

## Analysis of managerial and healthcare indicators after nursing personnel upsizing

*Análise de indicadores gerenciais e assistenciais após adequação de pessoal de enfermagem*  
*Análisis de indicadores gerenciales y de atención posteriores a adecuación de personal de enfermería*

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### ABSTRACT

**Objective:** analyze healthcare and managerial indicators after nursing personnel upsizing. **Method:** a retrospective, descriptive study was conducted using data from computer systems of a university hospital in southern Brazil. Healthcare and managerial indicators related to the first half of 2013 and 2014 were statistically analyzed. **Results:** increases of 40.0% in the number of nurses and 16.0% in the number of nursing technicians led to reductions of 12.0% in the number of sickness absences, 21.8% in positive balance for compensatory time off, 92.0% in paid overtime. Reductions of 75.0% in pressure ulcer rates, 10.5% in the number of falls and 50.0% in infections due to indwelling catheter use were also observed. **Conclusion:** nursing staff upsizing caused a positive impact on managerial and healthcare indicators and helped qualify care and improve work conditions for the nursing team.

**Descriptors:** Hospital Nursing Staff; Absenteeism; Health Care Quality Indicators; Hospital Personnel Administration; Patient Safety.

### RESUMO

**Objetivo:** analisar indicadores assistenciais e gerenciais após adequação do quadro de pessoal de enfermagem. **Método:** estudo descritivo, retrospectivo com dados obtidos dos sistemas de registros informatizados de um hospital universitário do Sul do Brasil. Foram analisados estatisticamente indicadores assistenciais e gerenciais, referentes aos primeiros semestres de 2013 e 2014. **Resultados:** o incremento de 40,0% no número de enfermeiros e 16,0% no número de técnicos de enfermagem resultou na redução de 12,0% no percentual de afastamentos por doença, 21,8% no total do banco de horas excedentes, 92,0% nas horas extras pagas. Houve redução de 75,0% nas taxas de úlcera por pressão, de 10,5% no número de quedas e 50,0% nas infecções por sonda vesical de demora. **Conclusão:** a adequação do quantitativo de pessoal repercutiu positivamente nos indicadores gerenciais e assistenciais, e contribuiu para qualificar o cuidado e melhorar as condições de trabalho da equipe de enfermagem.

**Descritores:** Recursos Humanos de Enfermagem no Hospital; Absenteísmo; Indicadores de Qualidade em Assistência à Saúde; Administração de Recursos Humanos em Hospitais; Segurança do Paciente.

### RESUMEN

**Objetivo:** analizar indicadores gerenciales y de atención luego de adecuación del plantel de personal de enfermería. **Método:** estudio descriptivo, retrospectivo, con datos obtenidos del sistema de registros informáticos de hospital universitario del sur de Brasil. Fueron analizados estadísticamente indicadores gerenciales y de atención correspondientes a los primeros semestres de 2013 y 2014. **Resultados:** el incremento del 40,0% en cantidad de enfermeros y 16,0% de técnicos de enfermería resultó en una reducción del 12,0% del porcentaje de licencias de salud, 21,8% del total del banco de horas excedentes, 92,0% de horas extra

pagas. Hubo reducción del 75,0% en tasas de úlcera por presión, de 10,5% en número de caídas y de 50,0% en infecciones por sonda vesical de demora. **Conclusión:** la adecuación cuantitativa del personal repercutió positivamente en los indicadores gerenciales y de atención, y contribuyó a calificar el cuidado y mejorar las condiciones laborales del equipo de enfermería.

**Descriptores:** Personal de Enfermería en Hospital; Ausentismo; Indicadores de Calidad de la Atención de Salud; Administración de Personal en Hospitales; Seguridad del Paciente.

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## INTRODUCTION

Healthcare and managerial indicators are used by institutions to monitor the services they offer. A favorable performance of these indicators is dependent on factors related to work process, such as human resource planning and nursing workload. These factors are constantly discussed in the literature as essential for the development of safe and high-quality health care and favor the provision of full, individual and humanized care. The importance of adjusting the nursing staff size is reinforced by studies conducted in Brazil and worldwide, which relate workload and nursing human resources planning with patient safety guarantee<sup>(1-6)</sup>.

Lack of planning leads to inadequate distribution of assignments and consequent insufficient nursing staff to fulfill the demands of hospitalized patients, that is, a great challenge to leaderships, as the increased number of patients attributed to the nursing team is associated with increases in adverse events and absenteeism<sup>(4)</sup>.

In this aspect, studies on absenteeism as an indicator of managerial quality are important to evaluate the workload and absence cover requirements and help adjust the nursing staff size and improve service quality<sup>(7)</sup>.

Healthcare quality indicators are also powerful tools for nursing team management, as they show the relevance of a properly sized nursing staff to care qualification to health service users<sup>(8)</sup>. Incidence of pressure ulcer and fall rate are indicators of healthcare quality commonly related to nursing care quality. The analysis and monitoring of these rates allow to identify where the highest rates occur inside an institution, related factors, patients at risk and opportunities for improvement<sup>(9-10)</sup>. Urinary tract infection caused by indwelling catheter is also considered a healthcare quality indicator, as preventive measures are known to reduce the occurrence of this infection<sup>(11)</sup>.

Monitoring of these indicators, combined with an evaluation of workplace and human resources available, allows managers to invest in improvements in the hospital and proper staff sizing, which can have an impact on quality and safety of patient care, and on satisfaction and maintenance of nurses in their workplaces<sup>(2)</sup>.

However, international studies<sup>(12-13)</sup> suggest the developments observed in this field are still insufficient to prevent risks to which patients are exposed in health systems worldwide. These authors recommend new studies should be conducted to allow a more sensitive and precise analysis of the association between workload and its relevance to healthcare quality and reduced patient risks.

A study shows that, when the number of nursing staff is insufficient to fulfill work demands, several tasks are left unperformed to patients, such as comfort, chat, health education and care plan update. The authors concluded that one of the reasons for not performing these tasks is the reduced number of nurses affecting service quality and patient safety<sup>(14)</sup>.

A balance between human resources planning and healthcare quality is still a great challenge to nursing managers. The aforementioned considerations encouraged the development of this study, which analyzed an intervention conducted in a hospital surgery admission unit. In addition, there was no other study in this field on managerial and healthcare alterations, as of December 2013, on nursing personnel upsizing. Therefore, the question that guided this study was: Does nursing personnel upsizing have an impact on managerial and healthcare indicators?

The objective of this study was to analyze managerial and healthcare indicators after nursing personnel upsizing.

## METHOD

### Ethical aspects

This study was conducted in compliance with national and international ethical standards in research involving human subjects<sup>(15)</sup> and its project was approved by the institution's research ethics committee. The authors signed a data use agreement.

### Study design, site and period

This is a retrospective, descriptive study conducted in an admission unit for adult patients of a university hospital in southern Brazil. This unit treats patients from the Brazilian government's health system, for several surgery specialties. Healthcare and managerial indicators related to the first half of 2013 and 2014 (January 16 to July 15 of each year) were statistically analyzed.

This surgery admission unit has 45 beds distributed in 15 rooms with three patients each, two toilets (one men's room and one ladies' room in the corridor). Before the changes in nursing staff, this hospital unit had 10 nurses and 31 nursing technicians distributed in morning, afternoon and night shifts, as well as a special shift for nurses who work on weekends and holidays only, in a 12-hour shift.

The nursing technicians have two day shifts of 6 hours and fifteen minutes each: the morning shift, from 7 am to 1:15 pm, and the afternoon shift, from 1 pm to 7:15 pm. At night, three teams from 7 pm to 7:15 am take turns every 72 hours. The employees work in the same shift and do not take turns among them.

In the day shifts, the proportion before the alteration was one nursing technician to seven patients, and after, it became one technician to six/seven patients. At night, the proportion was one nursing technician to nine patients, and now it is one nursing technician to seven/eight patients.

For the nurses, the proportion in the day shifts was one nurse to 23 patients and, at night, one nurse to 45 patients. After the personnel upsizing, it became one nurse to 15 patients in the day shifts and one nurse to 23 patients at night.

**Data sources: inclusion and exclusion criteria**

The study aimed to evaluate an intervention (number of nursing staff) in relation to healthcare and managerial indicators from the first half of 2013 and 2014. Therefore, all events that occurred were analyzed, with no sample calculation and/or inclusion and exclusion criteria.

**Study protocol**

Data were obtained from records of the institution’s People Management Coordination, Managerial Information System and Occupational Medicine. The following indicators were analyzed: number of sickness absences, number of positive hours for compensatory time off, number of hours from paid overtime, pressure ulcer rate, fall rate, and indwelling catheter infection rate. These indicators were selected because they are institutionally monitored measures and are sensitive to changes in nursing staff, as indicated by prior studies<sup>(4-5)</sup>.

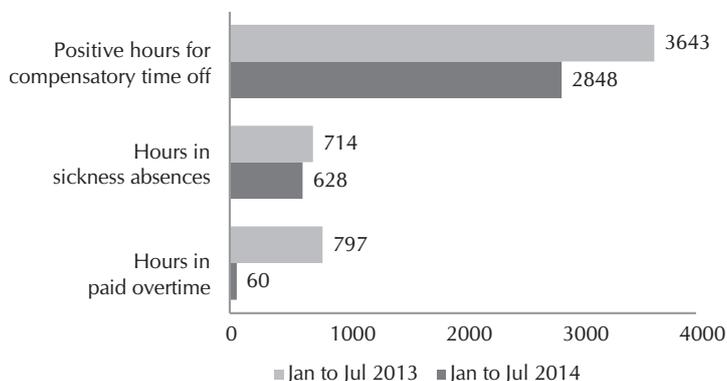
**Analysis of results and statistics**

Statistical data analysis was conducted by means of the Statistical Package for the Social Sciences (SPSS), version 18.0, including simple and relative frequency calculations.

**RESULTS**

The addition of 4 (40%) professionals to the team of nurses and 6 (16%) to the team of nursing technicians, starting in January 2014, resulted in reductions of 12% in the number of sickness absences, 21.8% in positive balance for compensatory time off and 92% in paid overtime (Figure 1).

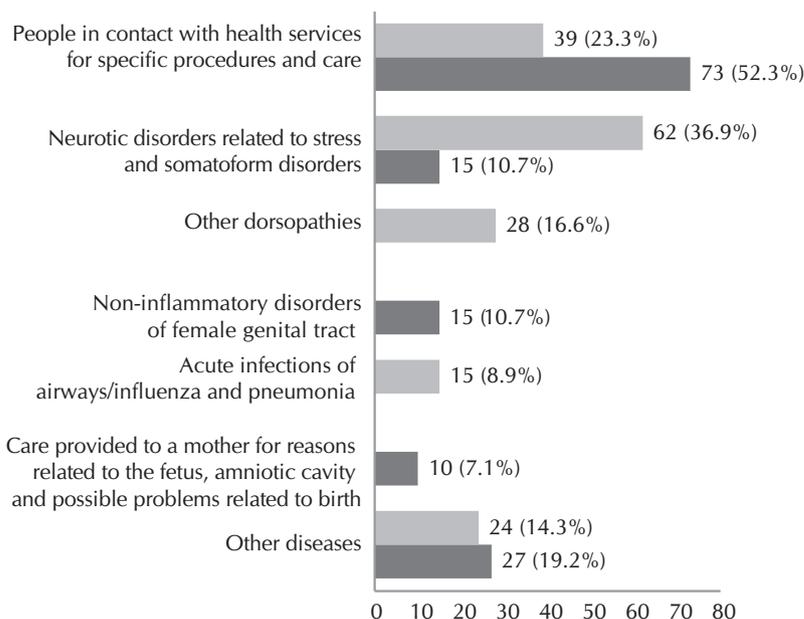
In the last month analyzed in the first half of 2014, due to the Soccer World Cup held in Brazil, the days of Brazil team’s games were optional working days to the nursing professionals. Then, even working their regular hours, they generated positive hours for compensatory time off. This increase was due to an administrative decision of the institution, and not an effective increase of worked hours of the professionals involved.



**Figure 1** – Managerial indicators before and after the change in staff size, Porto Alegre, Rio Grande do Sul, Brazil, 2015

The results showed an important reduction in the number of sickness absences when comparing 2013 to 2014, with contact with health services for specific procedures and care being the most prevalent reason in 2014. In 2013, sickness absences were due to neurotic disorders related to stress and somatoform disorders were the most prevalent, as illustrated in Figure 2.

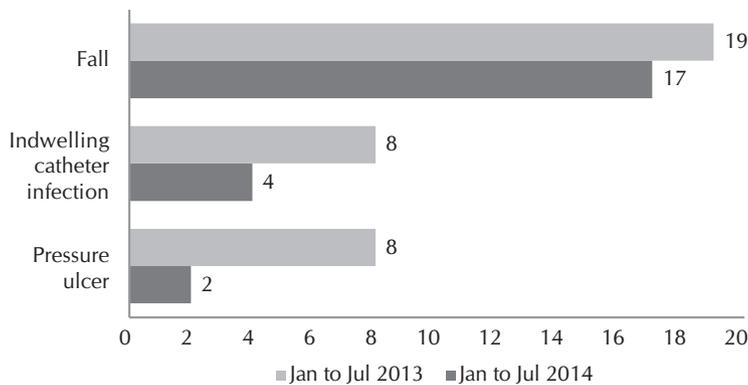
The other diseases that affected the nursing professionals in 2013 were: intestinal infection diseases and other viral diseases (10 cases [6.0%]); diseases affecting the veins, lymphatic vessels and lymph nodes (10 cases [6.0%]); care provided to a mother for reasons related to the fetus, amniotic cavity and possible problems related to birth (3 cases [1.7%]); symptoms and signs related to cognition, perception, emotional state and behavior (1 case [0.6%]).



**Figure 2** – Reasons of sickness absences among nursing professionals, Porto Alegre, Rio Grande do Sul, Brazil, 2013/2014

In 2014, the other diseases that affected the nursing professionals were: other dorsopathies (9 cases [6.4%]); disorders of the conjunctiva (9 cases [6.4%]); acute infections of airways/influenza and pneumonia (5 cases [3.5%]); intestinal infection diseases and other viral diseases (3 cases [2.1%]); and symptoms and signs related to cognition, perception, emotional state and behavior (1 case [0.71%]).

Regarding the prevalence of healthcare indicators, reductions of 75.0% in pressure ulcers, 10.5% in falls and 50.0% in indwelling catheter infections were observed, as illustrated in Figure 3.



**Figure 3** – Healthcare indicators before and after the change in staff number, Porto Alegre, Rio Grande do Sul, Brazil, 2015

## DISCUSSION

The results of this study showed improvements in healthcare and managerial indicators after an increase in personnel. A healthcare process evaluation has been gradually adopted, as process indicators are useful for diagnosis, definition of compliance indexes, definition of goals and planning of activities<sup>(11)</sup>. Improvements in hospital environment and number of staff had an impact on quality and safety of patient care and helped increase the satisfaction and maintenance of professionals in their jobs.

Regarding the managerial indicators, reductions of 92.0% in paid overtime, 12.0% in sickness absences and 21.8% in positive hours for compensatory time off were observed. Excess workload, often a result of working overtime, may be correlated with fatigue, tiredness and reduced attention ability, resulting in potential adverse events<sup>(16-17)</sup>. In this aspect, a reduced workload improves employee satisfaction and may contribute to a more favorable work environment<sup>(18)</sup>. The absence of overtime and better work conditions have an impact on employee appreciation and patient satisfaction regarding the result of services provided.

A study shows that, in some institutions, hours from overtime work become “positive hours for compensatory time off” and are compensated according to the institution’s needs or the employee’s sickness absences<sup>(7)</sup>. In this study, an increase in the nursing personnel allowed to reduce these positive hours and overtime work, contributing to reduced workload of the nursing team and a possible impact on healthcare quality.

A study conducted in 12 European countries showed a

significantly higher number of nurses from shifts of over 12 hours indicating poor healthcare quality, reduced patient safety and increased number of pending assignments than those working in shorter shifts<sup>(19)</sup>. In the institution analyzed in this study, compensatory time off is managed for a 3-month period, and the exceeding hours are preferably compensated as days off. With the nursing personnel upsizing, greater flexibility was observed, allowing days off as requested by the employees, which was perceived by the nursing team as positive.

Regarding sickness absences, the results showed a reduction in the number of days from sickness absences, particularly of employees with neurotic disorders. The literature shows musculoskeletal disorders<sup>(20)</sup>, respiratory system comorbidities<sup>(21)</sup> and mental disorders<sup>(22)</sup> – mainly depression, anxiety and stress-related disorders<sup>(23)</sup> – are the main causes of sickness absences among nursing professionals. Besides, the climate in southern Brazil contributes to respiratory tract diseases<sup>(21)</sup>.

Musculoskeletal disorders may appear as a result of the activities performed by these professionals, which require physical efforts often in inadequate positions and conditions<sup>(20)</sup>. In this aspect, nursing personnel upsizing reduced the number of patients under care of every nursing technician and nurse, allowing the nursing professionals to help each other more often; thus reducing individual physical effort.

The results obtained in this study show a very high number of absences in the group of “contact with health services for specific procedures and care”. The International Classification of Diseases (ICD) is used in medical certificates issued in case of medical appointments, exams and minor procedures. It should be noted that a larger nursing team allowed to plan and ensure elective procedures the professionals had demanded for some time.

Reductions in healthcare indicators, i.e., pressure ulcer, fall and indwelling catheter infection rates, represent improved quality of nursing care, in agreement with the findings of a prior study<sup>(2)</sup>, which showed a larger staff contributed to better healthcare results of patients.

A study conducted with patients hospitalized in clinical and surgical units of a university hospital in southern Brazil observed that, among 188 patients, 10.0% developed pressure ulcer stage II or above. However, only 3% of the cases were notified, indicating underreported data and, consequently, improper use of this tool by nurses<sup>(9)</sup>. In the studied unit, the institutional estimate for pressure ulcer cases is  $\leq 2$  per 1,000 patients, a level kept during all study, and which had a 75.0% reduction after the nursing personnel upsizing.

Fall rates were reduced by 10.5%, which can also be attributed to services of better quality. The analysis of adverse events related to patient fall should take into account the mobilization and incentive to fall records, allowing a more accurate and precise assessment of this indicator. In 2013, fall rates might have been underreported, a fact that would have generated a lower rate in the institution. The results indicate

that, despite more accurate records of falls in 2014, a reduction was observed in the prevalence of this adverse event.

Fall rates in a hospital environment vary with the type of patient and show that old people, people with walking or balance abnormalities, altered level of consciousness and taking specific medication are more likely to fall. A study reported that additions to a team of nursing technicians did not help reduce fall rates, whereas an increase in the number of nurses may be an effective strategy<sup>(24)</sup>. In the context of this study, both teams of nursing technicians and nurses were increased. In this institution, nurses are responsible for implementing the fall prevention protocol, and all the nursing team is committed to patient care. In addition, in the studied period, the institution's goal ( $\leq 2$  per 1,000 patients/day) was achieved, with an improvement in the indicator after the personnel upsizing.

A 50% reduction observed in the indwelling catheter infection rate may be related to the increased number of nursing technicians and nurses. A study<sup>(25)</sup> indicated the need to train the health team on healthcare practices using aseptic techniques and emphasize this device should be used for the shortest possible time to reduce the incidence of infections. It also recommends that institutions should offer hand washing facilities located in strategic places and personal protective equipment, and provide infection indicator assessment and feedback to health teams about such infection rates.

Personnel upsizing, as reported in this study, allows better investments in staff qualification for proper adherence to institutional policies. The institution's goal for indwelling catheter infection in the studied unit was 4.7 per 1,000 procedures/day in 2013 and 3.7 per 1,000 procedures/day in 2014. In 2013, this goal was not achieved – the result was 4.98 per 1,000 procedures/day. However, in the same period in 2014, this goal was achieved (2.61 per 1,000 procedures/day), with improvement in the indicator.

Conducting safe practices is a responsibility of the health team, while supervising health care related to such procedures is a task of nurses, who can perform it in a better way if a properly sized team is available. The literature shows that the average number of days of indwelling catheter use is higher among patients who presented infection, and that using indwelling catheters for the shortest possible time reduces this risk<sup>(25)</sup>. In this aspect, the health team has an important role in the prevention of this type of complication, always dedicating attention to avoid improper handling of these catheters and promptly arranging for immediately removing them<sup>(25)</sup>. In the studied unit, the nurses are instructed to be vigilant on catheter length of use

and talk to the medical teams for reasons for catheter maintenance and/or removal as soon as possible.

Another positive change resulting from this personnel upsizing was the possibility of nurses taking part in intra-hospital commissions, ensuring knowledge acquisition and a feeling of professional appreciation, as this opportunity was offered before and now they could participate.

The authors of a recent study concluded that, to reduce nursing staff turnover, positive solutions should be created and nurses should be involved in the design, implementation and assessment of these actions. In addition, the management should provide changes aiming to improve the performance of nurses<sup>(18)</sup>. Fulfill the needs of the team is a managerial attitude that can generate satisfaction in the workplace.

Nursing personnel upsizing first ensured easier management of days off and reduced conflicts when organizing team scheduling, allowing to hear individual preferences and keep a proper number of professionals to serve patients with quality and safety. In addition, a larger team of nurses improved healthcare supervision and service processes, leading to better healthcare quality results.

Despite the relevance of better results observed in healthcare and managerial indicators after an increase in the number of nursing staff in the studied unit, the limitations of this study – with a cross-sectional design, conducted in a short period and in only one hospitalization unit – should be taken into account.

## CONCLUSION

An analysis of healthcare and managerial indicators allowed to identify the impacts on the studied unit caused by nursing personnel upsizing, which can be used to support future decisions.

Nursing personnel upsizing had positive impacts, with reductions in sickness absenteeism, extra hours for compensatory time off, and overtime work. Absenteeism is an indicator that supports managerial decisions, and interventions to reduce it are required to keep healthcare quality, since an unplanned absence has a direct impact on staff allocation and overtime work to ensure the minimum proportion of patients per professional.

The results obtained from better indicators – such as pressure ulcer, fall and indwelling catheter infection rates – reinforce the importance of properly resizing nursing personnel to ensure patient safety and healthcare quality.

These findings can be used as tools in discussions with healthcare administrators in the development of strategies for properly sized nursing teams, aiming to qualify patient health care and safety and improve workplace conditions.

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