and surgical inpatient units.

METHOD

This was a descriptive, retrospective, and quantitative study carried out in four inpatient units at a large university hospital in southern Brazil. Of the units surveyed, two were for clinical admissions and two were surgical units. The choice of these sectors was intentional and was due to the fact that each unit consisted of 45 beds totally linked to the Unified Health System (UHS), which was interpreted as a positive factor for the comparability foreseen in the research objective.

Despite the identical number of beds, the patient profile - an element that correlates with dependency on care, the object of this study - of the units surveyed is not the same. The clinical inpatient sectors (henceforth referred to as Clinical Unit "A" and "B"), are an institutional reference for oncology care, among other clinical specialties (Clinical Unit A); and, it includes special care beds for post-stroke care, as well as patients being monitored by cardiac telemetry and pulmonology patients, among other clinics (Clinical Unit B).

On the other hand, the surgical inpatient sectors, also randomly called Surgical Units "A" and "B", are references for the care of patients after orthopedic surgery, among other general surgeries (Surgical Unit A). The Surgical Unit (Surgical Unit B) cares for patients after general surgery: digestive system, cardiovascular, peripheral vascular, thoracic, plastic, trauma, coloproctology, neurology, urology, gynecology, otorhinolaryngology, mastology, and ophthalmology. The difference in care profile was not considered a bias in this study, as it corresponds precisely to its scope/object.

Data from the classification records of patients admitted to these units from January to October 2022 was included, depending on the availability of access to the data. There was no sampling, as the data from all patient classifications in the time frame were recruited. Thus, the study was based on the natural eligibility criterion of the record's presence in the electronic system used at the survey hospital.

The data was collected from electronic spreadsheets that recorded the classification of hospitalized patients in the inpatient units of the hospital investigated, which are stored in a virtual cube in the Business Analytics Strategic Intelligence (BASE)® software and are managed by a working group of nurses responsible for actions related to the classification of patients in the hospital. This same software provided the occupancy rate data for the units in the time frame of the research.

Classification takes place in the last week of each month, from Monday to Friday, as predicted by a feasibility study.[11] The study period therefore covered 50 days of classification, which is longer than the minimum recommended (n=30) by scholars in the field of hospital nursing staff sizing.[1,12]

The classification is carried out by the unit's nurses, who have been duly trained for this purpose by the aforementioned working group and is done by applying Perroca's Patient Classification System (PCS). This PCS has nine patient assessment indicators, namely: planning and coordination of the care process; investigation and monitoring; body care and eliminations; skin and mucous membrane care; nutrition and hydration; locomotion and activity; therapy; emotional support and health education.[13]

Each indicator has four score levels that determine the patient's dependence on nursing care. The sum of the indicator scores places the patient in one of the following categories/levels of care dependency: Minimal Care (nine to 12 points); Intermediate Care (13 to 18 points); Semi-Intensive Care (19 to 24 points), and Intensive Care (25 to 36 points).[13]

The data was transferred from the institutional storage software to Microsoft Office Excel® spreadsheets and analyzed using descriptive and inferential statistics, as well as calculations specific to the methodology for sizing nursing staff in Brazil.[2]

The spreadsheet recording the classifications shows the average number of patients in each stratum of the PCS Perroca, which is the product of the sum of the classifications in each stratum divided by the number of evaluation days, in the case of this study, 50 days. With this average, the demand for nursing hours was calculated, according to the parameters established by Resolution 543/2017 of the Federal Nursing Council (COFEN), and, consequently, the dimensioned staff of the units was estimated using the equation and the parameters of demand for nursing hours/day by level of dependence of the PCS; and the distribution of the team between nurses and nursing technicians/assistants, according to the same regulation.[2] The technical safety index used was 15%, which is the minimum stipulated by current Brazilian regulations;[2] and the working hours of the nursing team considered was 36 hours per week, in accordance with the contractual regime of the majority of nursing workers in the field of study.

Another analysis carried out was the calculation of the patient classification rate, which was carried out by reversing the occupancy rate (%) of each unit, previously provided by an institutional database; and, subsequently, it is possible to deduce the classification rate (%) in a simple proportion over the sum of classified patients and the occupancy reverted from proportion to number of patients.

Once the nursing staff of the four inpatient units had been dimensioned, the available (so-called "real") workforce was acquired using data from the hospital's personnel management sector, and this was used to compare the dimensioned and real staff, in comparison to the proportional (%).

The chi-square test in conjunction with the analysis of the adjusted residuals was used to assess the association between the variables. The chi-square adjustment test was applied to compare the actual with the scaled. The significance level adopted was 5% ($p \leq 0.05$) and the analyses were carried out using the Statistical Package for the Social Sciences (SPSS) version 28.0.

The matrix project that housed this study complied with national standards for ethics in research involving human beings and was approved by the Research Ethics Committee of the surveyed hospital, under opinion no. 4.932.314/2021 and CAAE registration: 47595221.5.0000.5327.

RESULTS

The study compiled data from 7,486 classified inpatients across the four survey units. The nursing care dependency profile, by unit, is shown in Table 1, which illustrates the higher proportions of intermediate and semi-intensive care demand.

Table 2 describes the demand for nursing hours in each unit surveyed, which were deducted according to the average number of patients per day and the national parameters in force.

The total demand for nursing hours in each inpatient unit made it possible to project the staffing levels, which are duly compared between the units and related to the number of workers available in each sector (Table 3).

Table 1. Frequency of level of dependence on nursing care, by clinical or surgical hospitalization unit. Porto Alegre (RS), Brazil, 2022.

Inpatient Unit	Total n (%)	Minimal Care n (%)	Intermediate Care n (%)	Semi-intensive Care n (%)	Intensive Care n (%)	p-value
			Level of dependence on nursing care			
Clinic A	2,001 (100%)	205 (10.2%*)	868 (43.4%*)	786 (39.3%)	142 (7.1%)	
Clinic B	1,897 (100%)	83 (4.4%)	642 (33.8%)	810 (42.7%)	362 (19.1%*)	
Surgical A	1,681 (100%)	147 (8.7%*)	955 (56.8%*)	519 (30.9%)	60 (3.6%)	p<0.001*
Surgical B	1,907 (100%)	49 (2.6%)	541 (28.4%)	946 (49.6%*)	371 (19.5%*)	
General	7,486	484 (6.5%)	3,006 (40.2%)	3,061 (40.9%)	935 (12.5%)	

Source: Author's elaboration. Survey data. * Statistically significant association using the adjusted residuals test at a 5% significance level.

Table 2. Average daily number of patients, demand for nursing hours according to level of dependence on nursing care, occupancy rates, and patient classification, by clinical or surgical hospitalization unit. Porto Alegre (RS), Brazil, 2022.

Inpatient Unit	Minimal Care Average number of Patients (Nursing Hours)	Intermediate Care Average number of Patients (Nursing Hours)	Semi-intensive Care Average number of Patients (Nursing Hours)	Intensive Care Average number of Patients (Nursing Hours)	Total	OccupancyRate (%)	Classification Rate (%)
		Level of dependence on nursing care					
Clinic A	3.3 (13.2)	13.8 (55.2)	12.5 (125)	2.3 (41.4)	31,9 (234.8)	(98%)	(72.3%)
Clinic B	1.5 (6)	11.9 (71.4)	15.2 (152)	6.8 (122.4)	35.4 (351.8)	(95%)	(82.9%)
Surgical A	2.8 (11.2)	18 (108)	9.8 (98)	1.1 (19.8)	31.7 (237)	(85%)	(82.9%)
Surgical B	1 (4)	10.6 (63.6)	18.5 (185)	7.3 (131.4)	37.4 (384)	(90%)	(92.3%)

Source: Author's elaboration. Survey data.

Table 3. Comparison of nursing staff sizing in clinical and surgical hospitalization units. Porto Alegre (RS), Brazil, 2022.

| Inpatient Unit | Nursing staff sizing | | | | | | | | |
| | Nursing Staff Board | | | Nursing Technician/Assistant Staff Board | | | General Staff Board | | |
	Real n (%)	Sized n (%)	p-value	Real n (%)	Sized n (%)	p-value	Real n (%)	Sized n (%)	p-value
Clinic A	16 (72.72%)	22 (100%)	p=0.020	44 (141,93%)	31 (100%)	p=0.020	60 (113.20%)	53 (100%)	p<0.001
Clinic B	15 (45.45%)	33 (100%)	p=0.007	46 (100%)	46 (100%)	p=0.007	61 (77.21%)	79 (100%)	p<0.001
Surgical A	14 (82.35%)	17 (100%)	p=0.194	44 (122,22%)	36 (100%)	p=0.194	58 (109.43%)	53 (100%)	p<0.001
Surgical B	15 (41.66%)	36 (100%)	p=0.013	43 (86%)	50 (100%)	p=0.013	58 (67.44%)	86 (100%)	p<0.001

Source: Author's elaboration. Survey data.

DISCUSSION

It was found that patients dependent on intermediate and semi-intensive care prevailed in the clinical and surgical inpatient units evaluated. In contrast to these findings, research carried out in Brazilian university hospitals has found a high prevalence of patients dependent on minimal and intermediate care.[1,4,14-16] This may mean that the hospital serves a highly dependent clientele, given the complexity of the care it provides.

The clinical B and surgical B units had a higher number of patients classified as semi-intensive and intensive, which may be related to the high turnover of patients, which results in a higher number of admissions; a higher incidence of devices, such as bladder catheters, naso-enteral tubes, drains, ileostomies, among others; the performance of more complex dressings and a higher occurrence of patients traveling to perform exams and procedures within the institution. All of this necessarily involves a greater number of professionals involved, in addition to the time spent on each piece of care, increasing the degree of complexity of these patients.

In studies that have found a significant prevalence of high dependency and semi-intensive care patients, minimal care patients are still the majority.[17-19] In this study, minimal care-dependent patients had the lowest prevalence. The proportion of intensive care patients was also high compared to other Brazilian studies, which usually emphasized the presence of patients in this category in clinical inpatient units.[1,14]

It can be hypothesized that the high dependency of patients is a consequence of the post-pandemic period. Some international studies conducted during and after the COVID-19 pandemic have theorized that the clinical severity of patients with chronic non-communicable diseases has increased as a result of the lack of treatment during the isolation period. This phenomenon may influence the absence of patients who require minimal care in the units evaluated.[20-23] Another point that deserves to be taken into account is the very high complexity of the hospital institution surveyed, which implies the admission of more dependent patients than in hospitals with a lower technological density.

Concerning the demand for care, the average number of nursing hours was higher for semi-intensive care in three of the units evaluated. Only surgical unit A had a higher average number of hours for intermediate care, a consequence of the lower complexity of care found in this sector. In the same vein, researchers in the state of Sergipe compared the nursing workload between clinical and surgical patients in intensive care units and identified a lower workload for surgical patients, explained by comorbidities and the high length of stay of clinical patients.[24]

In contrast to the aforementioned study,[24] surgical unit B had the highest demand for nursing hours of all the units evaluated, which can be explained by the fact that in this unit adherence to patient classification was higher than in the others (92.3%), i.e. this factor may have had more of an impact on the workload than on the patient care profile. This result is a contribution of the research, as it clearly demonstrates that non-adherence to patient classification can have repercussions on inaccurate planning of the nursing workforce, which is undoubtedly a problem.

Despite the above, it is important that leaders provide the means for nurses to classify hospitalized patients, as this activity will also require time from their role since the process of classifying a patient requires knowledge of the individual's previous 24-hour clinical status.[11,13] There are various reasons for non-adherence to patient classification: hospitalizations shorter than 24 hours; the patient's absence from the unit at the time scheduled for classification, due to a diagnostic-therapeutic procedure, followed by a communication failure to proceed with classification at another time; or even the loss of data in the computerized system. In addition, the nurse's own workload may be a contributing factor to the low adherence to this process, explained, for example, by the fact that the unit with the highest occupancy rate was the one with the lowest classification rate.

Increased workload for nursing staff affects the quality of their work and consequently reduces patient safety. It is known that a high workload can lead to an increase in the number of falls, infections resulting from invasive procedures, and the length of stay of patients, increasing their risk of death.[1,25-26] In addition, a high workload worsens the team's working environment and can have a negative impact on the health of nursing workers.[1]

In order to maintain the nursing workload at functional levels, the professional staff must be aligned with the demand for tasks; therefore, sizing is an important tool for maintaining the quality of care and patient safety, but it does not dispense with the nurses' critical look at the distribution and equation of activities in the management of care.[27] Bringing this allusion to the findings of this study, it is clear that looking at the demand for hours, the occupancy rate, the classification rate, and the staff projection itself are the basis for more assertive decision-making, but they do not invalidate the view of nurses who work directly in the labor dynamics of the clinical and surgical sectors.

Based on the demand for nursing hours and the application of the PCS, the sizing of only one surgical unit (unit A) required the distribution of 33% of the nurses in the team, due to the greater demand for intermediate care. The other units had 42% nurses, due to the prevalent demand for semi-intensive care. This finding reiterates the high demand for care from patients who, according to current national regulations, should be assisted by professionals with a higher level of training.[2]

In all the units, there was a deficit in the number of nurses available, compared to the ideal sizing, a phenomenon corroborated by several other Brazilian studies carried out in different regions.[1,4,14-16] This reality is probably related to a rationalist view of reducing costs by paying higher-level staff.[28-29]

A study carried out in South Korea compared units with a high number of professionals (seven patients per nurse) versus units with a lower workforce (17 patients per nurse) to examine the effects of nursing staff on the outcome of omitted care.[30] Seven of the 24 elements of nursing care were omitted significantly less often in units with a higher number of workers, namely: turning, mouth care, bathing/skin care, patient assessments on each shift, assistance with toileting, feeding, and meal preparation. The authors therefore concluded that an increase in the number of nurses was associated with an improvement in care.[30]

A study carried out in Chile highlighted the negative implications of the nursing workload on patient safety, with the main impacts being an increase in the risk of death, length of stay, and chance of hospital readmission. Although adjusting the number of nursing professionals will increase operating costs, investing in staff can help to reduce the costs resulting from negative patient care outcomes due to insufficient numbers and/or quality of professionals, contributing to the quality of the services provided and improving patient satisfaction.[26]

The cost of nursing staff absenteeism, often directly related to work overload due to understaffing, is also highly costly for healthcare organizations, as evidenced by a survey carried out in 35 public healthcare institutions in the states of São Paulo and Minas Gerais, during the COVID-19 pandemic.[31]

Regarding the number of nursing technicians/assistants, a surplus was identified in one clinical unit and one surgical unit, a factor commonly exemplified in the national literature.[16,27-28] This is evidently related to the shortage of nurses and the appropriation of personnel with less training in the nursing teams. Another fact that needs to be taken into account when assessing the surplus is the fact that none of these units achieved 100% compliance with patient classification, which may have resulted in an underestimation of staffing levels.

The bureaucratization and division of nurses' work are relevant factors in sizing. In the Brazilian setting, many nurses can take on a "purely" managerial role, which can signal to senior management that hiring more higher-level professionals may not translate into an increase in manpower for bedside care.[32] Thus, depending on the demands of the unit and the institution's division of labor, increasing the number of nursing technicians becomes advantageous to the detriment of adapting the nursing staff.

An important point to be discussed is the fact that, although there is a discrepancy between the demand for nursing work between the units, potentially explained by the difference in the patient classification rate, the allocation/distribution of staff is, in short, very similar. In other words, the "real" number of nursing staff in both clinical and surgical units - all with the same number of beds - is very similar. This reinforces the fact that the distribution of nursing staff in hospitals is still an intuitive managerial activity that is not based on evidence, either on the profile of the clientele or even on the simple occupation of the sectors.

CONCLUSION AND IMPLICATIONS FOR PRACTICE

The conclusion is that, despite the significant differences, all the clinical and surgical units were highly dependent on nursing care.

Among the units studied, adherence to patient classification seems to have a greater influence on the projection of nursing staff than "just" the complexity of care. However, considering that one of the clinical units projected a similar number of staff to the surgical unit with the highest rate of adherence to patient classification, it is possible that this clinical unit was the one with the highest demand for nursing care. Added to the fact that this sector had a higher occupancy rate than the surgical units, the combination of this information could be valuable for planning the distribution of the nursing workforce in hospitalization for clinical and surgical adults.

It was found that staff sizing indicated the need to readjust the number of nurses per unit, as these professionals are trained to make decisions, manage, and provide direct care to highly dependent clients. To this end, it is also necessary to review the work processes assigned to each member of the team, in short, the greater proximity of the nurse in the provision of direct care.

This study has the inherent limitation of analyzing secondary data and the impossibility of generalizing data. Nevertheless, it is believed that the study contributes to the advancement of knowledge in the field of nursing management, especially as it demonstrates that nurses' awareness of the application of the PCS has repercussions on staff forecasting in hospitalization units. Another aspect that the study can contribute to, albeit indirectly, is the need for nursing management to be better equipped in the staff distribution process, using concise information and also the experience of nurses, since it seems that empiricism still prevails in this process.

AUTHORS' CONTRIBUTIONS

Approval of the article's final version. João Lucas Campos de Oliveira. Nicole Hertzog Rodrigues. Aline Marques Acosta. Rúbia Guimarães Ribeiro. Thiane Mergen. Aline Rodrigues da Silva.

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REFERENCES

1. Oliveira JLC, Maia MCW, Magalhães AMM, Moraes RMR, Santarem MD, Aquino TLO et al. Benchmarking de indicadores de qualidade e dimensionamento de pessoal de enfermagem entre unidades hospitalares. Rev Baiana Enferm. 2020 Sep;34:e37756. http://dx.doi.org/10.18471/rbe.v34.37756.

2. Resolução nº 543 de 18 de abril de 2017 (BR). Trata dos conceitos e metodologia de cálculo de pessoal de enfermagem. Diário Oficial da União [Internet], Brasília (DF), 8 May 2017 [cited 2023 Jun 28]. Available from: http://www.cofen.gov.br/wp-content/uploads/2017/05/Resolu%C3%A7%C3%A3o-543-2017-ANEXO-I.pdf

3. Vasconcelos RO, Rigo DFH, Marques LGS, Nicola AL, Tonini NS, Oliveira JLC. Dimensioning of hospital nursing personnel: study with brazilian official parameters of 2004 and 2017. Esc Anna Nery. 2017 Oct;21(4):e20170098. http://dx.doi.org/10.1590/2177-9465-ean-2017-0098.

4. Vicente C, Amante LN, Sebold LF, Girondi JBR, Martins T, Salum NC et al. Nursing staffing in a surgical hospitalization unit: a descriptive study. Cogit Enferm. 2021;26:e72640. http://dx.doi.org/10.5380/ce.v26i0.72640.

5. Manzan LO, Contim D, Raponi MBG, Pan R, Resende IL, Pereira GA. Levels of care complexity classification of patients in an oncology hospital. Esc Anna Nery. 2022 Jun;26:e20210450. http://dx.doi.org/10.1590/2177-9465-ean-2021-0450en.

6. Oliveira JLC, Cucolo DF, Magalhães AMM, Perroca MG. Beyond patient classification: the "hidden" face of nursing workload. Rev Esc Enferm USP. 2022 Jun;56:e20210533. http://dx.doi.org/10.1590/1980-220x-reeusp-2021-0533pt. PMid:35730716.

7. Maziero ECS, Teixeira FFR, Cruz EDA, Matsuda LM, Sarquis LMM. Nursing staff sizing in pediatric intensive care units: workload versus legislation. Cogit Enferm. 2020;25:e64058. http://dx.doi.org/10.5380/ce.v25i0.64058.

8. Ko Y, Park B. Calculating the optimal number of nurses based on nursing intensity by patient classification groups in general units in South Korea: a cross-sectional study. Nurs Open. 2023 Jun;10(6):3982-91. http://dx.doi.org/10.1002/nop2.1657. PMid:36852629.

9. Ko Y, Park B. Integrative literature review of patient classification tools for nursing intensity evaluation: focusing on comparison of South Korean and international tools. Nurs Open. 2021 Sep;8(5):2105-16. http://dx.doi.org/10.1002/nop2.757. PMid:33389824.

10. Ko Y, Park B, Lee H, Kim D. Developing and testing a Korean patient classification system for general wards based on nursing intensity. Nurs Open. 2021 Jul;8(4):1870-8. http://dx.doi.org/10.1002/nop2.845. PMid:33690973.

11. Macedo ABT, Souza SBC, Funcke LB, Magalhães AMM, Riboldi CO. Systematization of an instrument for patient classification in a teaching hospital. Rev Min Enferm. 2018 Jan;22:e-1152. http://dx.doi.org/10.5935/1415-2762.20180073.

12. Fugulin FMT, Gaidzinski RR, Lima AFC. Dimensionamento de pessoal de enfermagem em instituições de saúde. In: Kurcgant P, editor. Gerenciamento em enfermagem. 3rd ed. Rio de Janeiro: Guanabara Koogan; 2016. p. 121-35.

13. Perroca MG. Development and content validity of the new version of a patient classification instrument. Rev Lat Am Enfermagem. 2011 Jan/Feb;19(1):58-66. http://dx.doi.org/10.1590/S0104-11692011000100009. PMid:21412630.

14. Moraes RMR, Nishiyama JAP, Báo ACP, Costa FM, Aldabe LN, Oliveira JLC. Sizing of nursing staff in clinical, surgical and pediatric hospitalization units. Texto Contexto Enferm. 2021 Sep;30:e20200377. http://dx.doi.org/10.1590/1980-265x-tce-2020-0377.

15. Sell BT, Amante LN, Martins T, Sell CT, Senna CVA, Loccioni MFL. Dimensioning of nursing professionals and the occurrence of adverse events on surgical admission. Cienc Cuid Saude. 2018 Jan/Mar;17(1):1-7. http://dx.doi.org/10.4025/cienccuidsaude.v17i1.33213.

16. Siqueira LDC, Santos MC, Calmon ITS, Siqueira Jr PC. Dimensionamento de profissionais de enfermagem da clínica médica de um hospital universitário. Enferm Foco. 2019;10(4):35-40. http://dx.doi.org/10.21675/2357-707X.2019.v10.n4.2179.

17. Fernandes LS, Fernandes GAB, Reis VN, Gazola PRF, Dutra HS. Avaliação da complexidade da assistência de enfermagem em unidade de internação clínica. Rev Enferm Atual In Derme. 2022 Sep;96(39):1-12. http://dx.doi.org/10.31011/reaid-2022-v.96-n.39-art.1396.

18. Vandresen L, Pires DEP, Lorenzetti J, Andrade SR. Classification of patients and nursing staff's sizing: contributions of a management technology. Rev Gaúcha Enferm. 2018 Aug;39:e2017-0107. http://dx.doi.org/10.1590/1983-1447.2018.2017-0107. PMid:30088597.

19. Lorenzetti J, Gelbcke FL, Vandresen L. Management technology for hospital inpatient care units. Texto Contexto Enferm. 2016 Jul;25(2):1-11. http://dx.doi.org/10.1590/0104-07072016001770015.

20. Chan AHY, Horne R. Preventing a post-pandemic double burden of disease in the COVID-19 pandemic. Glob Adv Health Med. 2021 May;10:1-3. http://dx.doi.org/10.1177/21649561211010137. PMid:34104575.

21. Nehme R, Puchkova A, Parlikad A. A predictive model for the post-pandemic delay in elective treatment. Oper Res Health Care. 2022 Sep;34:100357. http://dx.doi.org/10.1016/j.orhc.2022.100357. PMid:36090954.

22. Baird AM. Re-engaging EU citizens with national screening programmes and cancer diagnosis post-pandemic. Lancet Oncol. 2022 May;23(5):566-7. http://dx.doi.org/10.1016/S1470-2045(22)00090-0. PMid:35489337.

23. Najafi B. Post the pandemic: how will COVID-19 transform diabetic foot disease management? J Diabetes Sci Technol. 2020 Jul;14(4):764-6. http://dx.doi.org/10.1177/1932296820930290. PMid:32517511.

24. Santos APA, Carvalho TA, Soares JPR, Coelho PRLF, Santos ES. Comparison of nursing workload between clinical and surgical intensive care patients. Cogit Enferm. 2021;26:e73689. http://dx.doi.org/10.5380/ce.v26i0.73689.

25. Magalhães AMM, Costa DG, Riboldi CO, Mergen T, Barbosa AS, Moura GMSS. Association between workload of the nursing staff and patient safety outcomes. Rev Esc Enferm USP. 2017 Dec;51:e03255. http://dx.doi.org/10.1590/s1980-220x2016021203255. PMid:29211232.

26. Aiken LH, Simonetti M, Sloane DM, Cerón C, Soto P, Bravo D et al. Hospital nurse staffing and patient outcomes in Chile: a multilevel cross-sectional study. Lancet Glob Health. 2021 Aug;9(8):e1145-53. http://dx.doi.org/10.1016/S2214-109X(21)00209-6. PMid:34224669.

27. Moraes RMR, Lara AC, Remedio EC, Gaiva MAM, Gentilini MM, Oliveira JLC et al. Patient classification and nursing staff dimensioning in a pediatric inpatient unit. Cogit Enferm. 2023 Feb;28:e83871. http://dx.doi.org/10.1590/ce.v28i0.89190.

28. Benites PA, Faiman CJS. A saúde dos profissionais que atuam em Unidades de Terapia Intensiva: uma revisão sistemática. Saúde Ética Justiça. 2022 Jul;27(1):37-50. http://dx.doi.org/10.11606/issn.2317-2770.v27i1p37-50.

29. Oliveira EM, Secco LMD, Figueiredo WB, Padilha KG, Secoli SR. Nursing activities score and the cost of nursing care required and available. Rev Bras Enferm. 2019 Feb;72(Suppl 1):137-42. http://dx.doi.org/10.1590/0034-7167-2017-0655. PMid:30942355.

30. Cho SH, Kim YS, Yeon KN, You SJ, Lee ID. Effects of increasing nurse staffing on missed nursing care. Int Nurs Rev. 2015 Jun;62(2):267-74. http://dx.doi.org/10.1111/inr.12173. PMid:25762430.

31. Betta CA, Silva VCG, Kuratomi SSK, Silva ES, Salvador ME, Nishio EA. Custo do absenteísmo de profissionais da enfermagem durante a pandemia de COVID-19. Rev Paul Enferm. 2022;33(1):A09. http://dx.doi.org/10.33159/25959484.repen.2022v33a09.

32. Souza VS, Inoue KC, Oliveira JLC, Magalhães AMM, Martins EAP, Matsuda LM. Sizing of the nursing staff in adult intensive therapy. Rev Min Enferm. 2018 Jan;22:e-1121. http://dx.doi.org/10.5935/1415-2762.20180056.