

## Restructuring the Nursing Staff and its Influence on Care Hours

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This descriptive study aimed to calculate and compare the nursing staff at the medical-surgical clinical units of a philanthropic hospital in current and projected situations, and to investigate how much time the nursing team delivers patient care in the current and projected situations. Gaidzinski's method was used to calculate the nursing staff, and the equation proposed by the Hospital Quality Commitment (HQC) to estimate care hours. The findings showed an increase of 33% in the staff, with a 68.4% increase in the number of nurses and 15.6% in the number of technicians / nursing auxiliaries. According to the projected situation, the care hours varied from 5.7 to 7.2. The number of nursing and the mean care time provided to the patients were inadequate according to the clientele's care needs. This could impair the quality of care.

Descriptors: Nursing Staff; Personnel Management; Workload.

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## Reestruturação do quadro de pessoal de enfermagem e seu impacto sobre as horas de assistência

Este estudo descritivo objetivou dimensionar e comparar o quadro de pessoal de enfermagem das unidades de clínica médico-cirúrgica de um hospital filantrópico, nas situações atuais e projetadas, e investigar o tempo de assistência dispensado aos pacientes pela equipe de enfermagem nas duas situações. Utilizou-se, para o dimensionamento, o método proposto por Gaidzinski, e, para o cálculo das horas de assistência, a equação proposta pelo Compromisso com a Qualidade Hospitalar (CQH). Os achados evidenciaram necessidade de acréscimo de 33% no quadro de pessoal, com aumento de 68,4% de enfermeiros e de 15,6% no número de técnicos/auxiliares de enfermagem. Na situação projetada, as horas de assistência variaram de 5,7 a 7,2. O quantitativo de enfermagem e o tempo médio dispensado aos pacientes revelaram-se inadequados às necessidades de atendimento da clientela, podendo comprometer a qualidade da assistência.

Descritores: Recursos Humanos de Enfermagem; Administração de Recursos Humanos; Carga de Trabalho.

## Reestructuración del cuadro de personal de enfermería y su impacto sobre las horas de asistencia

Este estudio descriptivo tuvo por objetivo dimensionar y comparar el cuadro de personal de enfermería de las unidades de clínica médico-quirúrgica de un hospital filantrópico, en las situaciones actuales y proyectadas, e investigar el tiempo de asistencia utilizado en los pacientes por el equipo de enfermería en las dos situaciones. Para dimensionar se utilizó el método propuesto por Gaidzinski, y, para el cálculo de las horas de asistencia, la ecuación propuesta por el Compromiso con la Calidad Hospitalaria (CCH). Lo encontrado colocó en evidencia la necesidad de aumentar en 33% el cuadro de personal, con aumento de 68,4% de enfermeros y de 15,6% en el número de técnicos/auxiliares de enfermería. En la situación proyectada, las horas de asistencia variaron de 5,7 a 7,2. El cuantitativo de enfermería y el tiempo promedio utilizado con los pacientes se revelaron inadecuados para atender las necesidades de la clientela, lo que puede comprometer la calidad de la asistencia.

Descriptorios: Personal de Enfermería; Administración de Personal; Carga de Trabajo.

## Introduction

Continuous quality improvement has permeated work processes in health services. Quality can be defined as a set of attributes that include the level of professional excellence, efficient resource use, patient safety and user satisfaction<sup>(1)</sup>. To measure performance and signal activity irregularities, instruments known as indicators are used. These can be defined as a quantitative measure used to reassess, replan and reorganize activities at a service, offering support for decision making in care management<sup>(2)</sup>.

Another aspect that needs to be taken into account in health service assessment is related to personnel

management. In the quality context, the human dimension is considered as the core of management discussions, as professional satisfaction is of fundamental importance to achieve organizational targets<sup>(3)</sup>.

Quantitative and qualitative nursing staff assessment can be considered an essential management indicator, as it directly interferes in care humanization, health care efficacy and costs. The number of nursing staff makes it possible to determine the time this team spends (care hours) to see to patients' needs, reflecting the care standards health services want to provide<sup>(4)</sup>.

Insufficient nursing staff has negatively influenced patient care quality, resulting in greater risk of adverse events (AE), such as medication errors, health care-related infection, non-programmed removal of probes, drains and catheters, among others<sup>(5-6)</sup>. It also affects patient morbidity and mortality rates and hospitalization time, with ethical-legal implications and high hospital costs<sup>(7-8)</sup>. Work overload can lead to exhaustion and professional dissatisfaction, which increase absenteeism and turnover rates<sup>(7-8)</sup>, jeopardizing the institution's goals and image.

As nurses need to continuously identify the quality of their team's professional practice and use the results found as a management tool for pertinent interventions in work processes<sup>(3)</sup>, the following study objectives were outlined.

**Objectives**

To calculate and compare the nursing staff at the medical-surgical clinical units of a philanthropic hospital in current and projected situations.

To investigate how much time the nursing team delivers patient care in the current and projected situations.

**Method**

This descriptive research was carried out at four medical-surgical clinical units of a philanthropic health institution in the interior of São Paulo State, with a total capacity of 196 beds. The study units represent 60% of installed beds.

Initially, the proposal to restructure the nursing staff was presented to the study institution's administration and nursing management. Next, the project was submitted to the Institutional Review Board, and data collection started after a favorable opinion.

For nursing staff calculations, Gaidzinski's equation<sup>(4)</sup> was used, with three variables: workload, working time and technical safety index (TSI).

The nursing team's workload was measured by using a validated patient classification instrument<sup>(9)</sup>, consisting of 13 care areas. Through this instrument, patients can be classified in one out of four care categories: minimal (13-26 points), intermediary (27-39 points), semi-intensive (40-52 points) and intensive (53-65 points). Standard deviation was added to patients' mean score<sup>(4)</sup>. Nine clinical nurses who worked at the units (five nurses in the morning shift and four in the afternoon shift) applied the instrument in June 2007.

The determination of the number of daily nursing care hours per care type and the distribution of the team per professional category were supported by Brazilian Nursing Council guidelines No 293/04, which fixes and establishes parameters for Nursing Staff Calculation<sup>(10)</sup>. The proportion of the team per predominant workload and 85% of daily work time (6 hours) were considered as productive time<sup>(11)</sup>.

With regard to absences, data were collected retrospectively between January and December 2006, using documents from the Personnel Department (unforeseen absence records) and the monthly scale from the Nursing Department (foreseen absences). Employees admitted until the fifth day and who worked until the 25th day of the month were included, considering a six-hour period for absences or days not worked<sup>(12)</sup>.

To calculate the percentage of foreseen absences, the following were considered: weekly leave, holidays not on Sundays and annual vacation. The sum of unauthorized absences, leaves and suspensions represented the percentage of unforeseen absences. From that point, the TSI was determined, which represents the percentage of professionals to be added to the total number in each category, so as to cover for days of foreseen and unforeseen absences<sup>(11)</sup>.

Nursing team care hours were obtained by applying the equation proposed by the Hospital Quality Commitment Program (HQC)<sup>(13)</sup> for minimal and intermediary care. This equation was chosen due to the high number and diversity of hospitals that participate in this program, which periodically monitor this indicator, so as to allow for greater comparability among findings.

Where

$$Q_k = \sum_k \frac{\sum P_k \cdot (n_j + s_n) \cdot h_j}{t_k \cdot p} \left[ \frac{(1+e) \cdot (1+v) \cdot (1+f) \cdot (1+a_k)}{d-e \quad D-v \quad D-f \quad D-a_k} \right]$$

Where:  
 k = professional category  
 j = dependence level  
 Q<sub>k</sub> = total number of staff members in professional category k  
 P<sub>k</sub> = percentage participation/ professional category k  
 n = average daily number of patients  
 s<sub>n</sub> = standard deviation of mean distribution  
 h = average hours of patient care  
 t = work journey  
 p = proportion of productive time  
 e = days of leave per week  
 d = weekdays  
 v = average vacation per year  
 D = days per year  
 f = number of holidays per year  
 a<sub>k</sub> = annual average of unforeseen absences/professional category k

$$\text{Nurse Hours} = \frac{\text{number of hours delivered per nurse}}{\text{number of patients-day during period}}$$

$$\text{Nurse Tech. and/or Aux. Hours} = \frac{\text{number of hours delivered per Nurse Tech. and/or Aux.}}{\text{number of patients-day during period}}$$

Note: Number of patients-day = sum of number of patients hospitalized per day at each unit over a given period.

To calculate the number of nursing hours per professional category, the number of care hours in a given period was considered, discounting hours not worked, such as: vacation, weekly paid leave, covering for another unit, hour discount, medical leave, late arrival, suspension, unauthorized absence and others. The actual work journey was considered as 5.75 hours (day) and 11 hours (night), discounting resting time in accordance with job legislation. Only the hours of clinical nurses were calculated. To project nursing care hours for the new staff, the number of staff members was divided by 12 months, resulting in the number of professionals on vacation/month.

## Results

At the four medical-surgical clinical units under analysis, 2291 patients/day were classified. The distribution per care category revealed more patients classified as minimal (47.1 to 79.6%) and intermediary care (17.7 to 38.6%), with less patients in the semi-intensive care category (1.9 to 12.3%). Patients were found who demanded intensive care at units IV (0.2%) and VI (2%) (Table 1).

Table 1 – Numerical, percentage and average distributions of patients hospitalized at medical-surgical clinical units, according to nursing care categories between May and June. São José do Rio Preto, 2007

Care categories	Unit I (n=20)	Unit II (n=30)	Unit IV (n=24)	Unit VI (n=41)
Minimal				
N (%)	336 (79.6)	409 (79.4)	360 (72.2)	403 (47.1)
Average	11.2	13.6	12	13.4
Intermediary				
N (%)	78 (18.5)	91 (17.7)	96 (19.2)	330 (38.6)
Average	2.6	3	3.3	11
Semi-intensive				
N (%)	8 (1.9)	15 (2.9)	42 (8.4)	105 (12.3)
Average	0.3	0.5	1.4	3.5
Intensive				
N (%)	-	-	1 (0.2)	17 (2)
Average	-	-	0	0.6
Total				
N (%)	422 (100)	515 (100)	499 (100)	855 (100)
Average	14.1	17.1	16.7	28.5
SD	2	4.3	2.5	4.2
CV (%)	14	25	15	15

The analysis of monthly schedules and Personnel Department documents related to nursing staff absences led to the results below.

### Foreseen absences due to weekly leave

$$E\% = \left( \frac{1}{7 - 1} \right) \cdot 100 = 17\%$$

### Foreseen absences due to holiday

$$F\% = \left( \frac{11}{365 - 11} \right) \cdot 100 = 3.1\%$$

### Foreseen absences due to vacation

$$V\% = \left( \frac{30}{365 - 30} \right) \cdot 100 = 8.9\% = 9\%$$

### Unforeseen absences

For the nurse category, this type of absence ranged from 0.6% (unit IV) to 11.5% (unit I); for technicians and auxiliaries, from 2.8% (unit IV) to 6.7% (unit II). TSI calculations for each hospitalization unit evidenced additions from 32 to 47% for nurses and from 35 to 40% for nurse technicians and auxiliaries (Table 2).

Table 2 – General percentage of unforeseen absences and staff added to cover for foreseen and unforeseen absences of nursing team members at medical-surgical clinical units, per professional category. São José do Rio Preto, 2006

Professional category	Hospitalization unit			
	I	II	IV	VI
Nurse				
Unforeseen absences (%)	11.5	11.3	6.9	0.6
Addition - TSI (%)	47	46	41	32
Nurse technician/auxiliary				
Unforeseen absences (%)	4.1	6.7	2.8	4.2
Addition - TSI (%)	37	40	35	37

The current nursing staff at the units under analysis consists of 77 professionals, including 12 nurses. Using the staff calculation method, the projected staff would comprise 115 nursing collaborators, with 38 nurses and 77 nurse technicians/auxiliaries (Table 3). In the current situation, care hours range from 4.2 to 4.9h. In the projected situation, a variation between 5.7 and 7.2h was evidenced (Table 4).

Table 3 – Comparison between current and projected nursing staff according to hospitalization unit under study and professional category. São José do Rio Preto, 2007

Hospitalization units	Current situation			Projected situation		
	Nurse*	Nurse tech/aux	Total	Nurse	Nurse tech/aux	Total
I (n=20)	3	11	14	6	12	18
II (n=30)	3	15	18	9	17	26
IV (n=24)	3	15	18	8	16	24
VI (n=41)	3	24	27	15	32	47
Total	12	65	77	38	77	115

\*Nurses work at more than one unit during night shifts

Table 4 – Comparison between number of care hours and projected nursing staff according to hospitalization unit under study and professional category. São José do Rio Preto, 2007

Hospitalization units	Hours					
	Current situation			Projected situation		
	Nurse*	Nurse tech/aux	Total	Nurse	Nurse tech/aux	Total
I (n=20)	1	3.6	4.6	2	3.7	5.7
II (n=30)	0.8	4.1	4.9	2.2	4.2	6.4
IV (n=24)	0.8	4	4.8	2.3	4.3	6.6
VI (n=41)	0.5	3.7	4.2	2.2	5.0	7.2

\*Nurses work at more than one unit during night shifts

## Discussion

In this study, the identification of the care clientele's profile showed that patients fit into the four care categories, showing their diversity and care complexity for the nursing team. Among the classified patients, the demand for minimal care predominated (65.8%), while some clients needed semi-intensive (7.4%) and intensive care (0.8%). Another study<sup>(12)</sup> carried out at hospitalization units also showed a higher percentage of patients in the minimal care category (68.7%), with lower percentages for semi-intensive (6.6%) and intensive care (1.5%).

Semi-intensive and intensive care patients' stay at the medical-surgical clinical units under analysis aroused reflections as to why those patients are allocated at these units, as they demand permanent attention from the nursing team, as well as more complex interventions and a higher workload. Causes can mainly be related with the insufficient number of beds at intensive care units (ICU) to respond to demands, or even to the inadequate assessment of care complexity.

In this research, percentages to cover for absences (TSI) ranged from 32 to 47% for the nursing category and from 35 to 40% for the nursing technician/auxiliary category. These levels are close to what was found at a university hospital<sup>(14)</sup>, i.e. from 39 to 43% (nurses) and from 38 to 46% (technicians and auxiliaries); but lower than levels in another research also carried out at a teaching hospital<sup>(12)</sup>, with 55 to 78% and 59 to 79.3%, respectively. It is important for each institution to express its reality with regard to coverage for absences. And, in case the decision is to use the TSI recommended by the Brazilian Nursing Council (8.33% to cover for vacations and 6.67% to cover for the absenteeism rate)<sup>(10)</sup>, the percentage of absences related to authorized leaves and holidays needs to be added with a view to additional staff<sup>(12)</sup>.

To reach the goal of 115 nursing collaborators at the units under analysis, 33% needs to be added to total staff. Research has shown different results, sometimes indicating the need to increase staff numbers by 17%<sup>(15)</sup>, sometimes maintaining the number of professionals<sup>(14)</sup>. Findings in the present research evidenced greater demands for nurses, representing a 68.4% increase in comparison with the current team. Percentages found in literature for this category were 62%<sup>(15)</sup> and 50%<sup>(14)</sup>. For technicians and auxiliaries at the research institution, a 15.6% increase was projected in relation to current staff, as opposed to other studies that showed the need to reduce this category by 8.7%<sup>(15)</sup> and 27%<sup>(14)</sup>.

These percentages evidence the reality at the study institution which, like other health institutions in Brazil, still maintains a reduced number of nurses for financial reasons, jeopardizing the maintenance of quality care and service supervision. This situation also entails risks for patient safety, as exclusive nursing activities are delegated to technical staff, with ethical-legal implications for nursing professionals and for the institution.

Average nursing time available per patient-day ranged from 4.2 to 4.9h. Other studies at medical-surgical clinical units presented 4.2h<sup>(16)</sup>, between 6 and 6.5h<sup>(17)</sup> and between 6.2 and 7h<sup>(5)</sup>. By adapting staff numbers, projected hours would vary between 5.7 and 7.2h, close to literature findings. As semi-intensive care patients were found at all units (1.9 to 12.3%), projected hours are also in line with the Brazilian Nursing Council's guidelines<sup>(10)</sup>.

In the current situation, average nursing care hours ranged from 0.5 to 1h; other authors presented 0.5h<sup>(16)</sup> and between 1.3 and 1.4h<sup>(17)</sup>. If the number of nurses

increased, however, according to staff projections, hours per patient-day would increase to between 2 and 2.3.

Unit VI showed the largest percentage of patients in the semi-intensive (12.3%) and intensive care category (2%), accompanied by the lowest average nursing care hours (0.5). After redimensioning the team, the hours needed to deliver care to this unit's clients could be projected, with a 41.7% increase in the current average nursing hours; nurses' hours increased by 77.3% and nursing technicians and auxiliaries' hours by 26%. A great decrease in patient care hours jeopardizes the quality of the care process due to the impossibility of attending to care areas that need interventions, with a consequent activity overload for the nursing team.

Some authors<sup>(7-8)</sup> demonstrated that nurses with a work overload have a greater chance of developing the Burnout syndrome (state of physical, emotional and mental exhaustion) and of becoming dissatisfied. They emphasized that hospitals with adequate nursing staff numbers and concerned with nursing training and retention achieve better results for clients and health services. A strong association between the nurse/patient proportion and morbidity and mortality risks, followed by complications among surgical patients, was documented in an American study carried out at 168 general hospitals. In that study, it was evidenced that, for each patient added to the nurse's mean workload, the risk of probable death increases by 7%<sup>(7)</sup>.

A correlation between the proportion of nurses/patient and the occurrence of adverse events has also been demonstrated in literature: 44.9% of adverse events were found at an ICU when the proportion of nurses was 1:2 patients; 23.8% at semi-intensive units at a proportion of 1:3 and 33.2% at hospitalization units at a proportion of 1:4 patients. The most frequent events were: non-programmed removal or obstruction of probes (57.6%), patient falls (16.6%) and medication errors (14.8%)<sup>(6)</sup>.

Another study carried out at medical-surgical clinical units of a private institution in São Paulo<sup>(5)</sup> found AE percentages ranging from 6.4 to 7.1%, even when patient staff numbers seemed to be adequate to respond

to patients' needs. It should be highlighted, however, that higher percentages of non-conformity situations were evidenced in cases of underdimensioned nursing staff.

The benefits of staff recalculating are not limited to the patient sphere alone, which is the main object of the care process. They also include the professional, by recovering the humanistic values of nursing care, and the institutional dimension. Hospitals aiming for service excellence have better credibility and a better image in the community and are more competitive in the health area.

It should be highlighted, however, that increasing the nursing staff alone will not guarantee improved quality and care productivity. This should be preceded by a systematic review of the work process, eliminating activities that add little value to the patient, are unnecessary or even redundant and demand time from the team. Thus, nurses should strongly commit to analyzing of the workflow and practices and redesigning this process when necessary.

Literature<sup>(18)</sup> appoints nursing as hospitals' main cost center, representing 33% of total costs and approximately 44% of direct patient costs; and also that about 80% of direct nursing costs are related to staff payments. Thus, the institution can see the hiring of additional staff as a great strain on its global budget. If nurse management presents solid arguments to the high administration, addressing the fact that a staff increase leads to a rise in operating costs but not necessarily to decreased profitability, can favor the availability of the resources needed to put in practice restructuring proposals.

## Conclusion

Based on these study results, it can be concluded that the nursing staff working at the units under analysis and the time this team spends remain below the clients' care needs. Knowing and assessing the reality can help the units' nurse managers to elaborate proposals, make decisions and negotiate on staff and work process re-adaptation. The balance between use of human resources and care quality remains a big challenge for nurse managers.

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