

Sickness-absenteeism, job demand-control model, and social support: a case-control study nested in a cohort of hospital workers, Santa Catarina, Brazil

Absenteísmo-doença, modelo demanda-controle e suporte social: um estudo caso-controle aninhado em uma coorte de trabalhadores de hospitais, Santa Catarina, Brasil

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Abstract

The aim of the study was to identify the Job Demand-Control (JDC) and social support contribution for sickness-absenteeism duration of Health Treatment Licences (HTL) in hospital workers (civil servants) of the Santa Catarina State Department of Health of (SES/SC), Brazil. These health workers have the second highest HTL among civil servants in the state, especially those working in hospitals. This is a case-control study nested in a cohort of hospital workers followed up between 07/01/2008 and 06/30/2009. The workers with HTL in this period were selected as cases and those without HTL were selected as cases matched by sex, age and working sector. The outcome was the duration of HTL and the exposure variables were JDC and supervisor and coworker social support. We used both primary and secondary data, zero-inflated negative binomial regression analysis, and socioeconomic and occupation variables in the adjustments. The data used for analysis included 425 participants (144 cases; 281 controls). Low coworker support added 2,04 (95% confidence interval (CI): 1,05-3,93) HTL days. This effect increased to 2,68 days (95% CI: 1,37-5,27) when combined with low job strain and raised 78% (95% CI: 1,02-3,12) more than JDC with high coworker support combined with high strain (*iso-strain*). This study uncovered the importance of coworker support for the duration of sickness-absenteeism and suggested its use for the interventions aiming to decrease the duration of HTL.

Keywords: Coworker. Civil servant. Interaction. Confounders. Low strain job. Count model.

Resumo

O objetivo do estudo foi identificar a contribuição do Modelo Demanda-Controle (MDC) e do suporte social para duração do absenteísmo-doença segundo Licenças para Tratamento de Saúde (LTS) nos trabalhadores de hospitais (servidores públicos) da Secretaria de Estado da Saúde de Santa Catarina (SES/SC), Brasil. Entre as secretarias deste estado, a SES/SC tem a segunda maior frequência de LTS, com destaque nos hospitais. Este é um estudo caso-controle aninhado em uma coorte de trabalhadores de hospitais da SES/SC, com acompanhamento entre 01/07/2008 e 30/06/2009. Os casos foram aqueles que apresentaram LTS nesse período, os critérios de pareamento foram sexo, faixa etária e setor de trabalho. O desfecho foi o total de dias de LTS, as variáveis de exposição foram MDC e o suporte social do supervisor e do colega. Utilizou-se dados primários e secundários, nas análises a regressão Zero-inflado Binomial Negativa, e as variáveis socioeconômicas e ocupacionais nos ajustes. O banco de dados para as análises teve 425 (144 casos; 281 controles) participantes. O baixo suporte do colega aumentou a expectativa de dias de LTS em 2,04 (IC95%: 1,05-3,93), unido ao trabalho de baixa exigência aumentou 2,68 (IC95%: 1,37-5,27) e ao de alta exigência (*iso-strain*) 78% (IC95%: 1,02-3,12) mais do que o MDC com alto suporte do colega. Este estudo mostrou a importância do suporte do colega sobre a duração absenteísmo-doença, e auxiliou conjecturar que a variável tempo nos trabalhadores de hospital leva a adaptação às exigências das tarefas e a monotonia. Intervenções no relacionamento entre os trabalhadores provavelmente diminuirão a duração de LTS.

Palavras-chave: Colega de trabalho. Servidor público. Interação. Confundidores. Trabalho de baixa exigência. Modelo de contagem.

Introduction

Sickness-absenteeism is the absence from the workplace due to illness or incapacity whose gravity can vary considerably.¹ Its consequences exceed the individual and institutional level and reach the governmental level.^{1,28,29} For example, by reducing the manpower and production, it increases the burden of tributes needed to finance the sickness benefits. In addition, the income of the absentees is reduced and their medical spending increased. There is also a suspicion of some members of society that the absentees may be abusing the benefit system. Among the health care workers, sickness-absenteeism is a serious problem in a variety of countries with different cultural backgrounds.²⁻⁵

Civil servants in the Santa Catarina State, Brazil, are entitled to the Health Treatment License (HTL), which is a benefit paid to civil servants who are unable to perform their jobs because of illness. International Classification of Diseases (ICD-10) is used to classify the HTL diagnoses. The State Department of Health (SES/SC in portuguese) has the second highest rate of sick leave with hospital workers leading the ranking.^{7,8}

Job stress and social support at work as measured by the Job Content Questionnaire [9] contribute to elucidate the occurrence of sickness-absenteeism. Karasek developed a screening for job-related stress by crossing two characteristics of the workplace: the psychological demands (high and low) and worker's control over his/her tasks (high and low).¹⁰ From the combinations of these characteristics, a four-way classification is derived: a) the job stress, also known as high-strain job, combining high psychological demand and low work control, often associated with ill health, b) low-strain job (low psychological demand and high work control), c) active (high both psychological demand and work control) and d) passive (low both in terms of psychological demand and work control). When low social support at

work is combined with high psychological demand, low work control and low social support, it is denominated “iso-strain”. It is known to contribute significantly to ill health. Although there are relatively few studies investigating the effect of these factors, they have shown that low control, high-strain job, low social support, and iso-strain are important predictors of sickness-absenteeism.¹¹⁻¹⁵

This study aims to identify the contribution of social support at work to the HTL duration in hospital workers employed by the Santa Catarina state.

Method

This is a case-control study nested in a cohort of the Santa Catarina state hospital workers. It targeted a population of 7176 civil servants (2350 men and 4826 women) allocated in 14 hospitals. The follow-up period began on 1 July 2008 and ended on 30 June 2009. Two eligibility criteria were used. First, at least three years of working experience in the state hospital before the follow up begin, what would increase the possibility of being acculturated to the institution. Second, for either case or control, the last HTL must have finished at least 12 months before the study started in order to diminish the probability of a study HTL being influenced by a previous one. All civil servants with HTL during the follow up period were selected as cases and their controls were their coworkers from the same workplace who did not use a HTL during the study period, matched by sex and age (\pm 5 years). All eligible controls were included to increase the sample size and therefore maximize the power of statistical tests. The relevant information for the study subjects selection was extracted from the computerized data base of the state administration (SEA/SC in Portuguese).¹⁶

The analysis combined the data from a self-reporting questionnaire²⁷ mailed to all eligible workers and the secondary data from the state administration. The outcome was HTL duration in days. All

exposure variables were derived from Karasek's questionnaire scales: Work Psychological Demand (five items), Control over Work (nine items), Supervisor Social Support (five items) and Coworker Social Support (six items). All scales were Likert type, ranging from 1 (strongly disagree) to 4 (strongly agree). Missing values of the questionnaire items were replaced by the median of the respondents. For statistical analysis, the above scales were all dichotomized using median as the cut-off point in order to generate categorical exposure variables (psychological demand, control over work, JDC, supervisor support, coworker support), as well as some of their combinations already established in the literature, such as iso-strain and JDC combined with supervisor and coworker support. The questionnaire data were entered using the software Epidata 3.1. Statistical analysis also controlled for major occupation and socioeconomic variables such as sex, age, marital status, and income level.

The questionnaire data were collected between March and August 2010. Initially, an official letter was sent to each hospital to introduce the study and ask for collaboration. Personnel department of the participating hospitals aided the data collection. When a hospital worker declined his/her participation in the study or returned an empty questionnaire, it was considered a refusal. If the questionnaire could not be delivered to the respondent, it was considered a loss to coverage. This research has been approved by the state administration, university and hospital ethics committees. All respondents signed a consent term.

The representativeness of the response was assessed by the comparison of 95% confidence intervals (CI) for the HTL duration between respondents and not respondents within each hospital and overall. Case-control group coverage of the hospitals was calculated for hospital unit. Stata 9.0 statistical software was used for the data analysis. First, a bivariate analysis was used to evaluate the impact of each exposure variable on the outcome.

Second, multivariate analysis adjusting for the control variables was added for each exposure variable. Incidence rate ratio was the effect measure used in all analysis. Various regression models for count data were tested: Poisson, zero-inflated Poisson, negative binomial and zero-inflated negative binomial. The latter model was selected for the final analysis as it accounted for the zero outcome being specific to the control group and therefore statistically dependent. Albeit conditional logistic regression is often used to analyze matched data,²⁰ count models were preferred here because the outcome was a count instead of a binary one. This method has the advantage of going beyond a simplified analysis of an ordinary situation analysis of the determinants of sickness-absenteeism by modeling its duration as well. The selected count model performed better than others in terms of deviance, Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC).^{17,18} All analysis accounted for the correlation between the answers of the hospital workers clustered within the same case-control group and therefore within the same workplace.¹⁹

Results

Case-control selection resulted in a total of 1403 respondents (309 men and 1094 women), among which 340 were cases and 1063 controls. Controls could not be matched in one hospital unit which was therefore excluded from the study. The questionnaires were returned by 727 respondents (190 cases and 537 controls), 163 (11,62%) questionnaires were delivered but not returned, 49 (3,49%) refused and 465 (33,14%) were lost for coverage. The final sample consisted of 425 participants, with 144 case-control groups containing 144 cases and 281 controls (an average of almost 2 controls per case). Overall coverage was 57,20% of all eligible case-control groups. The respondents were representative of the target population because the difference in HTL duration was not sta-

tistically significant between respondents and not respondents, with corresponding 95% CI of 31,98-46,55 and 45,23-66,73, respectively. The same holds for all but one of the 13 hospitals included in the final analysis. The only significant difference in 95% CI was 6,68-27,65 for respondents versus 29,92-111,45 for not respondents in one hospital.

Average follow-up time of the cohort was 364 days, with average HTL duration of 39,91 days (95% CI 31,22-48,60). 144 cases produced a total of 282 HTL episodes with 1,95 HTL on average. Three ICD-10 chapters with the highest frequencies were the diseases of musculoskeletal system and connective tissue (24,47%), the factors influencing health status and contact with health services (22,34%) and mental and behavioral disorders (13,83%).

Descriptive statistics of the control variables is provided in Table 1 and those of the exposition variables in Table 2. The missing values percentage was below 5% for all questionnaire items.

The bivariate analyses in Table 2 showed statistical significance for low coworker support alone ($p=0,034$) and in combination with low strain job ($p=0,007$). Active job was also significant ($p<0,000$) in decreasing the HTL duration but not after adjusting for the control variables.

Low coworker support in the multivariate analyses increased the HTL duration for 2,04 (95% CI 1,05-3,93) times compared to the workers with high coworker support. Low strain job combined with low coworker support increased the HTL duration 2,68 (95% CI 1,37-5,27) times compared to that of the four JDC jobs with high coworker support. High strain job and low coworker support (iso-strain) increased the HTL duration 1,78 (95% CI 1,02-3,12) times in comparison with the four JDC jobs with high coworker support.

In both analyses, a statistically significant interaction was identified for the combination of low coworker support with low strain job and with high strain (the latter only in the final multivariate model). The

inclusion of the control variables decreased the effects of low coworker support by 20%, of low strain job with low coworker support by 29% and of iso-strain by 13% when compared to their effects in bivariate analyses.

Discussion

This study can be considered representative and generalizable to the target population of the state hospital workers because the outcome (HTL duration) was similarly distributed between respondents according to the 95% CI. The generalizability was also strengthened by the concordance between the medical diagnosis based on ICD-10 in this study and the state administration health statistics in 2007, only the ranking was slightly different.⁷ In addition, the case-control matching has likely reduced the impact of confounding.

Although the case-control matching reduced the sample size, it increased its representativeness and therefore the validity of the study results. Statistical effects of the matching was taken into account by the cluster option in the estimation of the variance, thus correcting for the intraclass correlation.¹⁹

Median Replacing the missing values by the median for the non-response to the questionnaire items is deemed to have had a small effect because there were less than 5% of missing data for any of these items. A ZINB regression model was necessary due to the fact that the zero values in the outcome variable were conditioned on being a control subject and to account for overdispersion.¹⁷

Time pressure and the need to closely coordinate the work of several colleagues across various sectors and occupations is inherent to many hospitals.²¹ The hospital workers better adapted to their jobs were also less likely to be absent from work due a serious illness. The eligibility criteria also might have reduced the chance of a very long HTL duration in the study and therefore decreased the association between JDC exposure and HTL duration (Table

2), unlike in the studies with workers from various economic sectors^{11,13-15,22} or from a hospital under heavy job-strain.¹²

Low coworker social support significantly increased the HTL duration, the effect observed for the supervisor's support (Table 2). Two explanations may be considered: (1) matching by workplace resulted in selecting the coworkers with similar psychosocial work settings which may have strengthened social support among them, (2) supervisor was not the same for all workers, thus decreasing the association between supervisor support and the HTL duration. Other epidemiologic studies evaluating the impact of social support on sickness-absenteeism found a significant impact of supervisor social support. For example, two studies found that low social support more than doubled the probability of absenteeism compared to high social support,^{13,15} and another study found that high and middle support reduced the absenteeism.²² In a cross-sectional study on demographic, clinical and occupational profile of the Santa Catarina state civil servants with HTL due to mental and behavioral disorders, the hospital workers reported a low social support at work.²⁵

The association between low coworker support and HTL due to the low strain job (Table 2) is a new finding. Low strain job usually protects the worker from illness. However, Karasek^[10] found that the workers with low strain had little motivation for leisure activities and health promotion. Applying this line of thinking may be an explanation for the above finding that a low strain job soon becomes monotonous because of its low psychological demand and high control. This reasoning is supported by the fact that this group of workers also reported the longest work experience (19 years on average).

Control variables explained between 13% and 29% of the variation in HTL duration (Table 2). Other studies have shown the relevance of socioeconomic and occupational variables for the relationship between sickness-absenteeism and

Table 1 - Number and percentage of control variables sex, age, marital status, income and occupation between cases and controls, among civil servants hospital workers from Santa Catarina State Department of Health (SES/SC), Brazil, 2010

Tabela 1. Número e porcentagem entre casos e controles das variáveis de controle sexo, faixa etária, estado civil, renda e ocupação, nos trabalhadores de hospitais estaduais públicos de Santa Catarina, Brasil, 2010

Control variables	Case N(%)	Control N(%)
Sex		
Male	22(15.27)	42(14.95)
Female	122(84.73)	239(85.05)
Age (years)		
28-39	16(11.11)	34(12.10)
40-49	69(47.92)	142(50.53)
50-64	59(40.97)	105(37.36)
Marital status		
Married or marital union	80(55.55)	165(58.72)
Divorced or apart	29(20.14)	39(13.88)
Single or widower	35(24.31)	77(27.40)
Income (US\$)#		
1° Quintile (359,44-721,57)	36(25.00)	49(17.44)
2° Quintile (721,58-893,88)	31(21.53)	54(19.22)
3° Quintile (893,89-1067,81)	26(18.05)	59(20.99)
4° Quintile (1067,82-1401,97)	28(19.45)	57(20.28)
5° Quintile (1401,97-7056,56)	23(15.97)	62(22.06)
Occupation		
General technic support*	38(26.38)	85(30.25)
Technical clerical workert	62(43.05)	110(39.15)
Patient care technician§	17(11.80)	28(09.96)
Job with higher education requirement‡	27(18.75)	58(20.64)

Average monthly income between June 2006 and July 2009 / # Renda mensal média de junho de 2006 a julho de 2009.

* Telephonist, cook, gardener, carpenter, bricklayer, plumber, painter, maintenance agent, electrician, tailor, boiler worker, driver, general service worker / * Telefonista, cozinheiro, jardineiro, marceneiro, pedreiro, encanador, pintor, agente de manutenção, eletricista, costureiro, caldeireiro, motorista, agente de serviços gerais.

† Office work for people with at least high school level education / † Técnicos administrativos.

§ Technician in radiology and image, laboratory ancillary, technician or ancillary in nursing / § Técnico em radiologia e imagem, auxiliar de laboratório, auxiliar e técnico em enfermagem.

‡ Manager, accountant, physician, nurse, pharmacist, speech therapist, nutritionist, educator, social worker, psychologist, occupational therapist, physiotherapist / ‡ Administrador, contador, médico, enfermeiro, farmacêutico, fonoaudiólogo, nutricionista, pedagogo, assistente social, psicólogo, terapeuta ocupacional, fisioterapeuta.

Table 2 - Number and percentage of exposure variables. Analysis using Zero-inflated Binomial Negative (ZINB) regression for quantity of HTL days in function of Job Demand-Control (JDC) and Work Social Support variables, it bivariate and adjusted by control variables (sex, age, marital status, income, and occupation), among civil servants hospital workers from Santa Catarina State Department of Health (SES/SC), Brazil, 2010

Tabela 2. Número e porcentagem das variáveis de exposição. Análise por meio da regressão Zero-Inflado com Binomial Negativa (ZINB) da quantidade de dias de LTS pelas variáveis do Modelo-Demanda Controle e do Suporte Social no Trabalho, bivariada e ajustada pelas variáveis de controle (sexo, idade, estado civil, renda, e ocupação), em trabalhadores de hospitais estaduais públicos de Santa Catarina, Brasil, 2010

Exposure variable	Case N(%)	Control N(%)	Bivariate	p Value	Adjusted	p Value
Psychological Demand						
Low (\leq Median)	72(50.00)	150(53.38)	1.00	—	1.00	—
High ($>$ Median)	72(50.00)	131(46.62)	1.03(0.46-2.26)	0.948	0.98(0.64-1.51)	0.937
Control over Work						
High ($>$ Median)	58(40.28)	122(43.42)	1.00	—	1.00	—
Low (\leq Median)	86(59.72)	159(56.58)	0.84(0.40-1.79)	0.663	1.24(0.80-1.92)	0.327
Job Demand-Control (JDC)						
Active	29(20.14)	62(22.06)	1.00	—	1.00	—
Low Strain	29(20.14)	60(21.35)	1.42(0.36-5.51)	0.614	1.35(0.63-2.89)	0.430
Passive	43(29.86)	90(32.03)	0.86(0.31-2.39)	0.771	1.32(0.77-2.25)	0.314
High Strain	43(29.86)	69(24.55)	1.19(0.40-3.54)	0.756	1.54(0.85-2.79)	0.153
Supervisor support						
High ($>$ Median)	71(49.30)	139(49.46)	1.00	—	1.00	—
Low (\leq Median)	73(50.70)	142(50.54)	0.85(0.45-1.61)	0.623	1.29(0.70-2.39)	0.413
Coworker support						
High ($>$ Median)	59(40.97)	127(45.20)	1.00	—	1.00	—
Low (\leq Median)	85(59.03)	154(54.80)	2.04(1.05-3.93)	0.034*	1.83(1.07-3.12)	0.028*
JDC with Supervisor Support						
Four JDC Jobs with High Supervisor Support	71(49.30)	139(49.46)	1.00	—	1.00	—
Active with Low Supervisor Support	10(06.95)	36(12.81)	0.31(0.16-0.60)	0.000***	0.59(0.30-1.17)	0.133
Low Strain with Low Supervisor Support	12(08.34)	16(05.69)	1.42(0.54-3.73)	0.470	1.56(0.74-3.28)	0.239
Passive with Low Supervisor Support	25(17.36)	42(14.95)	0.96(0.38-2.47)	0.942	1.72(0.72-4.14)	0.224
High Strain with Low Supervisor Support (Iso-strain supervisor support)	26(18.05)	48(17.09)	0.69(0.28-1.65)	0.402	1.13(0.58-2.23)	0.710
JDC with Coworker Support						
Four JDC Jobs with High Coworker Support	59(40.97)	127(45.20)	1.00	—	1.00	—
Active with Low Coworker Support	9(06.25)	36(12.81)	2.41(0.47-12.48)	0.293	1.30(0.65-2.56)	0.454
Low Strain with Low Coworker Support	12(08.34)	20(07.12)	3.36(1.40-8.04)	0.007**	2.68(1.37-5.27)	0.004**
Passive with Low Coworker Support	29(20.14)	50(17.78)	1.54(0.61-3.91)	0.361	1.72(0.68-4.35)	0.252
High Strain with Low Coworker Support (Iso-strain coworker support)	35(24.30)	48(17.09)	1.90(0.79-4.55)	0.151	1.78(1.02-3.12)	0.042*

* $p < 0,05$; ** $p < 0,010$; *** $p < 0,001$

psychosocial factors.^{23,24} In this study, socioeconomic and occupational variables may have contributed to the absenteeism of the workers with low coworker support. We hypothesize that these workers were well adapted to the hospital work and in good health. The effect of socioeconomic and occupational variables was observed only in the multivariate analysis where the interaction between low coworker support and high strain (iso-strain) reached statistical significance. A Belgian cohort study with workers of varied occupations and institutions also found a significant contribution of iso-strain on absenteeism, with effects over 90% stronger after adjusting for these variables.^[15] On the other hand, low coworker support alone and in combination with low strain job remained significant in both bivariate and adjusted analyze. We find plausible the explanation that absenteeism is a coping strategy which is essentially an avoidance behavior as a reaction to the perception of the work environment as threatening to the workers.¹⁵

There are several limitations of this study that should be borne in mind. First, the questionnaire data collection began nine months after the cohort follow-up ended, thus facilitating the losses of some control subjects and possibly a memory bias often observed in case-control studies.²⁰ Second, the number of participants was insufficient for a stratified analysis by gender which is often performed for this type of study.^{11,13,15,22} third, the option to return the questionnaires by mail might have increased the probability of non-response. On the other hand, both the outcome and the control variables were extracted from a reliable information source^[16] and the validity and reliability of the questionnaires has been tested in Brazil and other countries.²⁶

Conclusions

There is only a handful of studies of this type in England, Japan, Netherlands and the Scandinavian countries, none of

which specific to hospital workers. Present study revealed that low coworker support plays an important role in increasing the HTL duration in the Santa Catarina state hospital workers with low strain job and that low coworker support adjusted for socioeconomic and occupational variables modifies the effect of iso-strain. Furthermore, this research raised the hypothesis that with time hospital workers become better adapted to the jobs with high demand and low control, whereas a low strain job becomes monotonous.

The findings of this study have shown that interventions designed according to the specific working conditions of each hospital are likely to decrease the HTL duration and that the factors leading to low coworker support need to be addressed in the elaboration of such intervention. HTL incidence may be used as an indicator of the effectiveness of the intervention.

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