

Analysis of the Sick Leaves among Employee in the Laser Cutting Company

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We aimed to explore all registered sick leaves in the company for laser cutting stratified by the reasons, length of absence from work and their relation to the gender, occupation, and age.

This is a one-year, retrospective study of all claims of sick leave by employees working at the biggest Bulgarian company for laser cutting. All health claims for sick leaves after the end of 2017 were collected and systematized by the reason, according to the international classification of diseases (ICD) 10th edition; employee occupation position; length of sick leave; gender, and age. The productivity losses were calculated and analysed and statistical analysis was performed through χ^2 method and correlation analysis. In the production company for laser cutting most prevalent were the sick leaves due to respiratory and infectious disease, with a prevailing share of younger employees – approximately 46 years of age. Production losses are significant for the employer and country economy.

Key words: sick leaves, laser cutting, productivity losses, temporary disability

Introduction

Metallurgy and mechanical engineering companies are often considered as having highly polluted environments [2]. The nature of the work done in such companies produces conditions (i.e., microclimate changes), which adversely affect the employees' health, leading to reduced productive capacity, and increased absence from work due to sickness [6]. Environmental risk factors in the production area might include heating conditions, pollutants, air quality, humidity, air velocity; otherwise known as thermal factors [12]. There are many ways in which these factors interact in order to produce an adverse health effect. For instance, heating and melting of metals requires extreme temperatures, which puts employees at risk of having a heat stroke, additionally, the subsequent rapid cooling procedures greatly raise the humidity, which increases air pollutant concentrations, due to the formation of fine spherical particles of dust and soot, all suspended in a stale air environment [21]. In such conditions, workers are frequently exposed to drastic temperature fluctuations and are at risk of cough and flu infections, which later could progress to chronic conditions. Improvements in

workplace microclimate in production facilities are aimed at ensuring better working conditions, improving production capacity, and decreasing the incidence of accidents, adverse health effects, as well as employee morbidity [22].

Companies often time monitor closely the sick days of employees as well as the reasons for them in order to identify patterns and address health issues pre-emptively [24]. Appropriate action, whether that of an incapacity investigation or taking preventive measures, should always be undertaken and conducted within the stipulations laid down by applicable legislation. In addition, the sick leaves have probable impact of the production of the companies. Sick leave can be defined as the absence from work due to illness or injury [30]. Little is known about temporary disability due to sick leaves in the laser cutting companies and its influence on the employee and employer [10]. This provoked our interest towards exploring the sick leaves due to short- and long-term morbidity in a Bulgarian company for laser cutting.

We aimed to explore all registered sick leaves in the company for laser cutting stratified by the reasons, length of absence from work and their relation to the gender, occupation, and age.

Materials and Methods

This is a one-year, retrospective study of all claims of sick leave by employees working at the biggest Bulgarian company for laser cutting. All health claims for sick leaves after the end of 2017 were collected and systematized by the following characteristics:

- Reason, according to the international classification of diseases (ICD) 10th edition;
- Employee occupation position;
- Length of sick leave;
- Gender, and
- Age.

The productivity loses were analysed by multiplying the number of days out of work with average wage for the country and classified according to payer. The average national wage was taken from the National statistical institute for 2017 year, estimated to be 570 euro [18]. The average monthly wage in the production companies in 2017 was 570 euro. Therefore, we estimated the average daily wage to be 27 euro. According to the national legislation, the first 3 days of sick leaves are paid by the employer with the rate being the individual employee's daily salary, however since that information is private, our results are for the average national wage. The repeated sick leaves claimed by a single person were counted separately.

Statistical analysis was performed through χ^2 method and correlation analysis.

Results

Sick leave analysis

The share of males in the company was 78% out of all 265 permanent employees at the end of 2017. 79% of them had applied for a sick leave, although the majority of them were absent from work for no more than 3 days (n=220). Absences longer than 3 days were recorded for n=9 people, while only 21% stated that they had more than one

reason for sick leave. Long-term absences of up to 30 days and more were registered for 18% of the employees (**Table 1**). 1.2% reported having work-related injuries. Due to separated counting of the repeated sick leaves claimed by a single person the number of employees with ≤ 3 days sick leave days + number of workers with >3 days sums up to 276, more than the total employees in 2017.

Table 1. General characteristics of the observed group

Indicator	Value
Total number of employees at the end of 2017	265
Male	208
Female	57
Number of people with sick leave days	211
Number of cases with 3 days sick leave	220
Number of people with more than 4 reasons for sick leave	56
Number of people with 30 or more sick days	48
Share of people with sick leave days (%)	61.3%
Average length of temporarily incapacity for work (days)	7 (SD 8.6)
Average share of long-lasting work incapacity (%)	30.2%
Average share of short-lasting work incapacity (%)	35.7%
Frequency of working people with work injuries (%)	1.2%

Table 2. Registered cases and days of sick leaves according to ICD code of the disease

Disease group	ICD code	N days	N cases	Average length (days)
Infectious diseases	A00-B99	391	100	3.91
Malignancies	C00-D48	2	1	2
Endocrine disorders	E00-E90	10	2	5
Psychotic and anxiety disorders	F00-F99	108	3	36
Nervous system disorders	G00-G99	315	43	7.3
Eye diseases	H00-H59	110	16	6.9
Ear diseases	H60-H95	63	13	4.8
Blood system disorders	I00-I99	239	19	12.6
Respiratory system disorders	J00-J99	938	193	4.9
Digestive system disorders	K00-K93	215	29	7.4
Skin and subcutaneous tissues	L00-L99	75	9	8.3
Bones and muscles system	M00-M99	706	96	7.4

Urinary tract system disorders	N00-N99	87	21	4.1
Pregnancy, delivery and maternal period	O00-099	132	5	26.4
Laboratory tested symptoms	R00-R99	12	5	2.4
Injuries, poisoning and external factors influence	S00-T98	717	56	12.8
External factors morbidity and mortality	V01-V98	1	1	1.0
Health system general factors and contacts	Z00-Z99	197	4	49.3
Total		4318	616	7

According to the causes of sick leave, respiratory system disorders prevailed with 193 observed cases, lasting approximately 5 days on average, followed by musculoskeletal diseases (n=706 for 7.4 days), and infectious diseases (n=391 for 4 days on average) – (Table 2). The high number of cases is because people stated that they had more than one reason for sick leave. Infectious diseases and respiratory system disorders are typical for the winter season and we can suppose that they are probably less connected with the working environmental factors, while the diseases of bones and muscles could be influenced by the working conditions. The long-lasting absences are due to psychotic and anxiety disorders of 3 people which were out of work for 36 days per person on average. Relatively high was the share of injuries and metal poisoning, and it can be argued that nervous system disorders, eyes and ears diseases could also be attributed to the working environment.

According to the employee occupation the highest group at risk were the mechanics which comprised a total of 314 cases of sick leaves – (Table 3).

Mechanics suffer mostly from respiratory system, bones and muscles, and infection diseases, but injuries and poisoning are also observed at a very high rate with a share of 9% sick leaves.

The total number of sick days recorded for the year was 4318 and almost half of them are attributed to mechanics (n=2078) – (Table 4), 3267 cases are attributed to males and the rest to female employees.

Stratification by age group revealed that young to middle aged workers (median 46 years) accounted for most of the sick days – (Table 5). However, the most common reason given was infectious disease, due to which we can assume that these were seasonal diseases, owing to the higher frequency of respiratory and infectious diseases in the winter season.

Productivity losses

The average monthly wage in the production companies in 2017 was 570 euro. Therefore, we estimated the average daily wage to be 27 euro. According to the national legislation, the first 3 days of sick leaves are paid by the employer [15] with the rate being the individual employee's daily salary, however since that information is private,

Table 3. Registered number of cases of sick leaves per occupation and reason

Disease group	ICD code	laser cutting	powder coating	welder	mechanics	warehouses	Administration	Installers	Total
Infectious diseases	A00-B99	2	4	5	51	11	21	4	100
Malignancies	C00-D48							1	1
Endocrine disorders	E00-E90				1			1	2
Psychotic and anxiety disorders	F00-F99				1	2			3
Nervous system disorders	G00-G99		1	1	24	11	6		43
Eye diseases	H00-H59			3	8		5		16
Ear diseases	H60-H95			3	6		3	1	13
Blood system disorders	I00-I99			1	15		1	2	19
Respiratory system disorders	J00-J99	4	11	21	87	15	38	17	193
Digestive system disorders	K00-K93			6	19	1	3		29
Skin and subcutaneous tissues	L00-L99		1		5	2		1	9
Bones and muscle system	M00-M99	3	3	8	57	12	7	6	96
Urinary tract system disorders	N00-N99		2	2	9	1	1	6	21
Pregnancy, delivery and maternal period	O00-099						5		5
Laboratory tested symptoms	R00-R99			1	1			3	5
Injuries, poisoning and external factors influence	S00-T98	2	1	9	29	1	9	5	56
External factors morbidity and mortality	V01-V98						1		1
Health system general factors and contacts	Z00-Z99				1		3		4
Total		11	23	60	314	56	105	47	616

Table 4. Number of days of sick leaves per occupation

Disease group	ICD code	laser cutting	powder coating	welder	Mech-anics	Ware-Houser	Admini-stration	installers	Total
Infectious diseases	A00-B99	4	14	58	181	36	88	10	391
Malignancies	C00-D48							2	2
Endocrine disorders	E00-E90				9			1	10
Psychotic and anxiety disorders	F00-F99				44	64			108
Nervous system disorders	G00-G99		3	7	148	64	93		315
Eye diseases	H00-H59			19	73		18		110
Ear diseases	H60-H95			24	20		12	7	63
Blood system disorders	I00-I99			3	225		2	9	239
Respiratory system disorders	J00-J99	19	39	162	410	66	159	83	938
Digestive system disorders	K00-K93			20	140	13	42		215
Skin and subcutaneous tissues	L00-L99		1		51	14		9	75
Bones and muscle system	M00-M99	21	17	81	405	63	50	69	706
Urinary tract system disorders	N00-N99		12	5	28	2	3	37	87
Pregnancy, delivery and maternal period	O00-099						132		132
Laboratory tested symptoms	R00-R99			2	1			9	12
Injuries, poisoning and external factors influence	S00-T98	34	7	114	335	14	128	85	717
External factors morbidity and mortality	V01-V98						1		1
Health system general factors and contacts	Z00-Z99				8		189		197
Total		78	93	495	2078	336	917	321	4318

Table 5. Age distribution of sick leave days

Age group	laser cutting	powder coating	Welder	mechanics	warehouse	administration	installers	Total
to 25	11	46	140	581	62	100	5	945,0
26-35	48	30	166	859	103	473	103	1782
36-45	19	17	136	584	28	220	67	1071
46-55			53	52	120	121	143	488
above 55				2	23	3	4	32
Total	78	93	495	2078	336	917	321	4318

our results are for the average national wage. For the registered 616 cases, the number of days that the employer covered was 1848 days amounting to 49 896 euro. The other 2470 days are covered by the Social insurance fund but only at the rate of 75% the monthly wage. We calculated the cost covered by the social insurance fund to be 50 018 euro and the total amount of sick days cost was 99 914 euro. Thus, the total amount of productivity losses sums up to 149 819 euro and out of them 67% is paid by society in the form of insurance coverage or out-of-pocket expense.

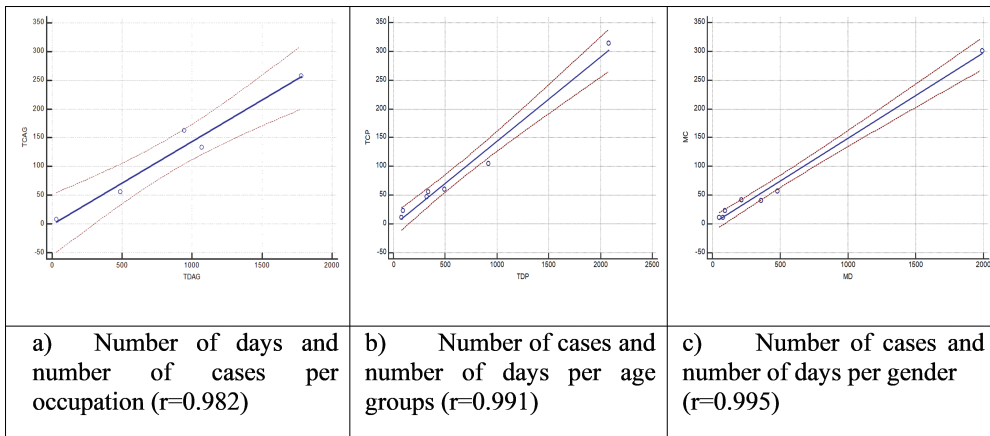
Statistical analysis

There is a statistically significant difference ($p=0.0104$) between the average number of cases of sick leaves for male ($n=6.6$) and female ($n=8.7$) employees. No statistically significant difference ($p=0.5271$) was found between the average number of days ($p=0.2962$) of sick leaves for male (15.7) and female (18.4).

A strong correlation was observed between the number of days and cases of sick leaves regardless of occupation, age group or gender with correlation coefficients varying between 0.995 and 0.982 (**Fig.1**).

Discussion

The current study explores for the first time the temporary disability in the laser cutting company in Bulgaria focusing on the medical reasons for diseases, age and gender distribution [25,26]. For the purposes of the analysis, temporary disability was defined as a condition that workers face as a result of illness or accident, because of which they temporarily could not perform their work and required health care services [13]. The regulatory framework in the country follows that of the European directives and its primary objective is to defend the interest of workers [8]. No cap on the number of sick days per year exist, but if the employee is out of work for 6 months, local legislation requires him to be examined by a medical committee which could decide that he is incapable of working and be diagnosed with a workplace related disability. To receive a



*Average line is the mean calculate value and upper and lower bands are for 95%CI

Fig.1. Correlation analysis

sick day, an employee has to document it through a health claim after which it is covered either by the employer or by the National Insurance Fund. Therefore, the data regarding all documented sick leaves in the company is valid and all days were consumed and correspond to the actual absences of the workers due to health reasons.

The temporary disability of 7 days per case in the observed company is close to number of sick leave days reported from other countries. The average number of sick days is 5.9 in UK [29]. Norway and Finland had the highest number of sickness absences per year per employee (Norway: women = 9.5, men = 8.0; Finland: women = 9.5, men = 6.2). Denmark and Sweden had the lowest number of sickness absence days (Denmark: women = 6.8, men = 5.3; Sweden: women = 7.1, men = 4.8) [23]. In Greece, in the private sector, the number of sick leave days was reported to be between 4.6 and 8.7 [1]. In the private sector of Singapore 3.2 days of medical leave per person per year were reported [5]. We can assume that industry and country specific characteristics have more influence on sickness absence than establishment size, employee's gender and occupation.

Studies that analyse the gender differences reported that women on average have more sick leaves than men [9,19]. Health differences and family reasons appear to be the best explanation for the gender difference in sickness absence [11]. In our study men comprised the majority of employees in the company which is why our results differ and a larger share of absences for males. Only 5 females were registered to have pregnancy and/or maternal leave for 132 days during the year.

In contrast with other authors, our study shows that younger ages consume more sick days, than older ones [17]. A reason for this could be the prevalent acute nature of the diseases for which employees applied for sick leave. Nonetheless, prophylactic measures should be taken more seriously among the observed workers and medical reasons should be explored in more detail in order to prevent chronic disease development [4,20]. Some authors also recommend ensuring zones for physical activities to reduce the likelihood of absence [27]. This is especially important for workers in production companies due to the high risk of musculoskeletal diseases [28]. Our study found a high prevalence of such diseases in comparison to other physiological systems that support such a proposal [7].

Sick leaves are causing significant production losses. Health-related productivity loss is estimated to cost the UK economy more than \$100 billion (£77.5 billion)[16]. In Spain per person cost due to productivity loss is reported to be from 2.589 euros to 1941 euros [3]. It is argued that costs could be reduced significantly if companies invested in adequate health and wellbeing programs for their employees [31]. In Bulgaria the average wage is the lowest one in EU and productivity losses are relatively lower in comparison to other countries but for the country itself they are not at all insignificant. Companies also experience a large burden due to sick leaves, evidence by the high productivity losses for the employer and employee in the observed company.

Limitation of our study is that we analysed only the officially registered health claims due to temporary disability and not the productivity losses due to presenteeism, although it also might have significant impact on the workforce's performance [14]. In addition, we recognize that the study might be mostly of interest of local authorities but international comparison shows that similar problems exist in many other countries and their comparison is important in order to reshape the national and international labour legislation.

Conclusion

In the production company for laser cutting most prevalent were the sick leaves due to respiratory and infectious disease, with a prevailing share of younger employees – approximately 46 years of age. Production losses are significant for the employer and country economy. There is a need of prophylactic and disease prevention programs to reduce the number of sick days leave and economic losses.

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