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DO WORKERS' HEALTH SURVEILLANCE EXAMINATIONS FULFILL THEIR OCCUPATIONAL PREVENTIVE OBJECTIVE? ANALYSIS OF THE MEDICAL PRACTICE OF OCCUPATIONAL PHYSICIANS IN CATALONIA, SPAIN

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Abstract

Objectives: Although routine workers' health examinations are extensively performed worldwide with important resource allocation, few studies have analyzed their quality. The objective of this study has been to analyze the medical practice of workers' health examinations in Catalonia (Spain) in terms of its occupational preventive aim. **Material and Methods:** A cross-sectional study was carried out by means of an online survey addressed to occupational physicians who were members of the Catalan Society of Safety and Occupational Medicine. The questionnaire included factual questions on how they performed health examinations in their usual practice. The bivariate analysis of the answers was performed by type of occupational health service (external/internal). **Results:** The response rate was 57.9% (N = 168), representing 40.3% of the reference population. A high percentage of occupational physicians had important limitations in their current medical practice, including availability of clinical and exposure information, job-specificity of tests, and early detection and ap-

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propriate management of suspected occupational diseases. The situation in external occupational health services – that covered the great majority of Catalan employees – was worse remarkably in regard to knowledge of occupational and non-occupational sickness absence data, participation in the investigation of occupational injuries and diseases, and accessibility for workers to the occupational health service. **Conclusions:** This study raises serious concerns about the occupational preventive usefulness of these health examinations, and subsequently about our health surveillance system, based primarily on them. Professionals alongside health and safety institutions and stakeholders should promote the rationalization of this system, following the technical criteria of need, relevance, scientific validity and effectiveness, whilst ensuring that its ultimate goal of improving the health and safety of workers in relation to work is fulfilled. Other countries with similar surveillance systems might be encouraged by our results to assess how their practices fit the intended purpose. Int J Occup Med Environ Health 2017;30(6):823–848

Key words:
Occupational medicine, Occupational health services, Workers' health surveillance, Periodical medical examinations, Medical practice, Preventive usefulness

INTRODUCTION

According to the International Labour Office (ILO), the central purpose of worker's health surveillance is the primary prevention of occupational and work-related diseases and injuries, and health examinations play a very important role, not only in primary but also in secondary prevention, through early detection. Workers' health surveillance should be based on sound ethical and technical practices, and procedures in a particular program must meet, clearly and demonstrably, four criteria: need, relevance, scientific validity and effectiveness [1].

In many countries, it is an obligation of all employers to provide occupational health coverage for their employees. In Spain, the main health and safety law [2], a transposition of European Framework Directive 89/391/EEC [3], requires companies to offer appropriate health surveillance to all their employees. This is mostly done in the form of periodic health examinations which are voluntary for workers, with the exception of certain regulated occupational risks like noise, lead, silica, asbestos, etc. The same law states that health examinations should be job-specific (i.e., in relation to the occupational risks) and should serve as a key instrument for prevention. Workers' health surveillance is defined as a preventive activity, and health examinations are performed as one of the available tools to "investigate and analyze the possible relationship between exposure to occupational hazards and damage to health, with the aim to propose measures to improve working conditions and the working environment" [4].

Workers' health surveillance activities in Spain are performed by occupational health professionals within internal or external occupational health services (OHS). Companies may either directly employ physicians and other members of the team (occupational nurses, hygienists, safety engineers, etc.) to create their own internal OHS, or contract the services from the external OHS: a private external provider that procures the physicians and the rest of professionals.

The role of reaching final diagnosis and providing treatment for occupational injuries and diseases lies with the Social Security system through occupational injuries and diseases insurers, to which physicians from the OHS refer suspected cases. Non-work-related issues are handled by the publicly financed National Health System. In Catalonia, 71.1% of companies have the external OHS, covering 83.7% of salaried employees [5].

In 2013, 28.2% of Catalan workers had a health examination for health surveillance purposes [6], which yielded approximately 700 000 examinations, given a salaried population of 2 471 100 [7]. Although no official data exists for Spain as a whole, assuming a similar ratio could be applied to a national salaried population of 14 069 100 in 2013 [7], nearly 4 million employees should be expected to attend for a health examination in the country every year. As any

form of screening, this extensively performed preventive activity should respond to the still valid [8] Wilson and Jungner criteria [9], and is not free of unwanted side-effects, such as undue anxiety associated with false positives, re-testing, over-diagnosis and medicalization [10–13]. Given the significant allocation of human and material resources, it should be based on scientific evidence and conducted effectively.

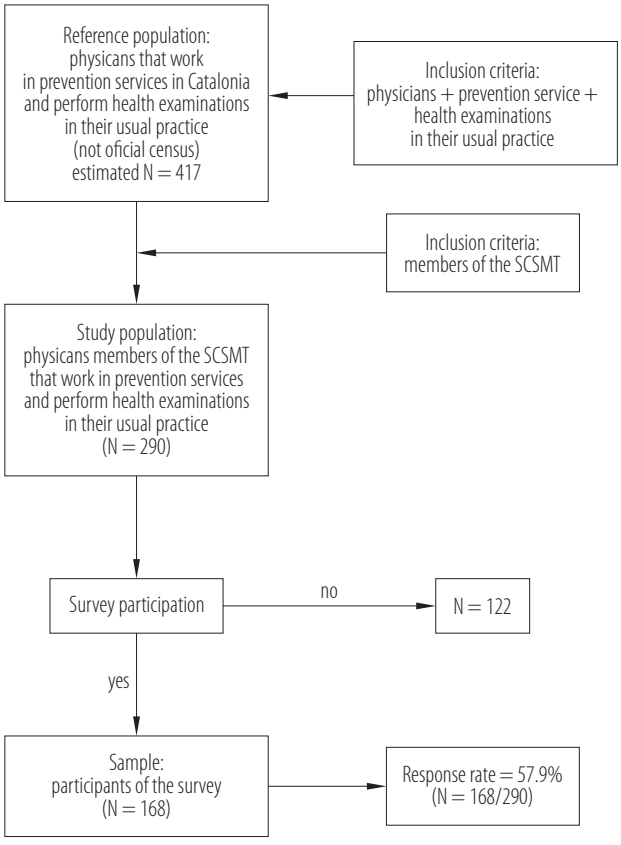
However, according to a previous study, a high percentage of occupational health professionals in Catalonia hold a negative opinion about the efficiency and preventive usefulness of the workers' health examinations performed in our theoretical job-specific health surveillance system [14]. These professionals largely described health examinations as not job-specific, inefficient and not evidence-based, and the health surveillance system as not cost-effective, not meeting the goal of early detection of health damage related to work, and not contributing to the improvement of the occupational risk prevention system. The situation seemed to be worse in external than in the internal OHS. These results warranted further investigation.

The objective of this study has been to describe and analyze the current medical practice of the workers' health examinations in Catalonia, mainly in terms of its occupational preventive aim, whilst searching for any potential differences by type of occupational health service.

MATERIAL AND METHODS

Study population and survey design

The study was of a cross-sectional design. The reference population was as a whole comprised of physicians working in the OHS in Catalonia and performing health examinations in their usual practice (Figure 1). There is not an official census, but indirect data [6] allowed to estimate that 417 physicians met those inclusion criteria. According to this data, the sample size required to estimate a proportion with an error of ±5% and a 95% confidence interval (CI) under the assumption of maximum uncertainty



SCSMT – Societat Catalana de Seguretat i Medicina del Treball (the Catalan Society of Safety and Occupational Medicine).

Fig. 1. Flowchart of reference population, study population and sample of occupational physicians participating in a survey about their usual medical practice, Catalonia, Spain, 2011

(p = q = 0.5) would be 200 physicians [15]. The study population consisted of the occupational physicians members of the "Societat Catalana de Seguretat i Medicina del Treball" (the Catalan Society of Safety and Occupational Medicine – SCSMT) which met the above mentioned inclusion criteria (N = 290, estimated).

A questionnaire was developed taking into account the objectives of the study and the scientific and legal aspects that would subsequently be used to analyze the responses. The translated version of the questionnaire is available online in the Table 1. To test feasibility and content validity, a pilot test with professionals (N = 14) was conducted which helped refine the final questionnaire. No issues

Table 1. Items, questions, answers, and dichotomizations used in the survey addressed to occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT) and performed workers' health examinations, about their usual practice, Catalonia, Spain, 2011*

No.	Variable	Question summary	Answer options						Option code
1	Language	In which language do you want to answer the survey?	Spanish	Catalan					
2	Sex	Sex	Male	Female					
3	Age	Year of birth (yyyy, e.g., 1978)	yyyy						
4	Qualification	Qualification	Medicine	Nursing					
5	Professional experience (years)	Since when have you practiced occupational medicine/nursing?	yyyy						
6	Specialty	Are you a specialist in occupational medicine/nursing?	Yes	No	Trainee				
7	Field of activity	In which field do you develop your main work activity?	OHS	Occupational injuries and diseases insurers (treatment tasks)	Occupational injuries and diseases insurers (sickness absence management)	Civil Servant	Audit	Others	
8	Type of OHS	In which type of OHS do you work?	External	Internal					
9	Type of External OHS	In which type of external OHS do you work?	Prevention society (previous mutual insurance)	Private	Prevention society in a company				

10	Performance of health examinations in usual practice	Do you do individual health surveillance and health examinations in your current practice?	Yes	No, I do management or other activities	Yes, but I prefer to answer opinion section of the questionnaire only			
11	Main activities of companies	Which is the main activity or activities of the companies covered by your OHS?	Agriculture	Industry	Construction	Services		
12	Workers/full time nurse	For each full-time nurse, how many workers do you cover on average in your OHS?	n					
13	Workers/full time physician	For each full-time physician, how many workers do you cover on average in your OHS?	n					
14	Adequate and sufficient administrative support	Do you have administrative support (filing, scheduling, introducing data to the computer, correspondence, non clinical telephone calls, etc.)?	Yes, adequate and enough	Yes, but it is not enough	No			a = yes
15	Health exams in mobile unit in the OHS	In your OHS, do you use mobile units to perform health examinations for companies in situ?	Yes	No				a = yes
16	If yes to 15, health exams in mobile unit by the professional	Do you perform health examinations in mobile unit?	Yes	Never/ Hardly ever				a = yes
17	Quality of health exams in mobile unit is worse	In your opinion, the quality of health examinations performed in mobile unit compared with those performed in centres is usually: …?	Better	Equal	Worse			a = yes
18	Accessibility of OHS for workers (consultations outside health exams)	In your OHS, outside of scheduled health examinations, do workers consult on health problems they suspect are related to work?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	Our OHS is not available outside scheduled health exams	b = always/ nearly always or often

Table 1. Items, questions, answers, and dichotomizations used in the survey addressed to occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT) and performed workers' health examinations, about their usual practice, Catalonia, Spain, 2011* – cont.

No.	Variable	Question summary	Answer options				Option code
19	Barriers to accessibility of OHS	In your OHS, outside of scheduled health examinations, what influence do you think the following potential obstacles have to hinder workers consult their health problems?					
19.1	Not knowledge of function/availability	Lack of knowledge of our function or availability	Strong influence	Significant influence	Little influence	No influence	c = strong or significant
19.2	Distrust	Distrust (they associate us with the employer)	Strong influence	Significant influence	Little influence	No influence	c = strong or significant
19.3	Timings/distance	Difficulty in coming to our OHS due to timings or distance	Strong influence	Significant influence	Little influence	No influence	c = strong or significant
19.4	Others (specify)		Open answer				
20	Working time (hours/week)	How many hours per week do you work in your OHS?	n				
21	Distribution of working time	Out of the total of your working time in the OHS, what percentage, approximately, do you spend doing the following activities? (Note: the sum has to be 100%)					
21.1	Individual health surveillance [%]	Individual health surveillance: time dedicated to health examinations directly or indirectly (e.g., introducing data to computer, telephone calls, administrative tasks related to health examinations, etc.)	%				
21.2	Collective health surveillance (epidemiological analysis) [%]	Collective health surveillance: analysis of workers' health surveillance results' and risk evaluations with epidemiologic criteria	%				

21.3	Other activities [%]	Other activities: clinical work, health promotion, occupational risks prevention, managements, research, educational and training activities, etc.	%				
22	Workers covered by the professional [n]	How many workers do you provide health surveillance cover to?	n				
23	Health exams performed per week	How many health examinations do you perform personally each week on average?	n				
24	Fitness for work certificates supervised per week (signed without visiting worker)	How many fitness for work certificates do you supervise per week on average (i.e., fitness for work certificates you sign without having seen the worker directly)?	n				
25	Distribution of type of health exams	Out of the health examinations you perform, what percentage approximately is: ...?					
25.1	Pre-employment	Pre-employment	%				
25.2	Pre-placement	Pre-placement	%				
25.3	Periodic	Periodic	%				
25.4	Return to work following sickness absence	Return to work following sickness absence	%				
25.5	At employer's request	At employer's request	%				
25.6	At employee's request	At employee's request	%				
25.7	Post occupational	Post occupational	%				
26	Availability of clinical information for health exam	How often do you have the following clinical information available at the moment of performing a health examination?					
26.1	Medical record (internal data)	Medical record (internal data)	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always
26.2	Previous biological monitoring or other tests if applicable (internal data)	Internal data from biological monitoring or other tests from previous years (if applicable)	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always

Table 1. Items, questions, answers, and dichotomizations used in the survey addressed to occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT) and performed workers' health examinations, about their usual practice, Catalonia, Spain, 2011* – cont.

No.	Variable	Question summary	Answer options				Option code
26.3	Previous medical or health surveillance data from other OHS if applicable (external data)	Previous medical record or health surveillance data from other OHS if applicable (external data)	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always
26.4	Medical reports from other health professionals if applicable (external data)	Corresponding medical reports if employees had been treated in primary care, specialized care, employer's mutual insurance companies, incapacity benefit inspectors, etc. (external data)	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always
26.5	Employee never/hardly ever is the only source of clinical information	My only source of clinical information is the employee him/herself	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	e = never/ hardly ever
27	Easiness for monitoring worker health over time	In your OHS, how would you rate the easiness to monitor over time the health of workers (e.g., compare previous audiometry and spirometry data, biological monitoring, blood tests, etc.)?	Very easy	Easy	Difficult	Very difficult	f = very easy or easy
28	Request for additional clinical information	Do you, with employee's consent, ask for additional clinical information from other health professionals to expand or confirm data?	Yes	No			yes
29	Easiness for obtaining clinical information	Rate the ease of obtaining additional clinical information for the following health professionals					
29.1	Primary care (National Health System)	Primary care (National Health System)	Very easy	Easy	Difficult	Very difficult	f = very easy or easy
29.2	Specialists (National Health System)	Specialists (National Health System)	Very easy	Easy	Difficult	Very difficult	f = very easy or easy
29.3	Mutual insurance companies	Mutual insurance companies	Very easy	Easy	Difficult	Very difficult	f = very easy or easy
29.4	Incapacity benefit inspectors body	Incapacity benefit inspectors body	Very easy	Easy	Difficult	Very difficult	f = very easy or easy

29.5	Occupational support for family physicians	Network of occupational support for family physicians	Very easy	Easy	Difficult	Very difficult	f = very easy or easy
29.6	Other health professionals (e.g., private)	Other health professionals (e.g., private professionals)	Very easy	Easy	Difficult	Very difficult	f = very easy or easy
30	Enough and reliable clinical information?	The clinical information about the health of workers that you have available at the moment of performing a health examination, is sufficient and reliable for doing your job correctly?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	b = always/ nearly always or often
31	Knowledge of non occupational sickness absence	Do you have knowledge of sickness absence episodes due to non occupational causes?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always
32	Knowledge of occupational sickness absence	Do you have knowledge of sickness absence episodes due to occupational causes?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always
33	Knowledge of occupational injuries and diseases without associated absence	Are you aware of occupational injuries and diseases without associated sickness absence of the employees under your care?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always
34	Investigation of occupational injuries	Do you participate in the investigation of occupational injuries?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always
35	Participation in occupational and work related diseases' investigation	Do you participate in the investigation of occupational and work-related diseases? We refer to the "investigation" and not the "diagnosis" (a duty of Mutual Insurance Companies)	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always
36	Availability of occupational/exposure information at the moment of health exam	How often do you have the following occupational/exposure information at the moment of performing a health examination?					
36.1	Job title	Job title	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	d = always/ nearly always

Table 1. Items, questions, answers, and dichotomizations used in the survey addressed to occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT) and performed workers' health examinations, about their usual practice, Catalonia, Spain, 2011* – cont.

No.	Variable	Question summary	Answer options					Option code
36.2	Job description	Job description	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		d = always/ nearly always
36.3	Risk evaluation	Risk evaluation of the job	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		d = always/ nearly always
36.4	Hygiene and environmental measures (if applicable)	Hygiene and environmental measures (if needed)	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		d = always/ nearly always
36.5	Personal protective equipment required (if applicable)	Personal protective equipment required	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		d = always/ nearly always
36.6	Direct knowledge of the workplace (visited)	I have direct knowledge of the workplace (I have visited it)	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		d = always/ nearly always
36.7	Employee never/hardly ever is the only source of occupational exposure information	I, never/hardly ever, have to rely exclusively on the information provided by the worker due to lack of occupational exposure information	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		e = never/ hardly ever
37	Enough and reliable information on exposures and working conditions?	The occupational information about exposures and working conditions that you have available at the moment of performing a health examination, is sufficient and reliable for doing your job correctly?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		b = always/ nearly always or often
38	Communication with risk prevention specialists	How is the communication with the risk prevention specialists (safety, hygiene, psycho-sociology and ergonomics) in your OHS?	Very good	Good	Medium	Poor	Very poor	g = very good or good

39	Frequency of workplace visits	How often do you do workplace visits?	I systematically visit workplaces	I often visit workplaces	I rarely visit workplaces	I never or hardly ever visit workplaces	h = systematic visits or visits often
40	Importance of workplace visits	How would you rate the importance of being able to visit workplaces?	0 (not important) to 10 (very important)				
41	Health examinations that include blood tests	What percentage of the health examinations you perform include blood tests approximately?	%				
42	Health examinations that include urine tests	What percentage of the health examinations you perform include urine tests approximately?	%				
43	Blood and urine tests that are specifically related to the occupational hazards	Out of the blood and urine tests performed in your OHS, what percentage are specifically related to occupational hazards? E.g., biological monitoring (lead, chromium, hippuric acid) or early detection of health problems related to work	%				
44	Other tests that are specifically related to the occupational hazards	Regarding other tests performed in your OHS (e.g., audiometry, spirometry, electrocardiogram, etc.), what percentage are specific to occupational hazards?	%				
45	The professional never/hardly has difficulty asking for tests/investigations specific to occupational hazards	Do you have difficulty asking for tests/investigations specific to occupational hazards (laboratory tests or others) due to administrative/bureaucratic and/or commercial/financial reasons?	Always/Nearly always	Often	Rarely	Never/Hardly ever	e = never/hardly ever
46	Easiness to perform collective health surveillance (epidemiological analysis)	In your OHS, how do you rate the ease to perform an epidemiological/collective analysis of data from health surveillance?	Very easy	Easy	Difficult	Very difficult	f = very easy or easy
47	Reasons for difficulties	In case of difficulty, what influence do the following possible reasons have?					
47.1	Lack of training	Lack of training	Strong influence	Significant influence	Little influence	No influence	c = strong or significant

Table 1. Items, questions, answers, and dichotomizations used in the survey addressed to occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT) and performed workers' health examinations, about their usual practice, Catalonia, Spain, 2011* – cont.

No.	Variable	Question summary	Answer options					Option code
47.2	Lack of tools	Lack of tools	Strong influence	Significant influence	Little influence	No influence		c = strong or significant
47.3	Lack of time	Lack of time	Strong influence	Significant influence	Little influence	No influence		c = strong or significant
47.4	Others (specify)		Open answer					
48	Usefulness of official guidelines (Spanish Ministry of Health)	Rate the practical usefulness of the Spanish Ministry of Health guidelines on health surveillance for your daily activity	0 (not useful) to 10 (very useful)					
49	Usefulness of official guidelines (Catalan Department of Health)	Rate the practical usefulness of the Catalan Health Department guidelines on health surveillance for your daily activity	0 (not useful) to 10 (very useful)					
50	Information to the worker about his/her general health	After health examinations in your OHS, do you inform the worker about the findings related to their general (not work-related) health (e.g., obesity, tobacco consumption, hypertension, diabetes, etc.)?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		d = always/ nearly always
51	Improvement of worker's general health after health examinations	After health examinations in your OHS, do you think that the general health of the worker (non work-related) improves (e.g., looses weight, stops smoking, controls his/her hypertension, diabetes, etc.)?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	I don't know	b = always/ nearly always or often
52	Information to the worker about his/her health in relation to work	After health examinations in your OHS, do you inform the worker about the findings related to their health in relation to work (e.g., diagnosis of suspected occupational or work-related diseases)?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		d = always/ nearly always

53	Referral of suspected occupational diseases to mutual insurance companies	In your OHS, if following a health examination an occupational or work-related disease is suspected, do you refer the worker to the mutual insurance company for diagnostic confirmation and treatment where appropriate?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever			d = always/ nearly always
54	The physician has never/ hardly ever avoided communicating suspected professional or work-related diseases due to possibility of negative employment consequences for the worker	Have you avoided communicating suspected professional or work-related diseases due to possibility of negative employment consequences for the worker?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever			e = never/ hardly ever
55	The physician has never/ hardly ever avoided communicating suspected professional or work-related diseases due to the feeling of a direct or indirect pressure put on him/her	Have you avoided communicating suspected professional or work-related diseases due to the feeling of a direct or indirect pressure put on you?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever			e = never/ hardly ever
56	Recommendations to the companies	After health examinations in your OHS, do you give recommendations to the companies on the need to introduce or improve protection and prevention activities?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever			d = always/ nearly always
57	Recommendations are taken into consideration	In case you give recommendations to the companies, are your proposals taken into consideration?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	I don't know		b = always/ nearly always or often
58	Information on health surveillance to risk prevention specialists with preventive purposes	In your OHS, is health surveillance information communicated to risk prevention specialists with a preventive purpose?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	I don't know		d = always/ nearly always
59	Improvement of worker's exposures and/or working conditions after health examinations	After health examinations in your OHS, do you think that the exposures and/or working conditions of the worker improve?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever	I don't know		b = always/ nearly always or often

Table 1. Items, questions, answers, and dichotomizations used in the survey addressed to occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT) and performed workers' health examinations, about their usual practice, Catalonia, Spain, 2011* – cont.

No.	Variable	Question summary	Answer options					Option code
60	Health examinations followed by fitness for work certificate	In your OHS, what percentage of health examinations are followed by fitness for work certificate?	%					
61	Health examinations followed by recommendations to the company	In your OHS, what percentage of health examinations are followed by recommendations to the company?	%					
62	Distribution of fitness for work outcomes	Out of the fitness for work certificates, approximately what percentage are: ...? (Note: the sum has to be 100%)						
62.1	Fit	Fit	%					
62.2	Not fit	Not fit	%					
62.3	Fit with conditions/restrictions	Fit with conditions/restrictions	%					
63	The physician has never/hardly ever avoided communicating a "fit with conditions/restrictions" due to the possibility of negative consequences for the worker	Have you avoided communicating a "fit with conditions/restrictions" due to the possibility of negative consequences for the worker?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		e = never/ hardly ever
64	The physician has never/hardly ever avoided communicating a "fit with conditions/restrictions" due to the feeling of a direct or indirect pressure put on him/her	Have you avoided communicating a "fit with conditions/restrictions" due to the feeling of a direct or indirect pressure put on you?	Always/ Nearly always	Often	Rarely	Never/ Hardly ever		e = never/ hardly ever
65	Some workers don't do health exams for fear of "not fit" or "fit with conditions/restrictions" (yes)	Do you think that there are workers who do not go to your OHS for health examination for fear of being found "not fit" or "fit with conditions / restrictions"?	Yes	No	I don't know			a = yes

66	"Fit with conditions/ restrictions": awareness and acceptance by companies	To what extent do you think that companies are aware and accept that some of their workers may have some restrictions or conditions to their fitness for work?	0 (not aware/accepting to 10 (very aware/accepting)			
67	Professional's satisfaction in relation to health surveillance (0 to 10)	How would you rate your satisfaction as a health professional in relation to health surveillance as you currently perform it?	0 (not aware/accepting to 10 (very aware/accepting)			
68	Agree to increase in occupational nurses' autonomy	In some countries, specialist occupational nurses have a major role in health surveillance: following a pre-established protocol, the occupational physician reviews only complicated cases or specific findings. Do you think it would be a good idea to increase the professional autonomy of occupational nurses in health surveillance in this regard?	Yes	No	I don't know	a = yes

* Grey background shows dichotomizations used.
OHS – occupational health service.

were raised in face-validity and no ceiling or floor effects were observed.

Data was collected from voluntary participants through an online self-administered questionnaire in September 2011. All the information, including the objective of the study, was sent by the administrative staff of the SCSMT. The researchers remained blind to the list of potential and actual participants throughout the process. The survey was anonymous and participation implied consent. The sample consisted of those professionals responding to the survey who chose the option "Yes, I do health examinations in my usual practice" and, therefore, those who worked in the OHS but did only management were excluded.

Study variables

Participants' characteristics

Participants' age (years old), sex (male/female), and the type of OHS (internal/external) were given.

Medical practice

A total of 57 factual questions were asked to occupational physicians about how they performed health examinations in their usual medical practice. Questions were worded in a direct and neutral manner and, whenever possible, numerical questions were asked; for frequency questions, Likert's scales were used with five categories of response, appropriately organized and scored. Health examination was defined as the clinical and occupational anamnesis together with medical examinations and tests performed by the occupational health professional to each individual employee in the context of the activities of health surveillance with the aim of establishing a possible relationship between the health and the working conditions of the subject.

This study explores surveillance examinations in general, regardless of the specific surveillance program addressed. The areas explored included the following: general organizational aspects including workload and tasks; availability of clinical and occupational exposure information; job-specificity of the tests used (i.e., were the tests related to specific occupational hazards?); communication issues (among the members of the OHS team, and with other health professionals and organisms); early detection and appropriate management of suspected cases of occupational diseases; knowledge of occupational and non-occupational sickness absence data; participation in the investigation of occupational injuries and diseases; accessibility for workers to the OHS; and professional independence.

Likert-type scales with 4 or 5 categories, numeric text boxes for continuous variables and open boxes for comments were used for the answers. For categorical items, categories were dichotomized. In most cases, the first two positive categories of answer were grouped together against all the rest (e.g., "always/nearly always or often" against "rarely or never/hardly ever"). For those variables considered essential to guarantee a correct medical practice, the extreme option was chosen (e.g., "always/nearly always"). Items of the questionnaire and answer options, together with their dichotomizations, are available online in the Table 1.

Data analysis

The univariate analysis: means were calculated for the quantitative variables, and distribution of frequencies of categories for categorical variables (valid percentage), together with 95% CI for both.

The bivariate analysis by the type of OHS: for the quantitative variables the Student-Fisher t-test for the comparison of means of independent samples (level of significance $\alpha = 0.05$) was used; means' differences and their 95% CIs were also calculated. For categorical variables, the prevalence and the difference in prevalence were calculated, as was their 95% CI.

Statistical analyses were performed with the SPSS 15.0 software package for Windows.

RESULTS

Out of the estimated 290 physicians that fulfilled the inclusion criteria, 168 (57.9%) responded the survey, representing 40.3% of the reference population (total estimated physicians performing workers' health examinations in Catalonia). The final sample had absolute precision values of ±7.5% for a confidence level of 95% under the assumption of maximum uncertainty (p = q = 0.5). No item had a percentage of missing values higher than 11%.

Out of the 168 participants, 47.6% worked in the external OHS (N = 80) and 52.4% in internal services (N = 88). The average age was 47.3 years old (range: 30–62 years old) and 59.5% were female (N = 100). No statistically significant differences were observed when compared with the distribution of occupational physicians members of the SCSMT as a whole (Table 2).

As shown in the Table 3, occupational physicians worked an average 36.8 h/week (median: 38), and spent between 64% (internal) and 84% (external) of their working hours in activities related to health surveillance (either individual and/or collective). Large differences were found regarding workload in relation to individual health surveillance: health professionals from the external OHS dedicated more time, did 2.5 times more health examinations and had nearly 3 times more workers assigned to them (3709 workers/full-time physician vs. 1353 for those in internal services). Both types of the OHS shared a 1:1 physician/nurse ratio and less than half of participants had adequate and sufficient administrative support.

Accessibility of workers to the external OHS was low, with 26% of employees making consultations outside health examinations for health problems possibly related to work, compared to 90% in internal services.

Most health examinations performed were periodic and included blood (96% for external, 88% for internal) and urine tests (87% external, 65% internal); however, physicians stated that these and other tests (e.g., urine or blood exposure markers, audiometry, spirometry, etc.) were specifically related to occupational hazards in less than a half of the cases.

Table 2. Sociodemographic and professional characteristics of occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT), performed workers' health examinations, and participated in the survey about their usual practice in comparison with all members of the SCSMT, Catalonia, Spain, 2011

Characteristics	Members of SCSMT						
	survey participants* (N = 168)			total (N = 539)			
	n (%)	95% CI	M	n (%)	M	MD	95% CI
Sex							
male	68 (40.5)	33.3–48.0		226 (41.9)			
female	100 (59.5)	52.0–66.7		313 (58.1)			
Type of occupational health service							
internal	88 (52.4)	44.9–59.8		183 (59.6)			
external	80 (47.6)	40.2–55.1		124 (40.4)			
Age [years]			47.28		48.24	0.961	–0.532–2.455

CI – confidence interval; M – mean; MD – mean difference.

* Response rate = 57.9% (168 of 290 physicians that fulfilled the study inclusion criteria).

Table 3. Time spent to health surveillance at the workplace, workload and tasks of occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT) and performed workers' health examinations, Catalonia, Spain, 2011 – by type of Occupational Health Service (OHS)

Question[1]	Type of OHS (M)			MD (95% CI)	PD (95% CI)
	total (N = 168)	external (N = 80)	internal (N = 88)		
20. Working time [h/week]	36.8	37.1	36.5	0.6 (–1.2–2.4)	
21. Distribution of working time [%]					
time spent to health examinations	56.3	66.0	47.5	18.5 (12.4–24.5)*	
time spent to collective health surveillance	17.4	18.0	16.8	1.2 (–2.5–4.9)	
time spent to other activities	26.3	15.9	35.7	–19.7 (–24.5–(–15.0))*	
23. Health exams performed [n/week]	34.2	49.6	19.7	29.9 (24.2–35.5)*	
24. Fitness for work certificates supervised [n/week]	23.2	40.7	7.4	33.3 (20.0–46.6)*	
13. Workers per full-time physician [n]	2 425.0	3 708.7	1 352.7	2 355.9 (1 726.9–2 985.0)*	
12. Workers per full-time nurse [n]	2 219.9	3 480.0	1 167.3	2 312.7 (1 763.7–2 861.7)*	
25. Distribution of type of health examinations [%]					
pre-employment	3.3	4.2	2.5	1.7 (0.0–3.4)*	
pre-placement	16.4	18.1	14.7	3.4 (–1.0–7.7)	
periodic	65.5	68.0	63.1	5.0 (–1.0–11.0)	
return to work following sickness absence	6.6	4.9	8.2	–3.3 (–5.8–(–0.8))*	
at employer's request	3.3	3.2	3.4	–0.2 (–1.7–1.3)	
at employee's request	4.6	1.3	7.6	–6.3 (–8.8–(–3.9))*	
post occupational	0.4	0.3	0.5	–0.2 (–0.6–0.2)	
41. Health examinations that include blood tests [%]	91.8	95.7	88.2	7.5 (2.3–12.6)*	
42. Health examinations that include urine tests [%]	75.7	87.3	65.1	22.1 (11.4–32.8)*	
43. Blood and urine tests that are job-specific [%]	41.3	33.5	48.5	–15.0 (–26.6–(–3.5))*	
44. Other tests that are job-specific [%]	68.2	71.9	64.8	7.2 (–2.2–16.5)	
60. Health examinations followed by fitness for work certificate [%]	92.8	99.0	87.1	11.9 (5.0–18.8)*	
61. Health exams followed by recommendations to the company [%]	26.4	26.0	26.8	–0.8 (–11.1–9.4)	
62. Distribution of fitness for work outcomes [%]					
fit	87.3	85.5	88.9	–3.4 (–7.0–0.2)	
not fit	1.3	1.5	1.2	0.3 (–0.4–1.0)	
fit with conditions/restrictions	11.4	13.0	9.9	3.1 (–0.2–6.4)	

Table 3. Time spent to health surveillance at the workplace, workload and tasks of occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine (SCSMT) and performed workers' health examinations, Catalonia, Spain, 2011 – by type of Occupational Health Service (OHS) – cont.

Question[1]	Type of OHS (M)			MD (95% CI)	PD (95% CI)
	total (N = 168)	external (N = 80)	internal (N = 88)		
66. Companies accept that some workers might be fit with conditions [pts] (0–10)	4.0	3.5	4.5	–1.0 (–1.8–(–0.3))*	
14. Adequate and sufficient administrative support[a] [%]	43.5	50.0	37.5		12.5 (–2.4–26.7)
18. Accessibility of OHS for workers (consultations outside health exams)[b] [%]	59.4	25.6	89.7		–64.0 (–73.7–(–50.6))*
19. Barriers to accessibility of OHS [%]					
unawareness of its functions[c]	65.5	88.5	44.8		43.6 (29.9–55.0)*
distrust[c]	46.7	62.8	32.2		30.6 (15.4–43.9)*
timings/distance[c]	34.5	43.6	26.4		17.2 (2.6–30.9)*
45. Physician never/hardly ever has difficulty asking for job-specific tests[d] [%]	40.5	23.3	56.3		–33.0 (–46.2–(–17.6))*
65. Some workers avoid health exams for fear of a "not fit" or "fit with conditions" certificate (yes)[a] [%]	43.6	60.6	28.2		32.4 (16.5–46.1)*

[1] Questions were grouped with a research logic, but their original numbering (as in Table 1) was left.
PD – prevalence difference.
Answer to the questionnaire: [a] yes; [b] always/nearly always or often; [c] strong or significant; [d] never/hardly ever.
* Statistically significant difference.
Other abbreviations as in Table 2.

If additional tests/investigations specific to occupational hazards (laboratory tests or others), not routinely included in the usual health examinations, had to be requested, physicians in external services had significantly more difficulty obtaining them due to administrative/bureaucratic and/or commercial/financial reasons.

These health examinations were nearly always followed by a fitness-for-work certificate (99% external, 87% internal) with no differences in the outcome by type of OHS: 87.3% of workers were declared fit, 1.3% not fit, and 11.4% fit with conditions/restrictions.

As shown in the Table 4, there were shortcomings in the availability of clinical and exposure information at the moment of performing the health examination, and the bivariate analysis showed significantly lower percentages in all items for the external OHS.

Regarding awareness of sickness absence data, 6% of physicians from the external OHS had knowledge of work-related absences, and 3% had knowledge of non-work-related absences, compared to 75% and 49%, respectively from internal services. None of the physicians from external services participated always/nearly always in the investigation of occupational injuries, whilst 36% in internal ones did so; and regarding occupational diseases, 4% of physicians in external services and 54% in internal ones participated in the investigations always/nearly always.

Table 4. Relevant input, procedural and outcome aspects of medical practice of occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine and performed workers' health examinations, Catalonia, Spain, 2011 – by type of Occupational Health Service (OHS)

Question[1]	Type of OHS [%]			PD (95% CI)
	total (N = 168)	external (N = 80)	internal (N = 88)	
26. Clinical information available during health examinations				
medical record[a]	67.5	54.1	80.0	–25.9 (–39.4–(–11.1))*
previous biological monitoring or other tests if applicable[a]	60.4	48.6	71.3	–22.6 (–36.7–(–7.1))*
previous medical/health surveillance data from other OHS if applicable[a]	9.9	4.1	15.4	–11.3 (–21.3–(–1.7))*
medical reports from other health professionals if applicable[a]	7.8	2.7	12.5	–9.8 (–19.0–(–1.1))*
employee never/hardly ever is the only source of clinical information[b]	18.2	9.5	26.3	–16.8 (–28.4–(–4.6))*
28. Physician requests additional clinical information if necessary[c]	79.9	77.0	82.5	–5.5 (–18.2–7.2)
36. Exposure information available during health examinations				
job title[a]	80.4	75.3	85.0	–9.7 (–22.3– 3.0)
job description[a]	56.2	45.2	66.3	–21.0 (–35.4–(–5.3))*
risk evaluation[a]	53.6	45.2	61.3	–16.0 (–30.8–(–0.3))*
hygiene and environmental measures if applicable[a]	35.3	17.8	51.3	–33.4 (–46.2–(–18.5))*
personal protective equipment required if applicable[a]	42.5	28.8	55.0	–26.2 (–40.1–(–10.6))*
direct knowledge of the workplace (visited)[a]	22.9	2.7	41.3	–38.5 (–49.6–(–26.3))*
never/hardly ever, have to rely exclusively on the information provided by worker[b]	30.7	19.2	41.3	–22.1 (–35.3–(–7.5))*
29. Easiness for obtaining information from:				
primary care (National Health System)[d]	41.8	44.6	39.4	5.2 (–11.9–22.2)
specialists (National Health System)[d]	34.4	25.0	42.4	–17.4 (–32.7–(–0.5))*
occupational diseases and injuries insurers[d]	49.6	36.4	60.9	–24.6 (–40.4–(–6.6))*
incapacity benefit inspectors body[d]	21.4	9.3	31.7	–22.5 (–35.8–(–7.8))*
occupational support unit for family physicians[d]	32.4	22.6	41.4	–18.7 (–34.5–(–1.3))*
other health professionals (e.g., private)[d]	62.0	56.3	66.7	–10.4 (–28.0–7.7)
Knowledge of other relevant health and injuries information				
31. Non work-related sickness absence[a]	26.8	2.7	48.8	–46.0 (–56.9–(–33.4))*
32. Work related sickness absence[a]	41.8	5.5	75.0	–69.5 (–78.4–(–56.5))*
33. Occupational injuries or diseases without sickness absence[a]	39.2	2.7	72.5	–69.8 (–78.6–(–57.2))*
34. Investigation of occupational injuries[a]	19.0	0.0	36.3	–36.3 (–47.2–(–25.4))*
35. Investigation of occupational and work related diseases[a]	30.1	4.1	53.8	–49.6 (–60.5–(–36.6))*
Multidisciplinary team work and workplace visits				
38. Communication with risk prevention specialists[e]	50.3	34.2	65.0	–30.8 (–44.5–(–14.9))*

Table 4. Relevant input, procedural and outcome aspects of medical practice of occupational physicians, who were members of the Catalan Society of Safety and Occupational Medicine and performed workers' health examinations, Catalonia, Spain, 2011 – by type of Occupational Health Service (OHS) – cont.

Question[1]	Type of OHS [%]			PD (95% CI)
	total (N = 168)	external (N = 80)	internal (N = 88)	
58. Information on health surveillance to risk prevention specialists (preventive purpose)[a]	30.7	15.5	44.3	–28.8 (–41.6–(–14.2))*
39. Frequency of workplace visits[f]	42.5	19.2	63.8	–44.6 (–56.8–(–29.4))*
Communication of results to worker, company and insurers. Case management				
50. Information to the worker about his/her general health[a]	92.1	90.3	93.7	–3.4 (–13.1–5.7)
52. Information to the worker about his/her health in relation to work[a]	61.6	52.8	69.6	–16.8 (–31.4–(–1.3))*
56. Recommendations to the companies[a]	24.5	16.7	31.6	–15.0 (–27.9–(–1.2))*
57. Recommendations are taken into consideration[g]	46.0	23.9	65.8	–41.9 (–54.6–(–26.3))*
53. Referral of suspected cases to occupational diseases and injuries insurers[a]	51.7	41.7	60.8	–19.1 (–33.7–(–3.1))*
Professional independence the participating occupational physicians never/hardly ever avoid communicating:				
54. Suspected professional diseases due to possible negative consequences to worker[b]	54.3	44.4	63.3	–18.8 (–33.5–(–2.9))*
55. Suspected professional diseases due to perceived direct or indirect pressure[b]	66.2	58.3	73.4	–15.1 (–29.4–0.0)*
63. Fits with conditions due to possible negative consequences for the worker[b]	45.6	49.3	42.3	7.0 (–8.8–22.4)
64. Fits with conditions due to perceived direct or indirect pressure[b]	67.8	67.6	67.9	–0.3 (–15.2–14.3)

[1] Questions were grouped with a research logic, but their original numbering (as in Table 1) was left.
Answer to the questionnaire: [a] always/nearly always; [b] never/hardly ever; [c] yes; [d] very easy or easy; [e] very good or good; [f] systematic visits or visits often; [g] always/nearly always or often.
* Statistically significant difference.
Other abbreviations as in Tables 2 and 3.

Fewer than 2/3 of physicians always/nearly always referred workers to occupational injuries and diseases insurers for diagnostic confirmation and treatment if, following a health examination, an occupational or work-related disease was suspected, and this referral rate was significantly lower in the external OHS (42% vs. 61% in internal services). Physicians made recommendations to the companies following health examinations but they were reportedly taken into account by companies in fewer than 2/3 of the cases.

Finally, the Table 4 also shows the potential threats to professional independence reported by occupational physicians.

DISCUSSION

A high percentage of occupational physicians have limitations in their current medical practice. These shortcomings include the availability of clinical and occupational exposure information at the moment of performing the health examination, the job-specificity of health examinations and

tests, the early detection and appropriate management of suspected occupational diseases, and threats to the professional independence of physicians. The situation in the external OHS is worse, remarkably in regard to knowledge of occupational and non-occupational sickness absence data, participation in the investigation of occupational injuries and diseases, and accessibility for workers to the OHS.

Regarding clinical information, the situation was worse for externally generated data, which could be explained by poor coordination and communication with the National Health Service and the occupational injuries and diseases insurers, and a lack of continuity of records when the worker changes jobs or the employer contracts different OHS. The limitations in exposure information (e.g., job description, risk evaluation, environmental measurements), are of particular concern because without it occupational medicine loses all meaning. They could be due to inefficient communication with other members of the OHS and to an excess of bureaucratization (e.g., long and uninformative/unpractical risk evaluations). This together with the low job-specificity of routinely used tests, and the difficulties for requesting additional tests when needed, point towards general health check-ups rather than the intended job-specific health examinations.

In this scenario, 85% of occupational health professionals participating in a previous study [14] felt that the highly trained Catalan occupational physicians and nurses are overqualified for the range of activities they currently perform and the way they do them. The fact that the number of workers assigned is practically the same for nurses and doctors is consistent with the structure in Spain, regulations recommending that the "basic occupational unit" is constituted by 1 doctor and 1 nurse for every 2000 workers [16]. More efficient structures could be promoted, and a majority of occupational health professionals are in favor of giving a major role in health surveillance to specialist occupational nurses, increasing their professional autonomy [14].

Accessibility is an important problem for the external OHS. Most enterprises in many countries, including Spain, are small and medium, often dispersed geographically. Physicians from the external OHS are located away from the workplaces, and their contact with workers is often limited to health examinations. On the contrary, accessibility is very good in the internal OHS, which together with a higher rate of health examinations for return to work after sick leave and at a worker's request could, at least partially, compensate the rest of the findings, therefore improving the possibilities of early detection of health problems related to work and identification of especially vulnerable workers in the internal OHS. When asked about possible barriers for accessibility, physicians from both types of the OHS agreed that lack of awareness of the functions of the OHS was the most important.

The fact that health examinations are virtually always followed by a fitness-for-work certificate, that is issued regardless of the job and the associated risks, might have the unintended effect of being detrimental to workers. Given that, according to participants, companies are not very receptive to accept workers "fit for work with conditions," some workers might decide to avoid accessing the OHS for fear of being declared "not fit or fit with conditions."

Another source of threat to professional independence and detriment for the worker could lay, paradoxically, in one of the main objectives of these examinations: the early diagnosis and treatment of occupational and work-related diseases. Only 42% of physicians from external services, and 61% in internal services declared that they always/nearly always referred suspected cases to occupational injuries and diseases insurers, whose responsibility was, as previously explained, the diagnosis, treatment and official reporting of occupational diseases and injuries in Spain. One possible explanation might be the fact that the regulatory framework in Spain determines economic compensation and corporate responsibilities for companies in case of recognition of occupational injury or disease.

In occupational health, there are interactions amongst many partners, sometimes with conflicting interests. Although the code of ethics of the International Commission of Occupational Health states in its basic principles that "occupational health professionals are experts who must enjoy full professional independence in the execution of their functions" [17], it cannot be guaranteed that this is always the case [18].

The high number of health examinations performed (4 million annually in Spain), most of them including blood and urine tests despite their acknowledged low job-specificity, could be explained by a badly understood concept of "health surveillance," by cultural and historical factors [19] (on occasions understood by workers and their representatives as "acquired rights," and by employers as something "tangible" in return for their economic investment on health surveillance or as a means of, supposedly, formally complying with their legal requirements), and by economic interests by the OHS themselves. At an approximate cost of 50–60 euro per health examination [20], direct costs to Spanish companies would amount to the minimum of 200 million euro per year, and thousands of millions of euro if extrapolated to Europe.

Indirect costs for companies are difficult to calculate but they include lost working hours, adjustments to maintain production schedules, and travel time and expenses. There is also an associated increase in health expenditures by the National Health System due to consultations with family physicians, and repetitions of examinations and tests due to the unavoidable large number of false positives generated. This situation is not unique to Catalonia and Spain. Health examinations for workers are extensively performed in many countries, either in the context of fitness-for-work examinations – mainly at pre-employment/pre-placement; as part of health surveillance – mostly periodic and often linked to fitness-for-work certification; or as general health checks.

In a survey performed by the Occupational Medicine Section of the European Union of Medical Specialists (UEMS) to official representatives from 25 European countries, 17 declared that employers in their countries were obliged to offer health examinations to all their employees; moreover, in 12 of these countries, it was also compulsory for employees to undertake the examinations [21].

The results of this study lead one to think that the health examinations analyzed are mainly generalist, and we should reflect on whether it is justified to do them at the expense of the employer and in a country with a robust and universal public health system, already covering for the screening, diagnosis and treatment of not work-related diseases. It seems clear that we are over-testing. But are we, at the same time, insufficiently or incorrectly testing in other areas where correct testing is very important? And, is all this to the detriment of other preventive and non-preventive activities that occupational medicine may offer?

In any case, "health examinations cannot protect workers against health hazards, and they cannot substitute for appropriate control measures, which have the first priority in the hierarchy of actions. And if prevention has proven successful, fewer examinations are needed" [22].

Strengths and limitations

This is the first study of its kind in Spain. Other strengths include the wide sample of occupational physicians, representing 40% of the reference population, and the fact that the information comes directly from the physicians themselves, who are the ones who know best what their usual practice is like.

Selection bias cannot be discarded as a limitation. On the one hand, the medical practice of the physicians who did not participate in this study may have been different from that of the respondents. The database of the SCSMT did not include data on exact tasks. Therefore, no comparison was possible between participating and non-participating physicians who performed health examinations in their usual practice. However, no significant differences

were observed for socio-demographic or professional characteristics between the sample and SCSMT members as a whole (Table 2) or between responders and non-responders in a broader survey conducted simultaneously to SCSMT members, which included the participants of this study [14], so there were no reasons to think that it would be different in this case.

On the other hand, the medical practice of the physicians from the SCSMT may have been different from that of physicians who were not members. In fact, physicians from the external OHS are underrepresented in the SCSMT, which is reflected in the distribution of the participants in this study. However, our knowledge of the Catalan situation and the results from a survey conducted in 2007 by the SCSMT [23], point to the fact that the professional situation and working conditions of those who are not members of the SCSMT are frequently worse, and, presumably, their practice would be too. This point, combined with the fact that our study shows that practice in external services has bigger limitations than in internal ones, leads one to think that the underrepresentation of professionals from the external OHS and a potential selection bias by the choice of the study population, would only add to underestimate the real situation in Catalonia.

Given the limitations of the study we have to be cautious in extrapolating results. However, in the worst possible scenario in relation to representativeness, the situation described by the participants in the study would correspond to 40.3% of the total estimated physicians performing workers' health surveillance activities and health examinations in Catalonia. Although the final error achieved was ±7.5%, this reduction in the precision of estimates did not change the conclusions, as the preventive usefulness would have been compromised even if the extreme range values of confidence intervals had been chosen.

Furthermore, given that health and safety laws and the labour inspectorate are common in Spain, and companies and occupational health services share similar practices and procedures, especially in the case of external OHS, most of which are large nation-wide corporations, it would be reasonable to think that our results might describe the situation in other parts of Spain, too.

How the results in Catalonia may be extrapolated to other countries is difficult to know but ruling out similar practices could be indicated in those with comparable scenarios in relation to routine health examinations.

Our results are in agreement with the best available scientific evidence, showing that the preventive usefulness of indiscriminate health examinations is highly questionable, both for the general population [24,25] and for the working population [26].

A Belgian survey of occupational physicians [27] showed results consistent with ours: physicians complained of being constricted by a legal framework leading to excessive periodic examinations at the expense of other forms of prevention. Those physicians in favor of periodic examinations stated that their content should be improved. A French qualitative study of occupational health doctors and workers also concluded that "occupational health practice often falls into an institutional framework that prioritizes medical examinations over the improvement of environmental and organizational conditions, worker health protection and, when needed, promotion of workplace adaptations" [28].

CONCLUSIONS

This study raises serious concerns about the occupational preventive usefulness of workers' health examinations as they are currently performed, given the shortcomings found regarding the clinical and exposure information available to the physicians who perform them, the job-specificity of the examinations and tests, and the early detection and appropriate management of suspected occupational diseases. The situation is worse in external occupational health services that cover the great majority of the Catalan workers. This in turn questions the appropri-

ateness of our health surveillance system, based primarily on these examinations.

Professionals alongside health and safety institutions and stakeholders should promote the rationalization of this system, following the technical criteria of need, relevance, scientific validity and effectiveness [22], whilst ensuring that its ultimate goal of improving the health and safety of workers in relation to work is fulfilled. Other countries with surveillance systems similar to ours might be encouraged by our results to assess how their practices fit the intended purpose.

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