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Does The Cornell Medical Index Measure Real Or Perceived Occupational Health?

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Does The Cornell Medical Index Measure Real Or Perceived Occupational Health?

Abstract

Background. The Cornell Medical Index (CMI) has been widely used to measure health indicators. Although its effectiveness in detecting subjective pathologies has been demonstrated, it has not been evaluated as an epidemiological screening test to detect pathologies contrasted with clinical records.

Methods. A cohort sample with a two-stage randomized procedure was selected from occupational sectors of construction, industry and services in Valencia, on the Mediterranean coast in Spain, between 2006-2007. The CMI was completed by 30,000 workers, and was later correlated with their occupational medical data 6 months later.

Results. The CMI showed high sensitivity in areas of the nervous system and sensory organs (highest sensitivity value=97.52% and predictive value of a negative test=96.6%), mental disorders, skin and connective tissue diseases (highest also accuracy) and genitourinary disorders. Specificity was high for skin and connective tissue diseases (93.4%).

Conclusions. Construction and industrial workers had a higher adjusted risk than service workers. The CMI showed adequate sensitivity and positive predictive values and could therefore be used as a screening test in some areas.

Introduction

General health status measures classify patients into different health states. Several indicators have been developed to assess either a subject's level of perceived health, or his or her ability to carry out normal daily activities (personal tasks, work, travel, etc.).

The methodological starting point of the CMI as a general health measure was the assumption that health can be characterized by a set of scores applied to 5 aspects or dimensions of health status.

Within the CMI classification system, every individual state of health can be described by a row vector ? (x_1, x_2, x_3... x_n), where the element x_i represents the score in a specific dimension [1,2].

The CMI was first developed in 1949 in a much more rigorous format, containing both somatic and mental health aspects. It has been assessed on numerous occasions and used in different epidemiological analyses [3-7], as well as in the field of Occupational Medicine [5,6]. Similarly, abbreviated versions of the CMI have been validated [7], and various studies published in Spain demonstrate its applicability in our setting [8,9].

Although these studies describe the use of the CMI to measure a subject's perception of how healthy he or she is, no research has been done to correlate perception concerning health with objective occupational health data. That is the general question.

The study that came closest to addressing this matter was probably a paper published almost 25 years ago[10] that correlated CMI as a predictor of cardiovascular diseases.

The main objective of this paper was to explore the use of the CMI as a screening technique, comparing the results obtained from administration of the CMI questionnaire with the data obtained from the subject's clinical histories, used as the standard test. A secondary objective was to identify the demographic factors influencing the CMI in a typical Mediterranean community.

Methods

The study was conducted in Valencia, a region with one and a half million inhabitants on the Mediterranean coast of Spain, with a capital city of the same name. The region enjoys a benign climate, and a health feature is the typical Mediterranean diet based on vegetables, salads and olive oil. By law, all workers must have their own clinical record and must be covered by an occupational health service.

A random sequential selection method in two stages was used to draw up the sample. Firstly, a random selection of 857 companies was carried out. The sample selection process yielded the following distribution: construction 103,500 registered workers,

industry 206,800, and services 576,300. The farming population of the region was excluded directly. This sector accounted for only 3.4% (31,600) of the total working population of the area in the fourth quarter of 2002.

The size of the sample of workers was determined by the following values: Z=1.96, E=0.3%, p=0.5, and q=0.5. A total of 30,000 questionnaires were completed.

Only a few temporary workers dropped out of the study. Data were collected uniformly during 2002-2003. The pathologies were grouped according to the CMI groups.

By law, the clinical occupational histories are very similar, and comprise two parts: one addresses symptoms and signs and exhibits the same distribution as the pathological groups of the CMI. The other part records diagnosis, treatment and course. We use this second part to confirm the diagnosis. “Real” health was based on physicians’ assessments recorded in the medical record. This allows prospective follow-up of pathologies and treatments. The disorders diagnosed among the workers and recorded at initial assessment were recorded along with the disorders registered one year later.

The pathological classification of the CMI was used in this study. We first obtained the CMI self-report with the informed consent of the subjects to review their clinical data, and 12 months later we checked the clinical records for confirmed new diagnoses (the gold standard). For example epilepsy, seizures (neuropsychiatric diseases), asthma, chronic bronchitis, pneumonia (respiratory diseases), angina, congestive heart failure, hypertension (cardiovascular diseases), pyelonephritis, cystitis (urological diseases), dermatitis (dermatological diseases) etc., following the International classification of diseases (ICD-9th-CM) [11].

The summarized Spanish version of the CMI was used [9]. This version is comprised of 88 questions (closed answers), which can be grouped into 12 sections.

Section A, eyes and ears, was broken down into two groups. Likewise, section J was divided into two sub-sections, one corresponding to general status (with the variables of asthenia and anorexia), and the other to the consumption of toxic agents such as smoking - high tobacco consumer (> 20 cigarettes per day) - coffee (> 3 cups per day), and alcohol (more than 40 g per day). Questions 41, 58 and 80 were deleted.

Some sociomedical data were collected from the clinical and work records of the participating employees, including sector (services, industrial, construction), age, sex, marital status, weight in kg, height in cm, place of birth (born in the Valencian Autonomous Community or elsewhere), number of people living at home (including the worker), residence (the city of Valencia, metropolitan and rural areas), occupation or the kind of work the person does on the job, and years of professional experience.

For the occupation classification, the method proposed by Domingo and Marcos based on British Registrar General Classification of occupational status[12], was used as follows: group I managers and liberal professions, group II personnel managers, group III intermediate board_members and managers, group IV skilled manual workers, and group V semi-skilled manual workers.

Group VI (clergymen and army) was eliminated. Workers with previous occupational experience in different fields were also excluded (3%).

In order to validate the questionnaire, consensual validity was measured. For the items analysis, a global-item correlation was performed, resulting in values of over 0.55. Likewise, to assess internal consistency, inter-item correlations were calculated, yielding values of over 0.51. These tests were performed for all the CMI dimensions, as well as globally. A multivariate factorial analysis was also carried out. The internal consistency of responses to the questionnaire was also assessed with Cronbach's Alpha test, and a criterion of extraction of eigenvalues over 1 was employed for the confirmatory factorial analysis and structural equation.

There were two possible procedures for model estimation, comprising either aggregated or individualized data analysis. We opted for an aggregated model. With this approach the degrees of freedom for fixing the model are determined by the empirical number of health states. The comparison of models in logistic regression was carried out by means of the feasibility ratio test, based on the stepwise elimination procedure. The dependent variable in the regression model was the presence of patology or not with the CMI answers.

The rules followed for selecting the multiple logistic regression models were the following: firstly definition of the confounding and interaction variables; secondly evaluation of the interaction terms; and thirdly evaluation of the confounding terms, i.e., of bias and imprecision. In some cases, for deciding to include the variable in the model or not, we resorted to the Wald test. Evaluation of the confounding variables was carried out based on the reference odds ratio (OR),

constructing all possible models that can be formed with the candidate confounding variables, and selecting the best model among the submodels that practically show no important differences with respect to the reference model – taking into account that a more precise model was preferred, i.e., the model in which the OR confidence interval was narrowest.

We used the reliability coefficient or correlation coefficient between two sequential tests and the reliability index or reliability coefficient square root, which resulted in values of at least 0.65 and 0.48, respectively[13-15] . We performed diagnostic tests for sensitivity, specificity, positive and negative predictive value, false positive rate and false negative rate, accuracy, J index of Youden on diagnosis security, and likelihood ratio. Statistical test were the c2 tests with qualitative variables, variance analysis and a multivariate analysis using the logit model.

Results

The selected population were 30000 workers but the average response rate was 94.2% for the three sectors: industry 95%, construction 95% and services 93%.

The bulk of the immigrant population belonged to the construction sector (Table 1), where 56% of the workers come from outside the region of Valencia ($p<0.01$). In fact, differences between the sexes in the construction sector were extremely pronounced. In terms of professional categories, Group 3 (administrators and workers in public services) was the largest in the services sector.

The study of the quantitative sociomedical variables analyzed in relation to the different occupational sectors is shown in Table 2. Significant age differences were found between the three sectors. In this regard, the variable of years of professional experience, height, weight and BMI showed relevant differences among the sectors.

Answers to the CMI were classified into pathological groups (Table 3). There were statistical differences in the answer distribution of the pathological groups. A significative finding was that the workers with the highest positive proportion answers of disorders in the different sections belonged to the services sector, with a mean of 10.3% of the total, followed by industry with 7.9%, and the construction sector, 6.1% ($p<0.01$).

However, there were two pathological groups which accounted for approximately twice the number of affirmative answers in the construction group: articular pathologies (distribution of positive answers: 19.7% construction, 12.8 industry, 6.6% services); and dermatological pathologies.

In relation to tobacco and alcohol, construction workers showed a considerably higher consumption rate: 67.4% were smokers and 26% were heavy smokers (Table 4). The corresponding percentages were 56% and 19.5% in the services sector. 15 % of the construction population drank either moderately or heavily, whereas the corresponding percentage for the services and industrial sectors was about 7% ($p<0.01$).

High consumption of coffee (> 3 cups per day) was far more frequent in the services sector, with a rate of 25% - nearly double that of the other sectors ($p<0.01$).

With these results, the CMI proves to be a highly sensitive measuring tool (Table 5), with figures of over 97% for the nervous system and sensory organs, followed by mental (94%) and skin and connective tissue diseases (91%). In the other pathological groups, the values were around 60%.

The sensitivity of the CMI was 92.1%, while its specificity and accuracy were 69% and 89%, respectively.

When the logit study was applied to the factors related to the pathological group of the CMI survey (Table 6), the adjustments regarding R2 did not exceed 74%, but showed a relatively high prediction percentage, better than 85%, with a significant X^2 test.

From the statistical point of view, the pathologies detected with the CMI were not found to be related to any of the following factors: the number of people, immigrants, or subject place of residence.

Of all the factors taken into account, age was the most important, with an impact on respiratory, cardiac, locomotive and dermatological pathologies. The construction and industrial sectors had a lower risk for cardiovascular and locomotive pathologies after adjusting by the age, BMI, years of experience and toxic consumptions.

Discussion

Sociomedical variables description. Our analysis of sociomedical variables revealed that the population we studied was relatively young (x=37 +/- 10.6). This is mainly due to the incorporation of young workers to the labor market, as a result of the demographic boom that took place in Spain in the 1960s and the great immigration of recent years.

While the average body mass index (BMI) for the global population was 24.8, this figure was slightly

higher in construction workers (BMI=25.4). This may be due to the fact that this collective was slightly older than the other groups. Pathological obesity, defined by BMI > 30, was not found[16].

When the factor of place of birth was taken into account, we found that a high percentage of workers (almost 40%) had come from outside Valencia. This is probably due to the high influx of immigrants from underdeveloped countries, particularly to the construction sector (56%).

The bulk of the population in our sample lived in the city of Valencia and its metropolitan area. Apart from purely demographic reasons, this circumstance can also be explained by the large number of companies established in the city and metropolitan area, and by the fact that the agricultural sector was excluded from our study.

Another finding of note was that in general, the services sector revealed the highest number of disorders or symptoms detected by the CMI, while the construction sector registered the lowest.

In turn, the construction sector registered a higher consumption of toxic substances (tobacco and coffee), with a greater percentage of smokers (67.4%, with a high proportion of heavy smokers as well: > 20 cigarettes a day, 26.4%). Almost 15% of this sector also acknowledged daily alcohol intake, compared with 7% in the other sectors (though in the latter case real consumption is higher than admitted, according to data from other studies) [17].

A possible consequence of these negative factors may be the high accident rate in the construction sector, which is the economic activity with the highest level of accidents in the Community of Valencia (17.8% of all labor accidents) – despite the fact that this sector only represents 7% of the registered working population.

Services workers nonetheless showed the lowest levels of subjective pathologies in two categories: osteoarticular pathologies [18] and dermatological pathologie. This finding is very logical, since construction workers are exposed to numerous risks[19], and is in line with the observations of other studies which outline a greater incidence of eczema on the hands in the construction sector, due to the known irritating and sensitizing effect of cement, and to exposure to numerous sensitizing agents used in rubber gloves and boots [20].

CMI. The CMI has proven to be useful in detecting emotional and neurotic disorders and somatic impairments [3, 21-22], since it allows the patient to freely express his or her symptoms, while collecting neuropsychiatric information at the same time and also measuring anger [23] [23]. In fact, studies on epidemiological disease patterns indicate that changes in the production mode can increase functional pathologies. The fact that the disorders reported in the neuropsychiatric section are clearly predominant in the services sector, together with the logit analysis, further indicates that the CMI is able to detect psychopathological disorders. Furthermore, the CMI showed the highest sensitivity score for the two groups of nervous system and mental disorders. This figure was also found in another paper that studied an older population and the concordance of CMI with structured clinical assessment for the identification of physical health status [24].

Our results showed almost no correlations among the different occupations studied and the pathologies detected by the CMI, after adjusting by other factors as the age, BMI, years of experience and toxic consumptions.

The services sector is generally considered to be privileged because it is free of classical risk factors such as physical danger, air contaminants like smoke and dust, noise, the handling of toxic substances or risk of traumatisms or radial tunnel syndromes [25]. However, the working environment of the services sector does present aggressive factors that can lead first to mental problems and later to physical disorders as well. These include a sedentary lifestyle, permanent stress, etc. Such risk factors can initially produce subtle changes in perceived health, such as irritability, mood changes or disorders in social relationships and dissatisfaction. As an example, workers in the Hamburg Construction Worker Study showing low satisfaction with their work achievements had a higher prevalence of chronic lower back pain [26]. All of these alterations can trigger neurovegetative responses, which, if long lasting, will eventually bring about organic lesions such as peptic ulcers, sustained hypertension and coronary disease [27]. There were no statistical differences among the sensitivity scores related to these factors of the three sectors.

Another factor to take into account is geography, or the physical environment proper. Some studies in the Community of Valencia [28] indicate that the risk of death from mental and central nervous system pathologies is smaller in predominantly industrial areas than in agricultural zones.

The findings of this study show that the CMI proves to be adequate as a screening test. Its sensitivity is high (92.1%), and it exhibits a strong positive predictive value (95%). Very few false negatives were detected, and the overall value of the test as a predictor of

health was good, particularly in the areas of the nervous system and sensory organs, genitourinary diseases, mental disorders, and skin and connective tissue diseases. The CMI can therefore serve as a very valid instrument in predicting pathologies, particularly in these areas – as was predicted 20 years ago [10] or more [29]. There was limited sensitivity in the cardiovascular and locomotive systems. In this sense, a previously published paper studied factors segregated by the hypothalamic-pituitary-adrenal axis in patients with rheumatoid arthritis, but found no correlation with the responses to the CMI health questionnaire [30].

The idea of a relationship between disease and the CMI is almost new. A previous paper established the relationship between[31] primary health care center attendance rates and CMI scores among both husbands and wives.

Limitations and biases. Several factors may introduce biases that are difficult to control in a study of this nature. The first of these is the simple use of the working population to select the sample, because this segment enjoys better health than the population as a whole and is not representative of the unemployed population. This bias, nonetheless, has not interfered with the internal validity of the study.

A final consideration is that the respondents to the questionnaire may have forgotten data, and that this may have introduced inaccuracies in terms of the pathologies reported or an underestimation of health problems. As some authors state, the answers solicited by the CMI in certain sectors may reveal the respondents' feelings about health, rather than their actual health status [5]. Lastly, the study was carried out among members of the working population who might have been afraid of revealing the degree of their health problems. However, this study is supported in part by another previous survey, at least in the field of somatic health [32].

A diagnostic understatement is likely, due to different reasons. For example, it is possible that in some generally chronic pathologies, confirmation of the diagnosis took more than 6 months, and also in some cases the diagnosis may not have been recorded in the clinical story (healthy effect). This would have affected the specificity and sensitivity values, and probably more in some pathologies than in others. However, we need more studies to confirm this relationship to health status.

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Illustrations

Illustration 1

TABLE 1

TABLE 1.

SOCIOECONOMIC VARIABLES PER OCCUPATIONAL SECTOR (number and percentages).

	SERVICES	INDUSTRY	CONSTRUCTION	TOTAL
Sex				
male	6851 (68.6%)	7232 (74.4%)	9661 (97.8%)	23744
female	3138 (31.4%)	2488 (25.6%)	221 (2.2%)	5847
TOTAL	9989	9720	9882	*p*<0.001
Marital status				
single	3531 (35.9%)	4231 (43.8%)	5073 (52.8%)	12835
married	6061 (61.7%)	5287 (54.7%)	4373 (45.5%)	15721
widowed	87 (0.9%)	36 (0.4%)	14 (0.1%)	137
divorced	149 (1.5%)	111 (1.1%)	148 (1.5%)	408
TOTAL	9828	9665	9608	*p*<0.01
Foreign				
no	5317 (69.1%)	6188 (69.2%)	3912 (43.9%)	15417
yes	2381 (30.9%)	2752 (30.8%)	4996 (56.1%)	10129
TOTAL	7698	8940	8908	*p*<0.001
Residence				
Valencia	5923 (61.3%)	5749 (63.2%)	3781 (40.3%)	15453
Metropolitan areas	3745 (38.7%)	3344 (36.8%)	5590 (59.7%)	12679
TOTAL	9668	9093	9371	*p*<0.001
Professional categories(*)				
1	69 (0.7%)	48 (0.5%)	130 (1.30%)	247
2	587 (6%)	104 (1.1%)	291 (3%)	982
3	2529 (26%)	758 (7.9%)	418 (4.3%)	3705
4	1739 (17.8%)	1633 (16.9%)	3122 (31.9%)	6494
5	1710 (17.5%)	2309 (23.9%)	3114 (31.8%)	7133
6	3111 (31.9%)	4797 (49.7%)	2706 (27.7%)	10614
TOTAL	9745	9649	9781	

Note: Professional categories(*): See annex 1

Illustration 2

TABLE 2

TABLE 2.
STATISTICAL ANALYSIS OF QUANTITATIVE VARIABLES PER OCCUPATIONAL SECTOR. Mean (SD)

	SERVICES	INDUSTRY	CONSTRUCTION	TOTAL
Age	39.27 (10.70)	32.04 (9.51)	41.37 (11.6)	37.56 (10.6)**
Years of experience	11.17 (6.59)	8.66 (7.15)	11.61 (10.91)	10.48 (9.21)**
Number of people	3.78 (1.39)	4.01 (1.48)	3.81 (1.60)	3.86 (1.31)*
Height	170 (8.70)	169 (8.69)	172 (6.88)	170 (8.09)**
Weight	70.74 (12.94)	67.88 (13.44)	74.24 (11.99)	70.95 (38.37)**
BMI	24.31 (3.49)	23.66 (3.70)	25.37 (3.78)	24.80 (8.62)**

Note: BMI = Body Mass Index, Analysis of variance *p<0.05 , **p<0.01

Illustration 3

TABLE 3

TABLE 3.
STATISTICAL ANALYSIS OF THE ANSWERS TO THE CMI SECTIONS AND OCCUPATIONAL SECTORS (number and percentage).

PATHOLOGY	SERVICES	INDUSTRY	CONSTRUCTION	TOTAL
Ophthalmological				
Yes	7324 (18.4%)	5359 (13.6%)	4799 (12.1%)	17482 (14.7%)
No	32511 (81.6%)	34127 (86.4%)	35012 (87.9%)	101650 (85.3%)
Total	39834	39486	39811	$p<0.01$
Auditory				
Yes	2802 (9.4%)	2457 (8.3%)	1962 (6.6%)	7221 (8.1)
No	27057 (90.6%)	27072 (91.7%)	27780 (93.4%)	81909 (91.9)
Total	29859	29529	29742	$p<0.01$
Respiratory				
Yes	7069 (7.1%)	5785 (5.9%)	5133 (5.1%)	17987 (6%)
No	92780 (92.9%)	92771 (94.14%)	94599 (94.9%)	280150 (94%)
Total	99849	98556	99732	$p<0.001$
Cardiovascular				
Yes	10106 (10.1%)	7743 (7.9%)	5906 (5.9%)	23755 (8%)
No	89514 (89.9%)	90700 (92.1%)	93711 (94.1%)	273925 (92%)
Total	99620	98443	99617	$p<0.01$
Digestive				
Yes	9982 (11.1%)	8316 (9.4%)	6546 (7.3%)	24844 (9.2%)
No	79944 (88.9%)	80545 (90.6%)	83281 (92.7%)	243770 (90.8%)
Total	89926	88861	89827	$p<0.01$
Articular				
Yes	1989 (6.6%)	3790 (12.8%)	5893 (19.7%)	11672 (13%)
No	28089 (93.4%)	25769 (87.2%)	24053 (80.3%)	77911 (87%)
Total	30078	29559	29946	$p<0.01$
Dermatological				
Yes	3111 (4.5%)	5036 (7.3%)	6067 (8.7%)	14214 (6.8%)
No	66721 (95.5%)	63736 (92.7%)	63729 (91.3%)	194186 (93.2%)
Total	69832	68772	69796	$p<0.01$
Neuropsychiatric				
Yes	11810 (13.1%)	8024 (9%)	6428 (7.2%)	26262 (9.8%)
No	78039 (86.9%)	80827 (91%)	83380 (92.8%)	242246 (90.2%)
Total	89849	88851	89808	$p<0.01$
Urological				
Yes	2875 (4.11%)	2318 (3.4%)	2234 (3.2%)	7427 (3.6%)
No	66922 (95.9%)	66770 (96.6%)	67653 (96.8%)	201345 (96.4%)
Total	69797	69088	69887	$p<0.01$
Systemic				
Yes	831 (2.1%)	445 (1.1%)	749 (1.9%)	2025 (1.7%)
No	38927 (97.9%)	38753 (98.9%)	38881 (98.1%)	116561 (98.3%)
Total	39758	39198	39630	$p<0.01$

X^2-test

Illustration 4

TABLE 4

TABLE 4.
STATISTICAL ANALYSIS OF THE ANSWERS TO THE GENERAL STATUS, TOXIC AGENT CONSUMPTION AND OCCUPATIONAL SECTORS (number and percentage)

PATHOLOGY	SERVICES	INDUSTRY	CONSTRUCTION	TOTAL
General status				
Yes	1598 (8.1%)	1423 (7.3%)	1623 (8.1%)	4644 (7.8%)
No	18257 (91.9%)	18179 (92.7%)	18373 (91.9%)	54809 (92.20%)
Total	19855	19602	19996	*p*=0.92
Coffee (+3 cups/day)				
Yes	2381 (24.5%)	1044 (10.6%)	1482 (15.8%)	4907 (16.9%)
No	7328 (75.5%)	8825 (89.4%)	7910 (84.2%)	24063 (83.1%)
Total	9709	9869	9392	*p*<0.01
Tobacco				
Yes	5448 (55.7%)	5972 (64.7%)	6243 (67.4%)	17663 (62.5%)
No	4327 (44.3%)	3261 (35.3%)	3015 (32.6%)	10603 (37.5%)
Total	9775	9233	9258	*p*<0.001
Tobacco (+20 cigarettes/day)				
Yes	1821 (19.5%)	1121 (12.4%)	2356 (26.4%)	5298 (19.4%)
No	7536 (80.5%)	7945 (87.6%)	6579 (73.6%)	22060 (80.6%)
Total	9357	9066	8935	*p*<0.01
Alcohol (+40 g/day)				
Yes	587 (3.1%)	587 (3.19%)	1359 (7.1%)	256 (4.44%)
No	18552 (96.9%)	17493 (96.8%)	17893 (92.9%)	5513 (95.56%)
Total	19139	18080	19252	*p*<0.01

Note= X^2-test, $p<0.05$

Illustration 5

TABLE 5

TABLE 5.
LOGIT ESTIMATION IN RELATION TO THE PATHOLOGIES PRESUMABLY DETECTED BY THE CMI AND SOCIO-OCCUPATIONAL. FACTORS STUDIED. MULTIVARIATE MODELS.

	RESPIRATORY		CARDIOVASCULAR		DIGESTIVE		LOCOMOTIVE		DERMATOLOGY		MENTAL		GENITOURINARY	
	C(*)	p	C(*)	p	C(*)	p	C(*)	p	C(*)	p	C(*)	p	C(*)	p
Constant	0.004	n.s.	4.01	n.s.	2.17	n.s.	6.59	0.01	3.03	0.01	2.14	n.s.	1.01	n.s.
Sector_1	1.04	n.s.	-1,17	0.04	1.04	n.s.	-1,19	0.01	-0,28	n.s.	0.04	n.s.	-1,21	n.s.
Sector_2	-0.45	n.s.	-1,36	0.03	5.05	n.s.	-0,46	0.01	-0,06	n.s.	0.1	n.s.	1.31	n.s.
Civil status_1	7.23	n.s.	0.18	n.s.	1.21	n.s.	2.4	n.s.	3.04	n.s.	0.49	0.01	2.44	n.s.
Immigrant	3.41	n.s.	0.39	n.s.	2.24	n.s.	1.38	n.s.	1.26	n.s.	1.2	n.s.	0.19	n.s.
Number of people	-3.21	n.s.	2.34	n.s.	0.68	n.s.	-2.08	n.s.	-2.03	n.s.	2.17	n.s.	0.21	n.s.
Address_1	5.49	n.s.	1.47	n.s.	0.63	n.s.	1.29	n.s.	0.48	n.s.	2.09	n.s.	0.02	n.s.
Address_2	0.23	n.s.	5.07	n.s.	0.19	n.s.	1.11	n.s.	1.44	n.s.	1.18	n.s.	0.2	n.s.
Occupation_1	0.005	n.s.	0.09	n.s.	-1.12	n.s.	0.47	n.s.	-0.29	n.s.	-1.35	n.s.	0.32	n.s.
Occupation_2	2.49	n.s.	1.23	n.s.	1.15	n.s.	0.67	n.s.	0.31	n.s.	1.07	n.s.	0.22	n.s.
Occupation_3	-2.1	n.s.	0.41	n.s.	2.46	n.s.	0.39	n.s.	0.15	n.s.	1.01	n.s.	1.13	n.s.
Occupation_4	1.33	n.s.	0.03	n.s.	1.68	n.s.	0.44	n.s.	0.09	n.s.	0.61	n.s.	5.56	n.s.
Sex_1	0.09	n.s.	1.23	n.s.	0.01	n.s.	-0.35	n.s.	1.11	n.s.	0.16	0.01	1.7	n.s.
Age	1.05	0.04	0.77	0.01	1.3	n.s.	0.4	0.02	0.06	0.01	0.05	n.s.	2.46	n.s.
Years of experience	1.06	0.04	-2.38	n.s.	0.02	n.s.	0.24	n.s.	0.05	n.s.	0.23	n.s.	2.06	n.s.
Age*Years of experience	1.08	0.03	1.48	n.s.	2,00	n.s.	1.24	n.s.	-0.09	n.s.	-0.33	n.s.	1.38	n.s.
Coffee	3.66	n.s.	-1.35	n.s.	1.15	n.s.	0.73	n.s.	3.71	n.s.	0.41	n.s.	0.87	0.01
Tobacco	2.96	0.01	0.01	n.s.	4.71	n.s.	2.58	n.s.	2.18	n.s.	0.42	n.s.	0.12	0.03
Alcohol	2.14	n.s.	0.04	n.s.	0.31	0.03	3.39	n.s.	1.92	n.s.	1.24	n.s.	0.36	0.01
BMI	1.43	0.02	0.07	n.s.	0.46	n.s.	0.13	0.03	0.04	n.s.	1.35	n.s.	1.2	n.s.

NOTE: C(*)=correlation coefficient,
n.s.=non-significant

Illustration 6

TABLE 6

TABLE 6.
RESULTS OF THE CROSSING BETWEEN THE SICK INDIVIDUALS DETECTED THROUGH THE MEDICAL REPORTS AND THOSE ALLEGEDLY SICK DETECTED THROUGH THE TEST*.

Group	Description	S	Sp	PVP	PVN	FPR	FNR	A	J	LR(+)	LR(-)
V	Mental disorders	93.9 (93.6-94.3)	68.3 (67.5-69.1)	79 (78.4-79.6)	89.9 (89.3-90.5)	31.7 (30.9-32.5)	6.1 (5.7-6.4)	82.7 (82.2-83.1)	0.6	2.97 (2.89-3.05)	0.09 (0.08-0.09)
VI	Nervous system and sensory organs	97.52 (97.2-97.7)	74.7 (74.7-76.2)	81.2(80.6-81.8)	96.6 (96.1-96.8)	24.5 (23.8-25.3)	2.5 (2.3-2.8)	86.9 (86.5-87.3)	0.7	3.97 (3.86-4.09)	0.03 (0.03-0.04)
VII	Cardiovascular system	51.9 (51-52.7)	50,7 (49.9-51.5)	49.4 (48.5-50.2)	53.2 (52.4-54)	49.3 (48.5-50.1)	48.1 (47.3-49)	51.3 (50.7-51.8)	0	1.05 (1.06-1.16)	0.95 (0.93-0.97)
VIII	Respiratory system	66 (65.2-66.8)	78.7 (78-79.3)	75.2 (74.4-76)	70.2 (69.5-70.9)	21.3 (20.7-22)	34 (33.2-34.8)	72.4 (71.8-72.9)	0.4	3.09 (2.99-3.2)	0.43 (0.42-0.44)
IX	Digestive system	58.5 (57.9-59)	55.3 (53.3-57.3)	93.8 (93.4-94.1)	10.4 (9.9-10.9)	44.7 (42.7-46.7)	41.5 (41-42.1)	58.2 (57.6-58.8)	0.1	1.31 (1.25-1.37)	0.75 (0.74-0.77)
X	Genitourinary diseases	81.6 (81-82.2)	83.1 (82.4-83.7)	85.5 (84.9-86)	78.8 (78.1-79.4)	16.9 (16.3-17.6)	18.4 (17.8-19)	82.3 (81.8-82.7)	0.6	4.82 (4.64-5.01)	0.22 (0.21-0.23)
XII	Skin and connective tissue diseases	91.2 (90.7-91.6)	93.4 (93-93.8)	93.3 (92.9-93.7)	91.4 (90.9-91.8)	6.6 (6.2-7)	8.8 (8.4-9.3)	92.3 (92-92.6)	0.8	13.9 (13.06-14.8)	0.09 (0.09-0.1)
XIII	Locomotive system and connective tissue	57 (56.3-57.6)	72.7 (71.4-73.9)	91.1 (90.6-91.5)	25.6 (24.9-26.3)	27.3 (26.1-28.6)	43 (42.4-43.7)	59.6 (59.1-60.2)	0.3	2.09 (1.99-2.19)	0.59 (0.58-0.6)
	TOTAL	92.1 (91.8-92.5)	68.7 (67.3-70.1)	94.9 (94.6-95.1)	58.2 (56.8-59.6)	31.3 (29.9-32.7)	7.9 (7.5-8.2)	88.9 (88.6-89.3)	0.6	2-95 (2.81-3.08)	0.11 (0.11-0.12)

Note: =* WONCA classification, S=Sensitivity, Sp=Specificity, PVP=Predictive value of a positive test, PVN=Predictive value of a negative test, FPR=False positive rate, FNR=False negative rate, A=Accuracy, J=Index J of Youden, LR+=Positive likelihood ratio, LR-=Negative likelihood ratio

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