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# Factors related to sickness absenteeism among nursing personnel

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## ABSTRACT

### Objective

To analyze short-term leaves among the nursing personnel of a university hospital.

### Methods

Study population included 965 nursing professionals active on 1 January 2000. Leaves up to 30 days in one year were analyzed. Sickness leaves (one-year aggregate), service demand, and diagnoses were described. Relative risk was estimated through multivariate analysis, using negative binomial distribution.

### Results

About 65% of workers generated 1,988 appointments, of which 68,6% lead to absence from work. The greatest demand occurred among nursing technicians, women, and statutory workers (OR=1.61; 1.47; 1.53 respectively). Over half the studied population (57.6%) had at least one absence. This corresponds to 87.8% of workers who had physician appointments. These workers generated a total 1,364 leaves of absence – 1.41 per worker – and 5,279 workdays were missed. Multivariate analysis was carried out considering each gender separately. An effect was found only for work regime (RR=1,45 e RR=2,43) for both men and women.

## Conclusions

A relationship exists between absenteeism and work regime. It is necessary to include other variables, such as time working for the company, shift, and number of children.

## Keywords

Absenteeism. Nursing, manpower. Regression analysis. Hospitals, university. Relative risk (public health). Negative binominal distribution.

## INTRODUCTION

Nursing professionals have a number of unique characteristics. These include gender distribution, hierarchy, and a high load of both physical and emotional stress.[3,6,14,21,22,24,25] Studies investigating the characteristics related to sickness among these professionals are rare in Brazil. There is not enough adequate research in this field, the profile of morbidities associated with work absenteeism among nursing professionals being hardly known. At the same time, there is a growing concern about this category, which includes roughly 780 thousand professionals countrywide.[10]

A number of studies indicate that short-term leaves may provide information concerning the health status of any given group of workers. In addition, such leaves may also be related to factors connected to work organization, such as number of hours of work, shift, and autonomy, among others.[4,5,12, 15-17,19]

There is no consensus as to how to define short-term sickness leaves. Such definition depends on each country's labor legislation, as well as on norms specific to each institution.

The aim of the present study is to analyze short-term leaves among the nursing personnel of a university hospital. Subjects included patients seen at the *Serviço de Atenção à Saúde dos Trabalhadores* (Worker Healthcare Service – WHS). In this Service, medical appointments are mandatory in order to control and investigate all sickness leaves and optional for the treatment of clinical occurrences that do not necessarily require absence from work. All sickness leaves at the studied hospital have as an attachment a medical diagnosis, recorded from the very first day of absence. The availability of such information distinguishes the present study from the majority of previously published studies on this subject.

Simultaneously to the study of leaves of absence, the frequency and reason for which the professionals sought medical care were analyzed. This information, in addition to explaining the reasons, more or less frequent, that lead to worker absenteeism, reflects the actual morbidity perceived by these professionals.

The present study represents an initial descriptive analysis of case records correspondent to one year of study among nursing professionals. It will serve as a rehearsal for a cohort study of the entire healthcare staff of a public university.

From the methodological point of view, the present study employs approach methods designed for clearly interdependent recurrent events, among which leaves of absence generated by a single worker may be included. Event recurrence implies situations in which some subjects have a greater probability of repeating the studied event than others, in such cases, the event cannot be characterized as an independent one. Population-wide comparison of recurrent events poses a challenge,[13] since the traditional approaches, such as Poisson regression, which treat events as independent, are not valid. If treated inadequately, analysis may lead to mistaken conclusions, in both statistics interpretation and interval estimation.[1,18] With this in mind, a number of authors have considered negative binomial distribution as more adequate for the analysis of recurrent events, since it allows, at least partially, for variance estimation, which Poisson regression is unable to do.[18]

## Methodology

Study population included all 965 nursing professionals active on 1 January 2000 at the university hospital. WHS's assistance demand database was used as a source of information. This database includes the records of all medical appointments taken place at the Service, and is precisely structured, either by appointment or by medical procedure. Data on nursing professionals that did not seek medical assistance during the present study were obtained directly from the hospital's Human Resource department files. Observation period in the present study was the entire year 2000. Variables investigated included "seeking for medical assistance" (classified as "yes" or "no"), "number of appointments", and "number of short-term leaves".

In accordance to the normative and legal context of the present study, short-term leaves were defined as those which, accounted for a maximum of 30 missed days, alone or combined, in one fiscal year. If this number is exceeded, the professional must be submitted to special medical investigation in order to determine the need for leave prorogation or for further leaves.[7]

"Leave duration" in days and "associated diagnoses", registered according to the Chapters of International Statistical Classification of Diseases and Related Health Problems - ICD1O, were analyzed as secondary variables. The final group of variables, classified as "administrative causes", included appointments carried out solely for work ineptitude assessment purposes. In this case, the diagnosis of the disease which originated the sickness leave was not classified; instead, it was considered as an "administrative procedure". Variables considered as potentially associated with sickness leaves were also evaluated; these included gender, age, and occupation (nurse, nursing technician, or nursing assistant). Work regime was also considered, professionals being classified as "public servants" or "private employees" (hired according to Brazilian private sector labor regulations).

Statistical analysis calculated bivariate associations between factors, number of appointments, and diagnosis descriptions. Associations between studied factors and the number of leaves of absence were established by means of relative risk determination, obtained through a negative binomial distribution model. SPSS 10 and S-PLUS 4.5. software were used for statistical analysis.

## RESULTS

Six hundred twenty-three professionals (65.5% of the sample) sought medical assistance at least once, mean rate being 5 per 100 workers/month. Of the total population, 139 were nurses, 590 were nursing technicians, and 236 were nursing assistants. As to gender, 837 subjects were female. Mean age was 39 years (SD=8.46); minimum age was 20, and maximum, 69.7 years. Concerning work regime, 71.4% of the population were "statutory" workers. Table1 presents the characteristics (occupation, gender, and work regime) of workers who sought WHS, in comparison to those who did not.

**Table 1** – Characteristics of workers who sought medical assistance.

| Variable | TN | %S | OR | 95% CI | | NA | Mean NA (SD) |
|---|---|---|---|---|---|---|---|
| Occupation | | | | Min | Max | | |
| Nurse | 139 | 56.8 | 1 | | | 208 | 1.5 (1.8) |
| Nursing technician | 590 | 67.9 | 1.61* | 1.10 | 2.35 | 1,264 | 2.1 (2.5)* |
| Nursing assistant | 236 | 64.8 | 1.40 | 0.91 | 2.15 | 516 | 2.2 (2.6)* |
| Gender | | | | | | | |
| Male | 128 | 57.8 | 1 | | | 206 | 1.6 (2.4) |
| Female | 837 | 66.8 | 1.47* | 1.00 | 2.14 | 1,782 | 2.1 (2.4)* |
| Work regime | | | | | | | |
| Private employees | 278 | 58.6 | 1 | | | 422 | 1.5 (1.8) |
| "Statutory" workers | 687 | 68.4 | 1.53* | 1.15 | 2.04 | 1,566 | 2.3 (2.6)* |

TN: Total population per group.

%S: Percentage of the total population who sought the Worker Healthcare Service in 2000.

NA: Number of Appointments.

Mean NA (SD): Mean number of appointments in relation to total population (Standard deviation).

*p<0.05.

Considering nurses, men, and private employees as reference categories, nursing technicians sought WHS assistance 1.61 times more than nurses (95%CI: 1.10-2.35); women, 1.47 times more than men (95%CI: 1.0-2.14); and statutory workers, 1.53 times more than private employees (95%CI: 1.15-2.04). As already mentioned, mean population age was 39 years (SD=8.46); however, mean age was 41.1 years (SD=7.9) for "statutory" workers, and 34 years (SD-7.6) for private employees. This difference was significant (t=13.0; p=0,000). Mean age was 37.8 years (SD=8.7) for men and

39.1 years (SD=8.4) for women, no significant difference being observed. Mean age was 39.8 years (SD=7.3) for nurses, 38.1 years (SD=8.6) for nursing technicians, and 40.7 years (SD=8.2) for nursing assistants. There was a significant difference between nursing technicians and assistants (Scheffé's test; p=0.001)

## Appointments

WHS provided 1,988 medical appointments for nursing professionals, an average 3.14 appointments per worker who sought assistance; 28.4% of workers had one appointment, 22,3% two appointments, and the remainder – 49.3% – three or more appointments. Table 1 shows that 1,782 appointments were for women, an average 3.2 (SD=2.4) appointments per woman, compared to 2.8 (SD=2.5) per man. For the whole 965-worker population, mean number of appointments per worker was 2.06 (SD=2.4); this rate was 2.13 (SD=2.4) for women and 1.61 (SD=2.4) for men, this difference being a significant one (t=2.25; p=0.025). Most appointments were for nursing technicians – 63.5% (1,264). The mean number of appointments per worker was 2.6 (SD=1.7) for nurses, 3.1 (SD=2.4) for nursing technicians, and 3.4 (SD=2.1) for nursing assistants. There was a significant difference between nurses and nursing technicians (Scheffé's test; p=0.030). As to work regime, the mean number of appointments per worker was 2.3 (SD=2.6) for "statutory" workers and 1.5 (SD=1.8) for private employees, generating another significant difference (t=1.44, p=0.000).

## Sickness leaves

Table 2 presents sickness leave distribution and comparison according to occupation, gender, and work regime.

**Table 2** – Distribution of sickness leaves according studied variables.

| Variable | N | OR (95% CI) | %[1] | %[2] | M/W | Days missed | Mean (SD) |
|---|---|---|---|---|---|---|---|
| | | | | | | | Days missed |
| Occupation | | | | | | | |
| Nurse | 72 | 1 | 91.1 | 51.8 | 1.16 | 707 | 9.8 (9.4) |
| Nursing technician | 354 | 1.34 (0.96 to 2.02) | 88.2 | 60.0 | 1.48 | 3.249 | 9.2 (9.1) |
| Nursing assistant | 130 | 1.14 (0.75 to 1.74) | 84.9 | 55.1 | 1.40 | 1.323 | 10.2(9.5) |
| Gender | | | | | | | |
| Male | 61 | 1 | 82.4 | 47.6 | 1.02 | 453 | 7.4(7.5) |
| Female | 495 | 1.59 (1.09 to 2.31)* | 88.5 | 59.1 | 1.47 | 4.826 | 9.7(9.4) |
| Work regime | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Private employees | 134 | 1 | 82.2 | 48.6 | 1.00 | 965 | 7.2(7.3)* |
| "Statutory" workers | 422 | 1.67 (1.26 to 2.22)* | 89.8 | 61.4 | 1.58 | 4.314 | 10.2(9.7)* |

%[1]: Percentage of workers that sought WHS assistance who were granted sickness leaves.

%[2]: Percentage of the total population who were granted sickness leaves.

M/W: Mean number of sickness leaves per worker over the entire population.

Mean (Standard Deviation): Mean number of days missed per worker on leave.

*p<0.05.

A total of 1,364 sickness leaves were granted, a mean 2.15 (SD=1.8) and maximum 12 per worker who sought WHS assistance. The figure shows sickness leave frequency according to recurrence. Thirty-six percent of workers were granted more than one sickness leave. These leaves accounted for 5,279 missed workdays, a mean 8.3 (SD=9.2) days, and a maximum 30 days per worker.

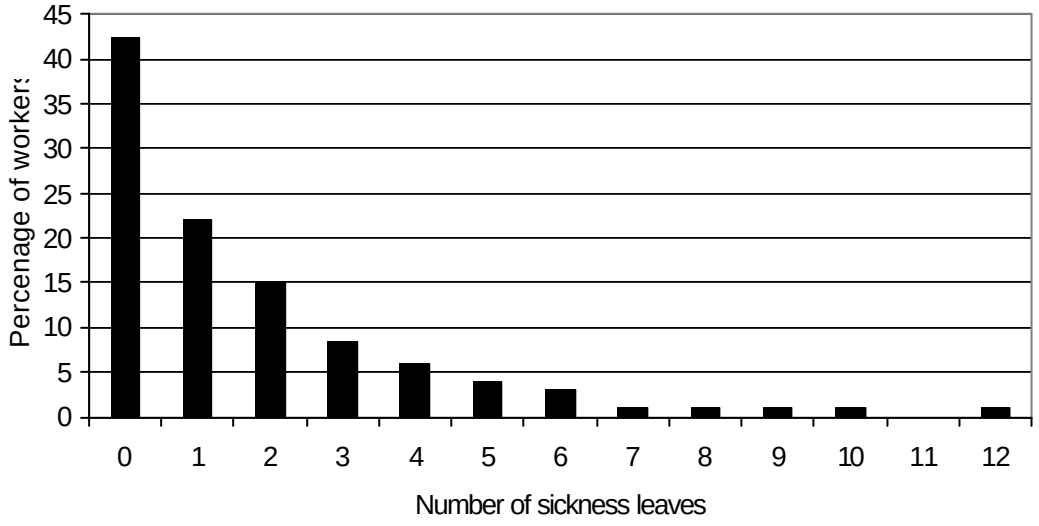


**Figure** – Number of sickness leaves distribution according to percentage of workers.

The mean number of leaves population-wide was 1.4 (SD=1.8) per worker; mean leave duration was 5.5 (SD=8.4) days, median 1.0 day, and third quartile 7 days. Of the 633 workers who sought WHS assistance, 556 (87.8%) were granted at least one sickness leave, representing 57.6% of total study population. Of these 556 workers, 37.6% were granted one leave, 26.3%, two leaves, 14.7% three leaves, 10.4% four leaves, and the remainder (11%) were granted five or more leaves. Concerning leave duration, 16% of subjects were granted one day, 12.9% two days, 8.3%, three days, 8.1%, four days, and 54,7% were granted five or more days sickness leave; 68.6% of appointments resulted in sickness leaves, and mean leave duration was 2.7 (SD=4.5) days, with a maximum 30 days, per appointment. In 46.6% of the appointments that yielded leaves of absence a single day was granted, in 13.5%, two days, and in the remaining 39.9%, three or more days. Significant differences were detected in the proportion of sickness leaves between men and women – the latter being 1.59 times more likely to be granted sickness leaves than the former (95%CI: 1.09-2.31). The odds of a "statutory" worker being granted a leave of absence were 1.67 times greater than those of a private employee (95%CI: 1.26-2.22). There was a significant difference in mean leave duration between work regimes (t=3.4, p=0.001); mean duration was greater among statutory workers. The difference in leave duration between men and women is borderline significant (t=1.85, p=0.065). No differences in age were found between workers that were granted leaves of absence during the year and those who were not. There was a significant difference in mean age between statutory workers who received leaves (41.9 years, SD=7.8), and private employees who received leaves (35.3 years, SD=7.4), the former being older (t=8.5, p=0.000).

## Morbidities

Diagnoses that generated the greatest number of sickness leaves included group X (Diseases of the respiratory system), with 18.2% of total leaves, followed by group XIII (Diseases of the musculoskeletal system and connective tissue), with 13.4%, and group I (Certain infectious and parasitic diseases) with 8.7%

**Table 3** – Distribution of appointments and leaves of absence according to the great disease groups.

| ICD-10 Chapters | | General | | | | Gender | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Female | | Male | |
| | | NA | %A | %ASL | %LA | %ASL | %LA | %ASL | %LA |
| I | Certain infectious and parasitic diseases | 150 | 7,5 | 78,7 | 8,7 | 80,7 | 8,8 | 60,0 | 6,9 |
| II | Neoplasms | 4 | 0,2 | 75,0 | 0,2 | 75,0 | 0,2 | 0 | 0 |
| III | Diseases of the blood & blood forming organs &... immune system | 14 | 0,7 | 42,9 | 0,4 | 46,2 | 0,5 | 0 | 0 |
| IV | Endocrine, nutritional and metabolic diseases | 14 | 0,7 | 50,0 | 0,5 | 75,0 | 0,5 | 16,7 | ,8 |
| V | Mental and behavioral disorders | 99 | 5,0 | 63,6 | 4,6 | 62,9 | 4,5 | 70,0 | 5,4 |
| VI | Diseases of the nervous system | 76 | 3,8 | 77,6 | 4,3 | 80,0 | 4,5 | 50,0 | 2,3 |
| VII | Diseases of the eye and adnexa | 70 | 3,5 | 81,4 | 4,2 | 80,0 | 3,9 | 90,0 | 6,9 |
| VIII | Diseases of the ear and mastoid process | 27 | 1,4 | 59,3 | 1,2 | 58,3 | 1,1 | 66,7 | 1,5 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| IX | Diseases of the circulatory system | 95 | 4,8 | 67,4 | 4,7 | 69,7 | 5,0 | 33,3 | 1,5 |
| X | Diseases of the respiratory system | 350 | 17,6 | 70,9 | 18,2 | 71,3 | 18,2 | 66,7 | 18,5 |
| XI | Diseases of the digestive system | 38 | 1,9 | 84,2 | 2,3 | 85,3 | 2,4 | 75,0 | 2,3 |
| XII | Diseases of the skin and subcutaneous tissue | 78 | 3,9 | 59,0 | 3,4 | 62,5 | 3,2 | 42,9 | 4,6 |
| XIII | Diseases of the musculoskeletal system and connective tissue | 279 | 14,0 | 65,6 | 13,4 | 66,0 | 13,2 | 62,5 | 15,4 |
| XIV | Diseases of the genitourinary system | 66 | 3,3 | 75,8 | 3,7 | 78,0 | 3,7 | 57,1 | 3,1 |
| XV | Pregnancy, childbirth and pueperium | 40 | 2,0 | 95,0 | 2,8 | 95,0 | 3,1 | 0 | 0 |
| XVIII | Symptoms, signs and abnormal clinical & laboratory findings | 115 | 5,8 | 73,0 | 6,2 | 75,5 | 6,5 | 44,4 | 3,1 |
| XIX | Injury, poisoning and certain other consequences of external causes | 102 | 5,1 | 78,4 | 5,9 | 78,8 | 5,4 | 76,5 | 10,0 |
| XX | External causes of morbidity and mortality | 78 | 3,9 | 14,1 | 0,8 | 13,3 | 0,8 | 33,3 | ,8 |
| XXI | Administrative causes | 293 | 14,7 | 67,9 | 14,6 | 66,5 | 14,3 | 81,5 | 16,9 |
| Total | | 1988 | 100 | 68,6 | 100 | 69,2 | 100 | 63,1 | 100 |

NA: Number of appointments.

%C: Percentage of all appointments.

%ASL: Percentage of appointments leading to sickness leaves per diagnosis group.

%LA: Percentage of sickness leaves over the total number of leaves of absence.

ICD – International Classification of Diseases, 10$^{th}$ revision.

It is also evident that the distribution of sickness leaves according to diagnostic group was similar to the number of appointments. Leaves were granted in 84.2% and 81.4% of appointments related to groups XI (Diseases of the digestive system) and VII (Diseases of the eye and adnexa) respectively. For groups I (Certain infectious and parasitic diseases), XIX (Injury, poisoning and certain other consequences of external causes), VI (Diseases of the nervous system), XIV (Diseases of the genitourinary system), XVIII (Symptoms, signs and abnormal clinical & laboratory findings), and X (Diseases of the respiratory system), 70%-80% of appointments produced sickness leaves.

## Factors associated with sickness leaves

In order to determine factors associated with sickness leaves, two negative binomial regression models were adjusted, one for each gender. Variables included in the model were occupation, work regime, and age (the respective median values were used as cutoff points). Table 4 presents the results of this analysis.

**Table 4** – Negative Binomial Regression model estimates for men and women.

| Coefficient | Gender | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Female | | | | | Male | | | | |
| | Value | SE | RR | 95% CI | | Value | SE | RR | 95% CI | |
| (Constant) | -5.97 | 0.15 | 1 | | | -5.84 | 0.51 | | | |
| Nursing assistant | 0.22 | 0.15 | 1.24 | 0.92 | to 1.66 | -0.52 | 0.51 | 0.59 | 0.22 | to 1.61 |
| Nursing technician | 0.25 | 0.13 | 1.28 | 0.99 | to 1.67 | -0.04 | 0.48 | 0.96 | 0.37 | to 2.46 |
| Regime: "statutory" | 0.35 | 0.11 | **1.42** | **1.14** | **to 1.76** | 0.78 | 0.29 | **2.19** | **1.23** | **to 3.91** |
| Age: median | 0.099 | 0.092 | 1.104 | 0.92 | to 1.32 | -1.01 | 0.30 | **0.36** | **0.20** | **to 0.66** |

$\phi$ =1.111; EE=0.116

$\phi$ =1.190; EE=0.413

median for women =38 years, for men =36 years.

Work regime was significant among women. Female statutory workers were 1.42 times more likely to be granted leaves than female private employees (95%CI: 1.14-1.76). Male statutory workers had a 1.42 times greater chance of being granted leaves than male private employees (95%CI: 1.23-3.91). The chance of a man older than 36 years being granted a leave was about 0.36 (36%) that of a younger man, which means that younger men have greater levels of absenteeism. Occupation, for both men and women, had no influence on absenteeism after adjustment for work regime and age.

## DISCUSSION

The unequal distribution between genders shows that nursing is still predominantly a female occupation. In spite of the entire population coming from the same hospital, the present study allows us to evaluate strata and compare behavior in view of certain conditions, such as job stability – which is granted to "statutory" workers but not to private employees – and their participation in the granting of leaves. There is an expressive difference between these two categories, perhaps due to statutory workers feeling more secure when on leave, their positions being secured by job stability. Other studies[26] suggest that labor disability rates decrease due to fear of dismissal. The great age gap between both work regimes may be explained by the fact that there have been no public statutory nurse selection processes since 1994. Thus mean age is much higher among statutory workers than among private employees, who can be hired as needed. This may also have an effect upon the increase of appointment and sickness-leave rates among statutory workers, since this rate is expected to increase with age. The WHS appointment rate, considered as high, reflects conditions proper of the present study population: easy access, mandatory disability evaluation, population composition

(healthcare professionals, which can contribute towards the greater valorization of certain symptoms and signs that, for the general population, might not have justified consulting a physician). Physical disability *per se* is often not the direct reason for taking leave; instead, sickness leaves impose themselves as a preventive measure. This is the case with herpes simplex and mild respiratory infections, or with professionals with skin lesions, which may lead to infection by germs present in the hospital environment.

The different appointment rates for the different occupations may be explained, initially, by the smaller number of nurses, which could discourage these professionals from taking leave. Likewise, hierarchically, the nurse may feel greater responsibility towards the team, which would also encourage them to continue work, even under adverse circumstances. As their activity is more an administrative one, the potential for patient contamination is not as large. On the other hand, internal arrangements among hierarchically superior occupations are more frequent, which could contribute towards a smaller demand for medical attention. For some authors, predominantly administrative occupations – as is the case with nurses if compared to nursing assistants and technicians – have smaller morbidity and mortality rates, and therefore a smaller amount of sickness leaves.[11,15,17,19]

It has been widely demonstrated that young men are more prone to sickness leaves than older men.[2,8,9,23] Likewise, several authors have demonstrated that, generally speaking, women are more likely to be granted sickness leaves than men.[2,8,9,11] Other authors,[14] however, have shown that short-term sickness leaves – up to seven days, in this case – were more common among men, whereas long-term leaves – longer than seven days – were more frequent among women. There is a relation between leaves of absence and work regime. It would be interesting, however, to study the role of other variables, such as time working for the company, shift, and number of children, so that the influence of other factors may also be determined.

The present study investigates a recurrent event – work absenteeism, which involves the same subject repeatedly – through relative risk determination. With this in mind, a negative binomial regression model was employed – an alternative for dealing with non-independent events – aiming at obtaining a precise estimate. Among the professionals who sought WHS assistance, a mean 2.15 leaves per worker was obtained for the year 2000, the maximum being 12 leaves for a single worker. Data demonstrated that the event “sickness leave” repeated itself for a same subject, and that the probability of having other appointments was not equal to that of having only the first one, therefore not characterizing an independent event.

## REFERENCES

1. Benavides FG, Sáez M, Barceló MA, Serra C, Mira M. Incapacidad temporal: estrategias de análisis. *Gac Sanit* 1999;13:185-90.

2. Blank N, Diderichsen F. Short-term and long-term sick-leave in Sweden: relationships with social circumstances, working conditions and gender. *Scand J Soc Med* 1995;23:265-72.

3. Bourbonnais R, Mondor M. Job strain sickness absence among nurses in the province of Québec. *Am J Ind Med* 2000;39:194-202.

4. Bourbonnais R, Vinet R, Meyer F, Goldberg M. Certified sick leave and work load. A case referent study among nurses. *JOM* 1992:69-74.

5. Bourbonnais R, Vinet R, Vézina M, Suzanne G. Certified sick leave as a non-specific morbidity indicator: a case-referent study among nurses. *Br J Ind Med* 1992;49:673-8.

6. Brage S, Nygard J, Tellnes G. The gender gap in musculoskeletal-related long term sickness absence in Norway. *Scand J Soc Med* 1998;26:34-43.

7. Brasil. Lei n.º 8.112 de 11 de dezembro de 1990. Regime Jurídico Único dos Servidores Civis da União. Belo Horizonte: . Associação Sindical dos Servidores da UFMG; 1991.

8. Brenner H, Ahern W. Sickness absence and early retirement on health grounds in the construction industry in Ireland. *Occup Environ Med* 2000;57:615-20.

9. Chevalier A, Luce D, Blanc C, Goldberg M. Sickness absence at the French National Eletric and Gas Company. *Br J Ind Med* 1987;44:101-10.

10. Conselho Federal de Enfermagem. Enfermagem: termômetro da economia da saúde. Disponível em URL: http://www.portalcofen.gov.br Acesso [abr 2002].

11. Feeney A, North F, Head J, Canner R, Marmot M. Socioeconomic and sex differentials in reason for sickness absence from the Whitehall II study. *Occup Environ Med* 1998;55:91-8.

12. Fischer JE, Calame A, Dettling AC. Objectifying psychomental stress in the workplace - an example. *Int Arch Occup Environ Health* 2000;73(Suppl):S46-S52.

13. Glynn RJ, Buring JE. Ways of measuring rates of recurrent events. *Br Med J* 1996;312(7027):364-7.

14. Knibbe JJ, Friele D. Prevalence of back pain and characteristics of the physical workload of community nurses. *Ergonomics* 1996;39:186-98.

15. Marmot M, Feeney A, Shipley M, North F, Syme SL. Sickness absence as a measure ak health status and functioning: from the UK Whitehall II study. *J Epidemiol Community Health* 1995;49:124-30.

16. Mira JJ, Vitaller J, Buil JA, Aranaz JM, Herrero JF. Absenteism as a symptom of occupational ill health in hospitals and its repercussion on quality assurance. *Qual Assur Health Care* 1992;4:273-87.

17. Moncada S. Continguts del treball I incapacitat temporal en la cohort "Casa Gran" de treballadors de l'ayuntament de Barcelona, 1985 [tesis doctoral]. Barcelona: Universidad Autónoma de Barcelona; 2000.

18. Navarro A, Utzet F, Puig P, Caminal J, Martín M. La distribución binomial negativa frente a la de Poisson en el análisis de fenómenos recurrentes. *Gac Sanit* 2001;15:447-52.

19. North F, Syme SL, Feeney A, Head J, Shipley MJ, Marmot MG. Explaining socioeconomic differences in sickness absence: The Whitehall II study. *BMJ* 1993;306:361-6.

20. Organização Mundial de Saúde. Centro Colaborador da OMS para a Classificação de Doenças em Português. Classificação estatística internacional de doenças e problemas relacionados à saúde. Décima revisão. São Paulo: EDUSP; 1995.

21. Pines A, Skulkeo K, Pollak E, Peritz E, Steif J. Rates of sickness absenteeism among employees of a modern hospital: the role of demographic and occupational factors. *Br J Ind Med* 1985;42:326-35.

22. Pitta A. Hospital, dor e morte como ofício. São Paulo: Hucitec; 1990.

23. Prins R, De Graaf A. Comparison of sickness absence in Belgian, German and Dutch firms. *Br J Ind Méd* 1986;43:529-36.

24. Ritchie KA, Macdonald EB, Gilmour WH, Murray KJ. Analysis of sickness absence among employess of four NHS trusts. *Occup Environ Med* 1999;56:702-8.

25. Smedley J, Egger P, Cooper C, Coggon D. Manual handling activities and risk of low back pain in nurses. *Occup Environ Med* 1995;52:160-3.

26. Stansfeld S, Feeney A, Head J, Canner R, North F, Marmot M. Sickness absence for psychiatric illness: the whitehall II study. *Soc Med* 1995;40:189-97.

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