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Original papers

Occupational exposure and sick leave in a local food industry company

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Abstract

Background: Sick leave (SL) medical certificates may help identify the intervention needed to reduce occupational exposures (OE) impact on employees' health. OE may trigger increased sick days, but the question remains whether tracking medical certificates could improve health and working conditions.

The objective of this observational retrospective cohort study was analyzing the SL situation for a local company in 2008, OE impact on future medical leaves during the next decade, and on all-cause mortality, towards improving global employee health.

Methods: Employees of a local company were divided into two groups (G): G1-multiple OE including chemical hazards, rotating shifts, manual weight lifting, repetitive movements and machinery maneuvering (MWLRMMM), and G2-without OE. They were followed-up retrospectively between 2008-2018 regarding information from SL certificates, SL number, and all-cause mortality. Professional risk was assessed by professional risk factors identification forms, and on-site evaluation.

Results: 369 patients (45.4% of all employees), mean age 33 ± 8.2 years old, 41.2% men, received 11310 SL days, 3036 days on the first certificate. G1 included 324 (87.8%), while G2 included 45 patients (12.2%). The most common OE, in 292 patients (79.1% of total, 90.1% of G1) was MWLRMMM. Sick days were significantly higher in G1 (p=0.046), while the association with MWLRMMM was almost significant (p=0.053). During the next decade, subsequent SL were significantly increased by the presence of OE (p=0.0023, risk ratio=2.4), especially MWLRMMM (p=0.0026). All-cause mortality was higher in older employees (p=0.025), and uninfluenced by OE (p=0.3194) or other parameters.

Conclusions: SL are commonly prescribed, and OE is associated with more sick days, therefore improved working conditions may reduce SL. No association between OE and all-cause mortality was documented. Multiple sources of information (medical certificates, direct communication with employees and prescribing physicians) could lead to less sick days and a healthier work environment.

Keywords: *sick leave, occupational exposure*

Background

Medical certificates for sick leave (SL) are an important source of information when identifying the need for intervention strategies to preserve employees' health. To avoid or reduce the individual (exclusion from production, isolation, temporary loss of contact with work, a drop in enthusiasm and professional satisfaction, depression etc), company and community impact of SL, an improvement of working conditions is prompted (physiological factors e.g. work intensity and duration or automatisation of some processes, hygienic – microclimate, and/or ergonomic factors). In Romania, specific SL certificate guidelines have been issued for prescribing physicians, with periodic updates, but little fluctuations regarding the required information [1]. SL certificate emission is necessary for finalization of diagnosis, treating the patient, rehabilitation of work capacity, if affected, as well as providing information for other stakeholders: employers, insurance offices [2].

Occupational exposures (OE) may trigger an increase in temporary work incapacity days. The question remains: could the analysis of medical reasons for issuing SL certificates offer information to help improve working conditions and employee health? A study from Norway analyzed the potential for lowering SL by modifying working conditions after assessing the causes for SL days in 999 consecutive SL episodes by four Norwegian National Insurance collaborators. They concluded that information in medical certificates alone is insufficient [3].

Criteria for issuing SL certificates: these are emitted by family physicians and other categories of medical specialists under contract with the National Insurance House, and the receiver must have a minimum of 6 months of financial contribution during the past 12 months.

In Romania, the medical information in certificates includes a sick pay code (1 through 15, meaning various categories of diseases and 51 code for COVID 19-related certificates), an International Classification of Diseases (ICD) code, whether the patient has been hospitalized for the episode, as well as the number of sick days.

For the same diseases episode, one certificate (termed "initial") or more certificates may be emitted (termed "continued", with the same pay code, diagnosis code and the mentioning of the "initial" certificate series), according to the number of SL days and wheter this spans beyond the end of the month. The maximum number of sick days per certificate is 31. A follow-up on the patients receiving SL certificates could help this process, by illustrating the evolution of such a cohort in the future in terms of end-points such as additional sick days, hospitalizations and all-cause mortality.

Study objective

The objective of this observational retrospective cohort study was to analyze if SL certificates represent an important and sufficient source of information to design health programmes capable of improving global employee health, and of implementing intervention strategies to reduce SL impact on an individual, company, and community level, and whether during the next 10 years OE had any impact on future SL received by the patients, hospitalizations, and all-cause mortality. The analyzed certificates have been issued to a local company between 2008-2018.

Study methods

A retrospective observational cohort study was developed in a local food industry company regarding SL certificates from 2008-2018. Employees with certificated issued in 2008 were included, and their evolution was followed during the next 10 years.

The inclusion criteria were: company employees who took up a SL in 2008, regardless of ICD code, and age over 18. Employees with incomplete data in the computer system were excluded, and SL in 2008 emitted for the same patient were recorded as future certificates. Following a search for medical leave certificates listed for 2008, 372 patients were found, but 3 had missing data, with 369 patients remaining. The patients were divided into two groups (G): G1 - patients with OE and G2 - patients without OE, and were followed-up retrospectively for 10 years.

Data from 369 of the 812 company employees were analyzed, meaning 45.4% of all employees. In 2008, they received 11310 days of SL, out of which 3036 were days on the first issue of the certificate, excluding certificates for the same patient in 2008. The subjects were divided into two groups: G1 included 324 (87.8% of total included patients) with OE such as rotating shifts, including night shifts, manual weight lifting of approximately 5-10 kg, repetitive movements and machinery maneuvering (MWLRMMM) (e.g. electric pallet jack), exposure to chemical hazards (disinfectants and industrial cleaning products, powdered condiments), while G2 included 45 patients (12.2%) with desk jobs. Subjects in G1 and G2 were followed-up retrospectively between 2008 and 2018

in terms of received medical certificates. Professional risk was assessed in 2 ways: by professional risk factors identification forms, and by on-site evaluation of production departments.

Recorded study variables included: demographical data, company department, OE, information from medical leave certificates (ICD code, sick pay code, number of sick days on the first certificate, whether this is an initial or follow-up certificate, month of SL, prescribing physician – family physician or specialist), SL during the next 10 years (number of certificates and of sick days), all-cause mortality during the next 10 years. All-cause mortality was assessed by accessing the public National Health Insurance House website (http://siui.casan.ro:82/Asigurati/).

Statistical analysis used Microsoft Excel version 2013 and Epi Info version 7.2.2.2. Numerical variables were expressed as mean ± standard deviation, while categorical variables were expressed as absolute value with percentage. Comparison was performed by ANOVA and nonparametric tests for quantitative variables, and Chi squared and Fisher Exact test for qualitative variables, statistical significance was set for p-value < 0.05. The correlation between the quantitative variables was tested by linear regression, and in the multivariate models by logistic regression, the variables for which significant associations were obtained in the univariate analysis were entered, together with variables that presented known associations in previous studies, or could present mutual influences. Access to the computer system and data storage on the computers of the healthcare provider was secured, and all the ethical requirements were met.

Results

Of the 369 selected subjects, 41.2% were male, with a mean age of 33 ± 8.2 years. The mean number of days of leave in 2008 was 30.7 for each included patient, from multiple certificates.

Table 1 summarizes the main characteristics of the study lot on inclusion (in 2008). The age distribution in the study population can be found in Figure 1.

Table 1. Main characteristics of the study population on inclusion for 2008.

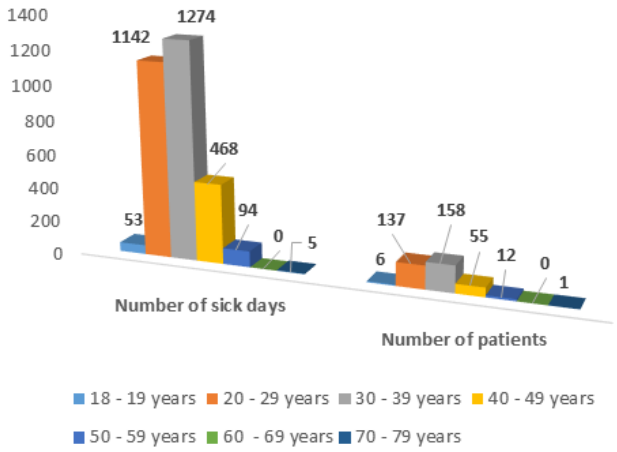
Parameter	Total sample (n=369)	G1 (n=324)	G2 (n=45)	p-value
Age (years)	33 ± 8.2	32.9 ± 8.2	32.5 ± 8.6	0.735
Male sex (n, (%))	152 (41.2)	139 (42.9)	13 (28.9)	0.0735
Initial certificate (n, (%))	339 (91.9)	297 (91.7)	42 (93.3)	0.7014
Number of sick days	8.2 ± 5.7	8.3 ± 5.5	7.7 ± 7	**0.046**
Hospitalized (n, (%))	29 (7.9)	26 (8)	3 (6.7)	0.751
Family physician (n, (%))	295 (79.9)	261 (80.6)	34 (75.6)	0.432

G= group, n=number, OE = occupational exposure

OE distribution is in accordance with the company structure, where personnel working in offices represents approximately 15%.

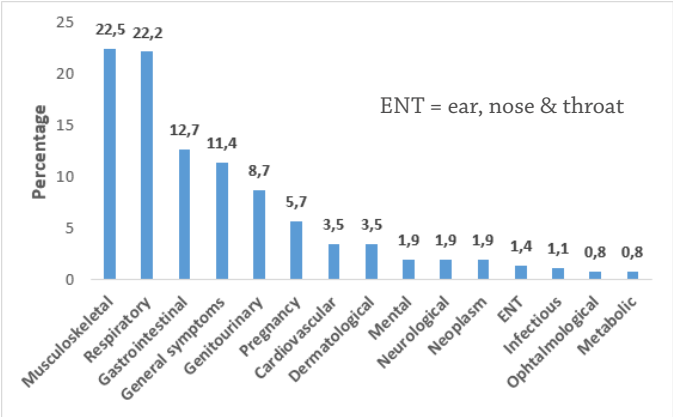
While most sick days (42%) according to age intervals were prescribed in the 30 – 39 years range, there was no significant correlation (p=0.391). Figure 1 illustrates the age distribution of sick days in the study lot. The number of sick days on inclusion was significantly different between specialist and family physicians (p=0.0186, 9.6 ± 6.4 in specialists versus 7.9 ± 5.5 days in family physicians).

Figure 1. Age distribution by decades for the employees included in the study lot, and sick days prescribed to them.



Diagnosis codes according to the ICD have been grouped in categories, as shown in Figure 2.

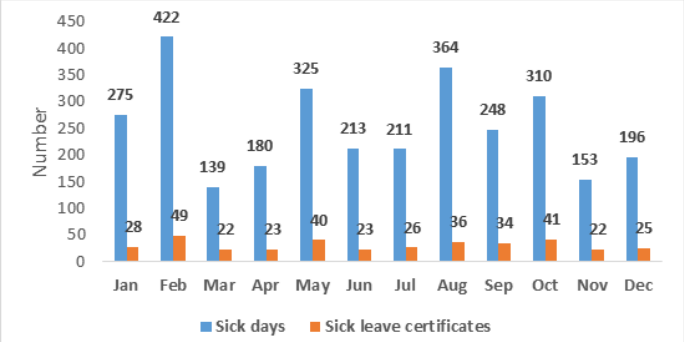
Figure 2. Disease categories in medical certificates on inclusion.



Musculoskeletal and respiratory diseases dominated the clinical picture, while pregnancy was the code for 5.7% medical certificates.

The number of sick days was unevenly distributed over the 12 months, as most of them were prescribed in February, August and May. The number of SL certificates followed a similar distribution, as seen in Figure 3.

Figure 3. Disease categories in medical certificates on inclusion.



In 2008, only certain sick pay codes were used, as follows: code 1 – common illness (2283 days, 299 patients), code 8 – pregnancy (348 days, 13 patients), code 6 – medical and/or surgical emergency (182 days, 35 patients), code 15 – maternal risk (80 days, 5 patients), code 9 – caring for a sick child aged <7 years (66 days, 11 patients), code 14 – neoplasms and AIDS (37 days, 3 patients), code 3 – work accidents (27 days, 2 patients), and code 13 – cardiovascular disease (13 days, 1 patient). Certificates for the work accidents category have mostly been Orthopedics and Rehabilitation specialists' recommendations, and between 2008 – 2018 there have been 46 such documents, with a total of 401 days (8.7 days per certificate, on average) and prescribed to 14 patients, leading to an average of 1.3/year.

The most prevalent OE, present in 292 patients (79.1% of total and 90.1% of G1) were MWLRMMM. These triggered borderline significant associations with the number of sick days (p=0.053) and hospitalization (p=0.06). Table 2 shows SL duration in exposed and non-exposed employees, according to 3 specific OE, in G1 and the total study sample population.

Table 2. Sick leave duration in exposed and non-exposed employees, by specific occupational exposures, in G1 and in the total study sample.

Ocupational risk factor	SL duration (mean and median) in exposed persons from G1 (n=324)	SL duration (mean and median) in non-exposed persons from G1 (n=324)	SL duration (mean and median) in exposed persons from the total study sample (n=369)	SL duration (mean and median) in non-exposed persons from the total study sample (n=369)	p in G1	p in the total study sample (G1 vs G2)
Manual weight lifting, repetitive movements, and machine handling (292 exposed)	8.2 (7)	9.3 (6.5)	8.2 (5)	8.4 (7)	0.475	0.053
Rotating shifts (264 exposed)	8.2 (7)	8.7 (5)	8.2 (7)	8.3 (5)	0.0616	**0.0074**
Chemical hazards (148 exposed)	8.7 (7)	8 (6)	8.7 (7)	7.9 (6)	0.2286	**0.0046**

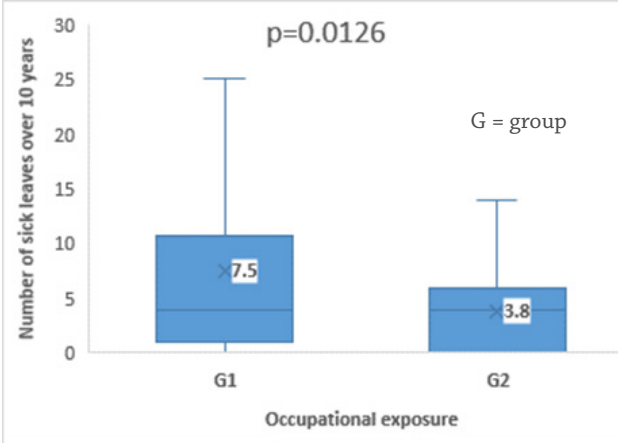
SL = sick leave, G = group

Evaluation after 10 years

From 2008 to 2018, company employees totaled 5955 SL certificates and 59055 sick days. 317 (85.9%) of the patients in the study lot totaled 27808 sick days out of the 59055 sick days for all the employees (47.1%), and 2589 medical leave certificates out of the company total of 5955 (43.5%).

The presence of subsequent SL was significantly associated to the presence of OE (p=0.0023, risk ratio=2.4, 95% confidence interval=(1.4;4.1)), confirmed by multivariate analysis (p=0.0013) in a model that included OE, age, sex, number of days and initial SL type (initial/continued), speciality of the prescribing physician (family physician or specialist), need for hospital admission. The number of medical leaves in the next 10 years was associated with sex (p=0.0001, 8.7 ± 9.8 in females versus 4.6 ± 5.6 in males), certificates prescribed by a specialist physician (p=0.0251, 9.6 ± 11 versus 6.4 ± 7.7 in those prescribed by family physicians), and OE (p=0.0126, 7.5 ± 9 in G1 versus 3.8 ± 3.8 in G2), but only the association with OE remained after logistic regression (p=0.0013, RR=3.5), with similar associations documented for the number of subsequent sick days (p=0.0014 for OE). Figure 4 shows the significant difference in means between patients from G1 and G2. Days of medical leave from work being recommended by specialist physicians in 2008 generated an almost significant association with the presence and number of medical leaves in the future after multivariate analysis as well (p=0.083 and 0.079, respectively). Hospitalizations in 2008 were not significantly different between patients who had/did not have subsequent sick leaves (p=0.6), nor were they linked to the number of subsequent leaves (p=0.1372), but there was a borderline significant association with the number of sick days (p=0.0652). After 10 years, subsequent medical leaves, the number of sick days, and the number of certificates were especially associated with MWLRMMM (p=0.0026, p=0.0004, p=0.005).

Figure 4. Association between occupational exposure and the number of sick leave certificates over the next 10 years.



After 10 years, 7 (1.9%) of all patients had died, regardless of cause. All-cause mortality was significantly associated with the age in 2008 (p=0.025), as the mean age in survivors was 32.7 ± 8.1 years, while patients who died were 41.6 ± 11.3 years old in 2008. There was no association with the presence of OE (p=0.3194), the initial number of sick days (p=0.522), gender (p=0.1), the disease category from the initial certificate (p=0.244).

Discussion

Almost half of the company employees had at least one day of SL in 2008. The extent of paid sick leave varies across Europe, by occupation and economic field, and in 2000 in the 15 member states of the European Union, 14.5% of employees reported sickness absence of at least 1 day in 2000, but these numbers have been constantly increasing [4]. With an average of approximately 1.3 patients with work accidents per year, mostly traumatic, this company appears to have a rather good safety at work (company frequency index 0.016 ‰ vs national frequency index in 2021 of 0.87 ‰) [5]. The study patients had a low mean age, as they were employed and active, with a female predominance, also found in the 999 patients of the Norwegian National Insurance trial [3].

The global presence of OE was linked to an increased number of sick days. Musculoskeletal and respiratory diseases were the most common reasons for incapacitating patients, but pregnancy, as a physiological state, was present in 5.7% of certificates. About 80% of the patients had MWLRMMM as an OE, and this could account for the fact that the most of the medical certificates (22.5%) were issued for musculoskeletal disorders. Upon detailed analysis according to specific OE, rotating shifts and chemical hazards each had a major impact on SL duration (p=0.0074 and p=0.0046, respectively), while the influence of MWLRMMM on this parameter was only borderline significant (p=0.053).

In February, many certificates had a respiratory disease as a diagnosis, with acute respiratory infections being more common in the cold season in Romania. Only about 8% of patients have been hospitalized during the episodes in 2008, an indicator of disease gravity, but this only had a borderline significant impact on future sick days in this study. The number of sick days recommended by specialists was significantly higher, both on inclusion and regarding future SL, as patients who are seen by specialists generally have more serious conditions, and sometimes are directed for a more detailed workup by the family physicians themselves. In Romania, family physicians have legally been restricted to prescribe more than a certain number of sick days, and this limit has fluctuated over the years, usually around 10 days per episode until august 2021, while specialists can prescribe up to 30 days or longer, for specific situations.

Future SL were also common in the study lot, as more than 85% of patients had at least one, and these patients represented 39% of company employees in 2008, while the sick certificates were 43.5%, with the rest being prescribed to employees without SL in 2008 or to new employees. OE, especially MWLRMMM, was the common risk factor for having sick days in the next 10 years, patients with OE being 3.5 times more likely to get SL certificates than those without hazards at work.

Although in Romania the life expectancy for men tends to be lower than for women, this was not

confirmed in our study, perhaps because of the low number of deceased patients during the follow-up interval of 10 years [6]. The mortality in this study population (almost 2%) remains higher than the one in Romania for the 30-34 years age group (about 1.2%) [7]. Age was the only factor influencing mortality, but a larger study with more patients and more companies could bring forward other predictors for this end-point.

The present research has some limits, such as the lack of data in patients' medical records, disease history or comorbidities, or not knowing the leave of absence medical certificate situation for patients leaving the company, lacking information about future hospitalizations and about the cause of death, partly because a centralized computer system for healthcare in Romania is still pending. Although most SL certificates are prescribed for actual illnesses, there is a certain but small percentage of these that are questionable from the medical point of view (they overlap with harvesting time, mainly in August and September). Future research in the form of a prospective study could add more information, including comorbidities and clinical data or treatment changes in patients who are prescribed SL.

Conclusion

SL are relatively often prescribed. The presence of OE, especially rotating shifts and chemical hazards, as well as manual mass manipulation, is associated with more sick days, an association that is also preserved for subsequent medical leaves. Therefore, if working conditions are improved, the number and duration of SL may be reduced. OE does not appear to influence all-cause mortality. A complex analysis focused on multiple sources of information (medical records, direct communication with the employees, and perhaps with the prescribing physicians) would benefit an individualized approach leading to less sick days, a safer work environment, and better productivity.

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