

PROFESSIONAL ACTIVITY, INFORMATION DEMANDS, TRAINING AND UPDATING NEEDS OF OCCUPATIONAL MEDICINE PHYSICIANS IN ITALY: NATIONAL SURVEY

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Abstract

Objectives: Occupational medicine is a discipline continually evolving in response to technological advances, changes in workplaces and production processes, emergence of new occupational risks and diseases and modifications in regulatory framework for occupational health and safety. Therefore, the recurrent reevaluation of professional activity, information demands and education and training needs of occupational physicians is essential in order to identify methodologies and tools that may contribute to improvement of their professional knowledge and competency. In this regard, we conducted the first large-scale national survey of Italian occupational medicine physicians to define their demographic and professional activity and to assess their information demands, training and updating needs. **Material and Methods:** A random sample of occupational physicians, listed in the national register of the Italian Ministry of Health, was selected to complete a voluntary survey. Subjects recruited in this study were asked to complete 3 different sections (personal and professional information, training and updating needs, professional activity and practice characteristics) of a questionnaire for a total of 35 questions. **Results:** Most of participants were specialized in occupational medicine, worked for a large number of companies and carried out health surveillance on a total number of workers that exceeds 1500. Occupational physicians would like to have a higher training offer towards practical aspects of health surveillance, risks assessment, manual handling of loads, chemical substances and upper limb biomechanical overload. Interestingly, statistically significant differences were observed subdividing the sample into different groups according to the legal requirements to perform the professional activity of occupational physicians in Italy or according to particular aspects of their professional activity. **Conclusions:** This study has provided interesting findings that may help to guide future discussion on alternative and additional instruments and/or methodologies that may be adopted to implement the quality and effectiveness of occupational medicine practice. *Int J Occup Med Environ Health* 2016;29(5):837–858

Key words:

Survey, Occupational medicine, Questionnaire, Occupational medicine physician, Information demand and need, Continuing medical education

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INTRODUCTION

The practice of occupational medicine (OM) is continually evolving in response to technological advances, changes in workplaces and production processes, emergence of new occupational risks and diseases and modifications in regulatory framework for occupational health and safety. Occupational medicine is primarily a preventive specialty, the main purpose of which is to avoid the occurrence of disease following exposure to specific occupational risk factors. Consequently, the OM, lying at the interface between work and health, is concerned not only with clinical medicine but also with toxicology, ergonomics, public health, epidemiology and administration or management competencies [1,2].

In this context, the occupational medicine physician (OP), in carrying out his or her activity, must be able to interact, with increasing and multidisciplinary competence, with other professionals of the risk prevention system, such as employers (ERs), employees (EEs), safety and industrial hygiene professionals, occupational health and safety services of the companies (OHSS), personnel representative bodies and labor unions, human resource managers, general practitioner (GP) and public health care professionals. Moreover, OPs are increasingly asked to address issues of environmental medicine and health promotion in addition to protecting the worker's health against work-related injuries and occupational diseases [3–5]. Therefore, there is an evident need to determine and periodically re-evaluate professional activity (and the related skills and competencies) and the information demands and/or education and training needs of OPs, in order to ensure adequate protection of workers and continually improve their health and safety in workplaces [1,6,7].

In this regard, several studies [8–13] attempted to define the core competencies and skills of OPs in order to identify methodologies and tools that may contribute to improvement of the OP's professional knowledge and competency (e.g., introducing evidence-based medicine in daily practice) [14,15], to guide educational curricula

and professional certification processes [11], to address learning outcomes for higher specialist training within the framework of the OM [6], to influence the organization and structure of service delivery [16], to inform policy decisions and then, ultimately, to fill the gap between “what the OM is” and “what it should be” [11,16].

In this context, using a self-administered questionnaire, we conducted the first large-scale national survey of Italian OPs to gather data regarding their professional activity, information demands and training and updating needs. The aim of this study, highlighting the current problems of Italian OPs, has been to gain helpful information to define, develop and implement management methodologies, operative procedures and training programs that are useful and timely in improving the quality and effectiveness of the OM practice in Italy.

MATERIAL AND METHODS

Participants

A random sample of OPs, enrolled in the national register of OPs of the Italian Ministry of Health, was selected to receive, in an electronic form (if an email address was available) or mailed version, the survey, the cover letter which explained the study and a pre-addressed postage-paid return envelope to the Italian Workers' Compensation Authority (Istituto Nazionale Assicurazione Infortuni sul Lavoro – INAIL), Research Division, Occupational Medicine Department. The physicians were offered the choice of completing an online or a hardcopy version of the questionnaire. The inclusion criteria for the study included possessing the legal requirements to perform the professional activity of an OP in Italy and being listed in the aforementioned national register at the time when the study was conducted (in Italy physicians who intend to carry out professional activity as OPs are legally obliged to register themselves in this list).

We randomly selected 4704 OPs using the Excel random sampling program (Microsoft Office, Microsoft

Corporation, Redmond, Washington, USA). At the time of selection of the study population, in the national register of OPs of the Italian Ministry of Health there were 9856 OPs. All non-respondents were sent one reminder letter approximately one month after the first invitation to encourage them to complete and return the questionnaire. One thousand two hundred thirty-seven compiled questionnaires were returned to INAIL, where they were coded and the data was entered into an electronic file.

Several organizations and institutions collaborated in raising awareness among OPs and consequently in fostering their participation in the national survey. These included the Italian Society of Occupational Health and Industrial Hygiene (Società Italiana di Medicina del Lavoro ed Igiene Industriale – SIMLII), the National Federation of Professional Associations of Physicians and Dentists (Federazione Nazionale degli Ordini dei Medici Chirurghi e degli Odontoiatri – FNOMCeO), the Salvatore Maugeri Foundation, the Interdisciplinary Department of Medicine (Occupational Medicine section) of the University of Bari, the Department of Social and Environmental Medicine of the University of Messina, the Department of Medicine (Occupational Medicine section) of the University of Perugia and the Department of Public Health and Pediatrics (Occupational Medicine section) of the University of Turin.

Questionnaire

The items and types of questions could not directly be derived from any already existing questionnaire but were instead designed on the basis of the results of a review of the literature. In particular, to define the main indicators of the investigation we carried out benchmarking of the relevant studies regarding surveys of physicians in the OM specialty [1,11–13,16–22], surveys of recent graduates [18,23], observational studies of the OP practice [15,24] and surveys on working conditions [25,26].

Furthermore, the questionnaire was also designed taking into account the specific Italian regulatory framework for occupational health and safety.

Subjects recruited in this study were asked to complete 3 different sections of the questionnaire for a total of 35 questions. The first section of the survey, called “personal and professional information” (16 items), assessed individual demographics and professional characteristics (e.g., gender, age, legal requirements to perform the professional activity of an OP, practice location, postgraduate training, work experience).

The second section of the questionnaire, entitled “training and updating needs of OPs” (5 items) collected data on information demands and training and education needs (e.g., effectiveness of the Italian Continuing Medical Education (CME) program, extent and type of the demand for information in the OP practice, importance of the knowledge areas for occupational risk factors, usefulness of different training tools such as scientific literature, conferences and/or congresses, distance learning and/or online courses).

Finally, the third area, called “professional activity and practice characteristics” (14 items), investigated the main characteristics of the professional OP practice and relationships with other professionals of the risk prevention system (e.g., importance and complexity of different OP tasks or duties, cooperation and collaboration with ERs, EEs and OHSS). The responses included no personal identifiers, such as name or date of birth and all information was kept confidential.

A preliminary version of the questionnaire used in this survey was tested for face validity by 100 OPs. In this pilot phase we asked OPs to express their opinion on the clarity and comprehensibility of each item, to comment on the functionality of the online system and to make suggestions in order to optimize the questionnaire. Subsequently, the questionnaire was adapted in accordance with OPs’ suggestions and observations.

Statistical data analysis

The statistical analysis was performed using SPSS software version 22. For categorical and Likert scale variables, percentages and frequencies were calculated for the total sample and, at a greater level of detail, using contingency tables to display the frequency distribution of the variables in the subsets generated by socio-demographic variables, in order to highlight any peculiarities. For items on the scale of 1 to 5 (1 – minimum score, 5 – maximum score) the average scores were calculated in both the total sample and the subsets generated by socio-demographic variables.

For the first group of items, to test the association between socio-demographic variables and answers provided, the Chi² test was employed. For the second group, to compare the mean scores between subgroups, the analysis of variance (ANOVA) was applied. Only significant results were reported. Values of $p < 0.05$ were considered significant.

RESULTS

Personal and professional information

Individual demographics and professional characteristics of Italian OPs are reported in the Table 1. Most of respondents were male, aged 55–64 years and living in northern Italy. As regards the legal requirements to carry out professional activity as an OP in Italy, the majority of the participants had specialized in OM. Seventy-five percent of the OPs were members of a scientific society and/or professional association and they were mainly members of the SIMLII. Interestingly, only about one-third of the subjects stated that they worked exclusively as OPs and the most of the sample carried out the professional OP activity as freelance practitioners.

The results of this survey showed that most of the OPs, working for a large number ($N \geq 50$) of companies, carried out health surveillance on a total number of workers that exceeded 1500 (that is the number of workers visited in

a year by OPs). The companies in which the participants had the role of OPs are mostly small (10–49 workers) and belong primarily to the industrial sector of manufacturing activities. Finally, as regards health surveillance, the OPs reported that the occupational risk factors most present in those companies included visual display units (VDUs), manual handling of loads (MHL), noise, exposure to chemical substances and upper limb biomechanical overload.

Table 1. Demographics and professional information of Italian occupational medicine physicians (OPs)

Variable	Respondents
Gender [%]	
male	72.4
female	27.6
Age [%]	
< 35 years	2.7
35–44 years	22.8
45–54 years	23.6
55–64 years	40.6
≥ 65 years	10.3
Geographical area of residence [%]	
Northern Italy	44.6
Middle Italy	21.5
Southern Italy and Islands	33.9
Legal requirements to perform OP profession [%]	
specialty in occupational medicine (OM)	74.0
specialty in hygiene and preventive medicine	14.0
authorization pursuant to article 55 of Decree Law No. 277 [28]	7.0
specialty in forensics medicine	5.0
Member of* (responses (cases)) [%]:	
SIMLII	36.2 (47.6)
ANMA	15.8 (20.7)
AIRM	8.1 (10.6)
CoNaMeCo	3.2 (4.2)

Table 1. Demographics and professional information of Italian occupational medicine physicians (OPs) – cont.

Variable	Respondents
Member of* (responses (cases)) [%]: – cont.	
AIDII	3.0 (3.9)
ICOH	2.0 (2.7)
SIVR	0.2 (0.3)
other	6.6 (8.7)
none	24.9 (32.7)
Other medical activities in addition to OP profession* (responses (cases)) [%]	
general practitioner	16.4 (17.5)
self-employed (medical branch)	10.9 (11.7)
employed in public institutions	7.9 (8.5)
hospital physicians (medical branch)	4.7 (5.0)
employed in the Local Public Health Authority	4.0 (4.3)
medical specialist outpatient	3.1 (3.3)
self-employed (surgery branch)	1.2 (1.3)
hospital physicians (surgery branch)	0.9 (1.0)
other	17.2 (18.4)
none	33.7 (36.2)
OP profession as* (responses (cases)) [%]:	
self-employed	63.5 (81.2)
collaborator of private occupational health center	14.0 (18.0)
employee of a company	9.5 (12.1)
employee of public occupational health center	8.6 (11.1)
employee of private occupational health center	1.7 (2.2)
collaborator of public occupational health center	1.6 (2.0)
employee/collaborator of an external occupational health center	1.0 (1.3)
Companies served as OP [%]	
< 10	30.6
10–25	19.1
26–50	15.5
> 50	34.8

Table 1. Demographics and professional information of Italian occupational medicine physicians (OPs) – cont.

Variable	Respondents
Company size (served as OP) [%]	
< 10 workers	31.5
10–49 workers	39.2
50–249 workers	14.9
≥ 250 workers	14.4
Workers seen as OP [%]	
≤ 50	5.0
51–100	6.4
101–500	25.3
501–1 000	21.2
1 001–1 500	16.4
> 1 500	25.6
Occupational risk factors more frequent in companies* (responses (cases)) [%]	
VDUs	11.5 (94.9)
MHL	11.2 (92.7)
noise	9.8 (81.4)
chemicals	9.0 (74.4)
upper limb biomechanical overload	8.8 (72.7)
vibrations	8.3 (68.8)
night shift work	8.3 (68.5)
biological agents	8.2 (67.7)
work-related stress	6.4 (52.8)
carcinogens	5.1 (42.1)
artificial optical radiation	4.1 (33.6)
others	9.3 (77.1)

* Multiple choice item.

SIMLII – Società Italiana di Medicina del Lavoro ed Igiene Industriale (Italian Society of Occupational Medicine and Industrial Hygiene); ANMA – Associazione Nazionale Medici d’Azienda (Italian National Association of Company Doctors); AIRM – Associazione Italiana di Radioprotezione Medica (Italian Association of Medical Radioprotection); CoNaMeCo – Coordinamento Nazionale dei Medici Competenti (Italian National Coordination of Occupational Physicians); AIDII – Associazione Italiana degli Igienisti Industriali (Italian Association of Industrial Hygienists); ICOH – International Commission on Occupational Health; SIVR – Società Italiana Valori di Riferimento (Italian Society of Reference Values); VDUs – visual display units; MHL – manual handling of loads.

Training and updating needs of OPs

The Table 2 shows the results of the second section of the questionnaire (training and updating needs of OPs). Most of the respondents “neither agreed nor disagreed” in considering the current Italian CME program to be an effective tool for OP updating even if a significant proportion of participants disagreed with this consideration. Consequently, we asked OPs to indicate the main factors that prevented them from getting an adequate training offer. In this regard, many participants believed that a significant improvement could be achieved by training events discussing topics and issues that really met the practical needs of OPs or reducing the costs or the distance (< 100 km) of training events.

Concerning the topics that should be discussed in the training events, OPs believed that the most important ones were the practical aspects of health surveillance and the risk assessment. In terms of occupational risk factors, the results showed that participants would like to have a higher training offer regarding the MHL, chemical substances, upper limb biomechanical overload, carcinogens and work-related stress. Finally, the workshops organized by the Local Public Health Authorities were considered to be the most useful training tools by Italian OPs.

Table 2. Training and updating needs of Italian occupational medicine physicians (OPs)

Question and answer	Responses
Do you agree to consider the Italian continuing medical education (CME) program to be an effective tool for OP updating? [%]	
strongly agree	3.9
agree	10.1
neither agree nor disagree	36.8
disagree	35.3
strongly disagree	13.8

Table 2. Training and updating needs of Italian occupational medicine physicians (OPs) – cont.

Question and answer	Responses
Factors that would ensure a better training offer* (score) (M±SD)	
discussing topics that meet OPs' practical needs	4.56±0.77
lower economic costs	4.42±1.06
lower distance (< 100 km) of training events	4.28±1.08
greater publicity of training events	4.16±1.11
increasing the online and distance learning	3.79±1.28
duration of training events not longer than 2 days	3.61±1.31
organization of training events on non-working days	3.09±1.52
Most important topics that should be discussed in training events** (responses (cases)) [%]	
practical aspects of health surveillance	28.1 (82.9)
risk assessment	15.5 (45.6)
medical-legal obligations	12.7 (37.6)
legislative changes	9.3 (27.5)
biological monitoring	6.5 (19.3)
health promotion	5.1 (15.1)
industrial hygiene applied to OM	4.9 (14.5)
disability and work	4.9 (14.5)
methodologies for epidemiological surveillance	3.9 (11.6)
counseling	3.1 (9.2)
methodologies for risk communication	2.4 (7.2)
aspects of injury prevention	2.4 (7.0)
privacy, deontology and ethics	0.6 (1.8)
others	0.5 (1.5)
Most important occupational risk factors that should be discussed in training events** (responses (cases)) [%]	
MHL	15.1 (44.6)
chemicals	13.6 (40.2)
upper limb biomechanical overload	12.2 (36.2)
carcinogens	11.8 (35.1)

Table 2. Training and updating needs of Italian occupational medicine physicians (OPs) – cont.

Question and answer	Responses
Most important occupational risk factors that should be discussed in training events** (responses (cases)) [%] – cont.	
work-related stress	9.0 (26.8)
electromagnetic fields	8.1 (23.9)
night shift work	6.6 (19.6)
biological agents	5.5 (16.3)
artificial optical radiation	4.9 (14.5)
noise	3.8 (11.2)
VDUs	3.0 (8.8)
ionizing radiation	2.9 (8.5)
vibrations	2.5 (7.5)
asbestos	1.1 (3.3)
Usefulness of updating methodologies and tools*** (score) (M±SD)	
workshops of the Local Public Health Authorities	3.82±1.14
training courses with lectures	3.75±1.11
scientific literature	3.63±1.10
consultation of databases	3.58±1.13
newsletter	3.52±1.15
discussion of case-studies	3.50±1.17
online and distance learning	3.50±1.26
university seminars	3.46±1.17
conferences and congresses	3.39±1.11
SIMLII online and distance learning	3.30±1.28

* Scale variable from 1 = very unimportant to 5 = very important.

** Multiple choice item (max 3).

*** Scale variable from 1 = very useless to 5 = very useful.

M – mean; SD – standard deviation.

Other abbreviations as in Table 1.

Professional activity and practice characteristics

The main characteristics of the OP professional practice in Italy and the relationships of OPs with other professionals of the risk prevention system are described in the Table 3 and 4. Italian OPs, before beginning professional cooperation with an ER, conduct a careful preliminary assessment

of the company, particularly with regard to the several aspects of health and safety at work. According to the opinion of most OPs, the most important factors of this preliminary assessment are consultation of the Risk Assessment Document (RAD), carrying out an observational walkthrough survey of workplaces and meeting the occupational health and safety manager of the companies.

With regard to the cooperation between the OPs and the ERs, the survey provided interesting findings, showing that, relating to the protection of the health and safety of workers, the ERs involved the OPs mainly in the redeployment of workers unfit for a specific task or suited to work modifications. Surprisingly, the cooperation between the OPs and the ERs is less evident in other important activities, such as the organization of training courses or the risk assessment. This data is particularly interesting since, in accordance with the current Italian legislation on work and health, it would confirm one of the most important distinctive characteristic of occupational health and safety services in Italy, namely the attempt to realize an integrated system in which different occupational health and safety professionals work together to reach the highest level of prevention and protection.

The results related to risk assessment are also particularly interesting in the light of the fact that most respondents believe that the participation of the physician in such activities is always necessary, even if this task is judged highly complex. Similarly, some OPs believe that the evaluation of alcohol and drug use and/or abuse is also particularly difficult. With regard to the relationships of OPs with other professionals of the Italian risk prevention system, most of the respondents have a collaborative working relationship with both the occupational health and safety manager and the workers' health and safety representative.

Comparison of varied groups of OPs

In Italy the Decree Law No. 81/08 [27] has stated that the role of the OP may be carried out by physicians

Table 3. Practice characteristics of Italian OPs – part one

Question	Responses [%]				
	always	often	sometimes	almost never	never
How many times, before beginning a working relationship with an ER, do you perform the following activities:					
to see the RAD	85.4	11.3	1.7	1.0	0.6
to carry out an observational walkthrough survey of workplaces	79.5	15.9	3.1	1.1	0.4
to meet the occupational health and safety manager of the companies	68.8	18.8	7.9	2.6	1.9
to see the health surveillance program of the previous OP	56.8	22.0	11.5	5.9	3.7
to meet the workers' health and safety representative	48.5	21.6	18.0	7.6	4.3
to see reports of the inspections carried out by the Local Public Health Authority	43.3	21.4	16.5	12.1	6.7
to see the book of work injuries	30.1	25.4	24.5	13.8	6.2
to see the walkthrough survey reports of the previous OP	28.7	18.4	23.0	17.2	12.7
to see a company's first aid procedures	27.5	25.7	25.3	15.7	5.9
to see a company's emergency procedures	18.4	19.9	30.2	21.2	10.2
In the companies in which you are an OP, how many times have you been involved by the ER in the following activities:					
redeployment of workers unfit for a specific task or fit subject to work modifications	47.4	26.6	12.3	7.7	6.0
application of measures for the protection of health and physical and psychological integrity of workers	30.0	28.3	23.9	11.3	6.4
organization of training courses in first aid	24.2	35.8	24.3	9.5	6.2
risk assessment	29.1	29.5	27.0	10.7	4.0
identification of first aid procedures	20.6	29.2	25.4	16.2	8.1
risk assessment of work-related stress	24.3	25.5	24.9	16.6	8.7
identification and selection of PPE	9.4	22.8	32.5	23.4	12.3
training courses regarding the occupational risk factors	15.3	28.5	31.9	17.1	7.3
identification of emergency procedures	7.8	12.6	28.2	28.3	23.0

OP – occupational physician; ER – employer; RAD – risk assessment document; PPE – personal protective equipment.

specializing in the OM (medical graduates must undergo a 5-year postgraduate training course), forensic medicine, hygiene and preventive medicine (they must attend a 2nd level university master course that is at least 1-year advanced professional training course) and by physicians who are in possession of the authorization pursuant to Article 55 of the Decree Law No. 277 [28] (those

are physicians who, at the time of entry into force of that law, had already carried out the OP profession). Although those physicians may perform the same professional activity (that is as OPs), it should be noted that their specialist training is quite different.

Consequently, according to the legal requirements to perform the professional activity of an OP in Italy, we

Table 4. Practice characteristics of Italian OPs – part two

Question and answer	Responses
Degree of complexity of different tasks performed by the OP* (M±SD)	
collaboration to risk assessment	3.80±1.10
evaluation of alcohol use and/or abuse	3.44±1.30
evaluation of drug use and/or abuse	3.13±1.34
delivery of health records to public institutions	2.91±1.32
walkthrough survey of workplaces	2.73±1.31
Is it necessary to involve an OP in risk assessment? [%]	
yes	86.5
no	13.5
The evaluation of alcohol and drug use and/or abuse is an effective preventive tool [%]	
strongly agree	11.8
agree	19.7
neither agree nor disagree	32.2
disagree	24.5
strongly disagree	11.8
Usefulness to perform the walkthrough survey of workplaces with* (M±SD):	
an ER	4.18±1.11
an occupational health and safety manager of the companies	4.73±0.61
a workers' health and safety representative	4.40±0.91
The employer is respectful of an OP's autonomy and independence [%]	
strongly agree	22.7
agree	26.4
neither agree nor disagree	34.2
disagree	13.9
strongly disagree	2.9
Worker training is a tool that allows to change the bad behaviors at work [%]	
strongly agree	29.0
agree	37.2
neither agree nor disagree	26.3
disagree	6.3
strongly disagree	1.2

Table 4. Practice characteristics of Italian OPs – part two – cont.

Question and answer	Responses
The working relationship with the occupational health and safety manager of the companies is [%]:	
collaborative	88.7
formal	10.0
non-existent	1.3
The working relationship with the workers' health and safety representative is [%]:	
collaborative	77.2
formal	16.2
non-existent	6.6
The application of the Decree Law No. 81/08 [27] has increased the protection of health and safety in the workplaces [%]	
strongly agree	4.8
agree	21.9
neither agree nor disagree	45.5
disagree	21.8
strongly disagree	6.0
Number of occupational diseases reported (to the Local Public Health Authority) in the last 5 years ^a [%]	
0	35.9
≤ 5	36.3
6–15	18.2
16–25	4.9
> 25	4.7
Number of occupational diseases denounced (to the Workers' Compensation Authority) in the last 5 years ^b [%]	
0	40.3
≤ 5	33.9
6–15	16.4
16–25	5.1
> 25	4.3
The report of occupational disease is a useful checking tool [%]	
strongly agree	6.2
agree	14.5

Table 4. Practice characteristics of Italian OPs – part two – cont.

Question and answer	Responses
The report of occupational disease is a useful checking tool [%] – cont.	
neither agree nor disagree	44.1
disagree	25.6
strongly disagree	9.6
The denounce of occupational disease is a useful epidemiologic tool [%]	
strongly agree	8.8
agree	24.2
neither agree nor disagree	40.7
disagree	18.2
strongly disagree	8.1
The procedures of report and denounce of occupational disease should be simplified [%]	
strongly agree	45.9
agree	34.0
neither agree nor disagree	17.1
disagree	2.6
strongly disagree	0.4

* Scale variable from 1 = very simple to 5 = very complex.

** Scale variable from 1 = very useless to 5 = very useful.

^a Number of occupational diseases reported to the Local Public Health Authority for epidemiological and preventive purposes.

^b Number of occupational diseases denounced to the Workers' Compensation Authority for social security (insurance) and compensatory purposes.

Abbreviations as in Table 2 and 3.

classified the participants into 4 groups in order to investigate whether the different educational background could determine significant differences in those groups, especially in terms of information demands and training or updating needs. Concerning personal and professional information, statistically significant differences were observed with respect to gender, age, geographical area of residence ($p < 0.001$), number of companies for which they served as OPs ($p = 0.004$) and a company size ($p = 0.002$). In the second section of the questionnaire, statistically significant differences ($p < 0.05$) were

found with regard to the usefulness of some updating methodologies and tools, such as scientific literature, consultation of databases and discussion of case-studies. Finally, as regards the main characteristics of the professional activity, 4 out of the 10 tasks that an OP may perform before beginning a working relationship with an ER, showed significant differences regarding the attitudes expressed (carrying out an observational walkthrough survey of workplaces, $p = 0.002$; meeting the occupational health and safety manager of the companies, $p < 0.001$; seeing the health surveillance program of the previous OP, $p = 0.031$; seeing the walkthrough survey reports of the previous OP, $p = 0.005$).

Similarly, in the OP subgroups significant differences were observed regarding involvement in the redeployment of workers unfit for a specific task or suited to work modifications ($p < 0.001$), in the organization of training courses in first aid ($p = 0.007$) or occupational risk factors ($p = 0.005$) and in identification of emergency procedures ($p = 0.001$). Physicians specializing in forensic medicine and hygiene and preventive medicine, compared with other groups, considered some tasks performed by the OP slightly more complex (evaluation of drug use and/or abuse and walkthrough survey of workplaces, $p < 0.05$). In particular, with regard to some specific aspects of those 2 activities, the OP subgroups expressed quite different opinions. For example, specialists in hygiene and preventive medicine are the only ones to consider the evaluation of alcohol and drug use and/or abuse to be an effective preventive tool ($p = 0.003$) while, with respect to the usefulness of performing the walkthrough survey of workplaces together with the occupational health and safety manager of the companies, the highest and lowest scores were provided by specialists in the OM and in forensic medicine, respectively ($p < 0.001$).

According to the findings of this survey, the most important factor that would ensure a significant improvement of the training offer is the organization of training events in which topics, that meet the current practical needs

of OPs, should be discussed. However, it is not obvious that all OPs have the same needs. Indeed, information demands, training and updating needs are influenced by several variables that belong to daily professional practice. In this context, we subdivided the respondents into various groups, according to particular aspects of their professional activity (number of companies supported by an OP, a company size and a total number of workers visited in a year as an OP), to verify the possible presence of statistically significant differences (Tables 5–7).

With regard to the stratification of the sample, according to the parameter named “number of companies supported by an OP” (Table 5), results revealed the presence of important differences in relation to the approach that OPs have with a company before beginning a working relationship, showing statistically significant differences with regard to the consultation of the health surveillance program of the previous OP ($p < 0.001$), of reports on inspections carried out by the Local Public Health Authority ($p = 0.007$), of the work injury log ($p = 0.012$), of walkthrough survey reports of the previous OP ($p < 0.001$), and of the company’s first aid ($p = 0.02$) and emergency procedures ($p = 0.001$), and meeting the occupational health and safety manager of the companies ($p < 0.001$) and the workers’ health and safety representative ($p = 0.007$) (Table 5). Finally, the involvement of OPs in some specific tasks relating to the protection of the health and safety of workers also showed important differences.

The statistical analysis of the results provided by the sample, divided according to a company size, showed important differences regarding 2 factors that would ensure a better training offer, that is lower distance (< 100 km) of training events ($p = 0.014$) and organization of training events on non-working days ($p = 0.036$) (Table 6). Statistically significant differences were also observed with respect to the usefulness of 3 updating methodologies and tools, such as scientific literature ($p = 0.001$),

consultation of databases ($p = 0.003$) and discussion of case-studies ($p < 0.001$).

Among the different activities that an OP may carry out before beginning a working relationship with a company, only the following showed similar percentage rates: carrying out an observational walkthrough survey of workplaces, consulting the work injury log and the company’s first aid and emergency procedures; the other investigated tasks presenting rather different values (Table 5). By contrast, with regard to the involvement of the OPs by the ERs in different management aspects of the protection of the health and safety of workers, statistically significant differences were detected for all items (Table 5), including the redeployment of workers unfit for a specific task or fit subject to work modifications ($p < 0.001$).

The Table 7 shows the results with statistically significant differences in relation to the total number of workers seen by OPs in a year. The only updating tool for which, in the different subgroups, significant differences were observed in terms of usefulness, was the discussion of case-studies ($p < 0.05$) (Table 7). As regards the degree of complexity of some tasks performed by OPs, quite different ratings were obtained by the evaluation of alcohol and drug use and/or abuse and walkthrough survey of workplaces ($p < 0.05$) (Table 7).

Unlike the other parameters of the professional activity, the total number of workers subjected to medical examinations as a part of health surveillance would seem marginally to affect the approach of OPs to a company. Indeed, statistically significant differences were only detected for carrying out an observational walkthrough survey of workplaces ($p = 0.004$) and consultation of company’s first aid and emergency procedures ($p = 0.015$ and $p = 0.028$, respectively). By contrast, 7 out of the 9 investigated activities in which the OPs may be involved by the ERs revealed important differences with respect to the total number of workers seen by physicians in a year (Table 7).

Table 5. Statistically significant differences according to the number of companies supported by an OP and a company size

Question and answer	Responses [%]					
	companies supported by an OP		P	workers in company		P
	1-25	≥ 26		1-49	≥ 50	
How many times, before beginning a working relationship with an ER, do you perform following activities?						
to meet the occupational health and safety manager of the companies			< 0.001			< 0.001
always	75.3	61.7		63.7	80.2	
often	13.9	23.9		22.1	11.2	
sometimes	7.2	8.5		8.3	6.6	
almost never	2.2	3.3		3.4	1.0	
never	1.4	2.7		2.5	1.0	
to see the health surveillance program of the previous OP			< 0.001			0.001
always	61.3	51.4		53.2	64.9	
often	22.3	23.2		23.7	19.5	
sometimes	8.4	14.3		12.8	7.9	
almost never	3.5	8.1		6.9	3.0	
never	4.5	3.1		3.4	4.6	
to meet the workers' health and safety representative			0.007			0.010
always	53.5	42.0		44.3	55.8	
often	19.3	23.9		22.8	18.6	
sometimes	17.0	19.7		18.7	16.9	
almost never	6.3	9.2		9.1	5.3	
never	3.9	5.2		5.1	3.3	
to see reports of the inspections carried out by the Local Public Health Authority			0.007			< 0.001
always	47.3	38.7		40.2	50.7	
often	19.1	23.7		21.5	21.1	
sometimes	17.3	16.0		16.0	17.8	
almost never	9.1	14.9		14.5	5.7	
never	7.2	6.7		7.8	4.7	
to see the walkthrough survey reports of the previous OP			< 0.001			< 0.001
always	37.2	18.9		24.4	37.5	
often	17.7	19.7		18.8	18.2	
sometimes	22.1	23.6		22.3	24.0	
almost never	12.5	21.9		19.7	11.5	
never	10.5	15.8		14.8	8.8	

Table 5. Statistically significant differences according to the number of companies supported by an OP and a company size – cont.

Question and answer	Responses [%]					
	companies supported by an OP		P	workers in company		P
	1–25	≥ 26		1–49	≥ 50	
In the companies in which you are an OP, how many times have you been involved by the ER in the following activities:						
application of measures for the protection of health and physical and psychological integrity of workers			0.034			< 0.001
always	32.8	27.8		26.3	39.9	
often	30.5	26.1		26.3	33.6	
sometimes	22.4	25.9		25.9	19.5	
almost never	9.2	12.7		13.4	4.7	
never	5.1	7.5		8.1	2.3	
organization of training courses in first aid			< 0.001			< 0.001
always	30.2	18.9		18.9	39.0	
often	31.2	42.1		39.3	30.0	
sometimes	20.5	26.8		27.0	15.3	
almost never	9.2	9.2		9.6	8.0	
never	9.0	3.1		5.2	7.7	
risk assessment			< 0.001			< 0.001
always	38.0	19.4		4.7	2.0	
often	26.1	33.1		13.8	3.7	
sometimes	23.9	29.8		29.6	19.7	
almost never	8.2	13.3		29.5	30.5	
never	3.8	4.3		22.4	44.1	
identification of first aid procedures			< 0.001			< 0.001
always	28.6	13.8		15.7	34.4	
often	27.6	30.7		29.9	27.2	
sometimes	22.0	30.1		27.7	22.1	
almost never	12.9	19.0		18.3	10.2	
never	8.9	6.4		8.4	6.1	
risk assessment of work-related stress			< 0.001			< 0.001
always	32.9	16.3		16.2	45.3	
often	22.8	27.9		25.3	25.3	
sometimes	25.0	25.6		27.9	18.6	
almost never	12.4	21.5		21.6	6.1	
never	6.9	8.7		9.1	4.7	

Table 5. Statistically significant differences according to the number of companies supported by an OP and a company size – cont.

Question and answer	Responses [%]				P	P
	companies supported by an OP		workers in company			
	1–25	≥ 26	1–49	≥ 50		
In the companies in which you are an OP, how many times have you been involved by the ER in the following activities: – cont.						
identification and selection of PPE					< 0.001	< 0.001
always	13.7	4.4	6.3	16.1		
often	22.5	23.1	21.9	25.2		
sometimes	31.8	33.5	32.4	32.9		
almost never	19.4	27.3	26.5	15.4		
never	12.5	11.7	13.0	10.4		
organization of training courses regarding the occupational risk factors					< 0.001	< 0.001
always	22.7	6.7	8.6	29.8		
often	32.5	24.5	25.9	34.4		
sometimes	25.0	39.7	36.0	23.4		
almost never	13.9	20.6	20.9	8.4		
never	5.9	8.5	8.6	4.0		
identification of emergency procedures					< 0.001	< 0.001
always	11.5	3.9	5.2	13.9		
often	12.7	11.7	11.2	15.3		
sometimes	30.1	26.8	27.1	31.3		
almost never	22.8	34.0	31.0	21.8		
never	23.0	23.5	25.5	17.7		

Abbreviations as in Table 1 and 3.

Table 6. Factors ensuring a better training offer

Factor	Responses according to workers in a company (M±SD)		P
	1–49	≥ 50	
Lower distance (< 100 km) of training events	4.35±1.04	4.16±1.14	0.014
Organization of training events on non-working days	3.16±1.52	2.93±1.53	0.036

M – mean; SD – standard deviation.

Table 7. Statistically significant differences according to the total number of workers visited in a year (number of medical examinations) by OPs

Question and answer	Responses according to workers visited in a year						P
	≤ 50	51-100	101-500	501-1 000	1 001-1 500	> 1 500	
Usefulness of updating methodologies and tools (M±SD)							
discussion of case-studies	3.17±1.12	3.01±1.28	3.42±1.13	3.48±1.21	3.60±1.12	3.66±1.17	< 0.05
Degree of complexity of different tasks performed by the OP (M±SD)							
evaluation of alcohol use and/or abuse	4.13±1.03	3.42±1.37	3.45±1.26	3.21±1.37	3.52±1.23	3.40±1.30	< 0.05
evaluation of drug use and/or abuse	3.92±1.11	3.37±1.37	3.23±1.32	2.97±1.37	3.02±1.26	2.85±1.29	< 0.05
walkthrough survey of workplaces	3.06±1.41	3.05±1.38	2.95±1.29	2.61±1.29	2.48±1.24	2.71±1.30	< 0.05
How many times, before beginning a working relationship with a ER, do you ask to perform the following activities [%]:							
to carry out an observational walkthrough survey of workplaces							0.004
always	78.8	70.5	78.6	81.0	77.0	83.3	
often	17.3	13.1	18.7	14.4	18.8	12.5	
sometimes	3.8	9.8	0.8	2.8	4.2	3.0	
almost never	0.0	6.6	1.6	0.9	0.0	0.8	
never	0.0	0.0	0.4	0.9	0.0	0.4	
to see company's first aid procedures							0.015
always	36.0	21.1	31.3	26.4	20.0	25.3	
often	16.0	45.6	26.6	24.1	27.5	23.4	
sometimes	32.0	19.3	24.6	25.9	27.5	26.1	
almost never	14.0	7.0	13.5	14.2	16.9	19.9	
never	2.0	7.0	4.0	9.4	8.1	5.4	
to see company's emergency procedures							0.028
always	32.0	18.6	23.3	15.2	12.3	16.3	
often	26.0	30.5	18.5	19.0	19.1	18.6	
sometimes	24.0	30.5	28.9	29.9	36.4	30.6	
almost never	10.0	13.6	20.9	20.9	22.2	24.4	
never	8.0	6.8	8.4	15.2	9.9	10.1	
In the companies in which you are an OP, how many times have you been involved by the ER in the following activities [%]:							
redeployment of workers unfit for a specific task or fit subject to work modifications							< 0.001
always	30.0	29.0	37.6	49.3	57.4	62.3	
often	16.0	29.0	27.2	24.7	27.8	27.2	

Table 7. Statistically significant differences according to the total number of workers visited in a year (number of medical examinations) by OPs – cont.

Question and answer	Responses according to workers visited in a year						P
	≤ 50	51-100	101-500	501-1 000	1 001-1 500	> 1 500	
In the companies in which you are an OP, how many times have you been involved by the ER in the following activities [%]: – cont.							
redeployment of workers unfit for a specific task or fit subject to work modifications – cont.							< 0.001
sometimes	22.0	12.9	16.4	11.6	9.3	6.2	
almost never	12.0	19.4	9.6	8.8	3.1	3.1	
never	20.0	9.7	9.2	5.6	2.5	1.2	
application of measures for the protection of health and physical and psychological integrity of workers							0.010
always	30.0	25.8	27.1	32.1	29.9	33.8	
often	20.0	35.5	23.1	25.6	30.5	34.6	
sometimes	22.0	24.2	26.7	21.9	26.8	20.8	
almost never	20.0	9.7	12.7	14.9	8.5	6.5	
never	8.0	4.8	10.4	5.6	4.3	4.2	
risk assessment							0.044
always	33.3	35.1	28.2	27.4	23.6	30.5	
often	15.7	24.6	29.4	24.5	35.4	35.2	
sometimes	29.4	29.8	25.0	28.8	28.6	26.2	
almost never	15.7	8.8	11.5	14.2	10.6	5.9	
never	5.9	1.8	6.0	5.2	1.9	2.3	
risk assessment of work-related stress							0.002
always	21.6	26.2	23.1	23.3	22.6	29.2	
often	25.5	19.7	19.5	25.6	26.2	32.7	
sometimes	25.5	27.9	25.1	26.5	28.7	20.8	
almost never	9.8	16.4	22.7	14.0	18.9	13.1	
never	17.6	9.8	9.6	10.7	3.7	4.2	
identification and selection of PPE							< 0.001
always	22.4	12.9	11.2	7.8	4.9	5.3	
often	14.3	22.6	21.5	24.4	18.4	27.6	
sometimes	22.4	35.5	25.5	31.8	38.7	39.5	
almost never	22.4	16.1	27.1	22.6	28.2	18.4	
never	18.4	12.9	14.7	13.4	9.8	8.8	

Table 7. Statistically significant differences according to the total number of workers visited in a year (number of medical examinations) by OPs – cont.

Question and answer	Responses according to workers visited in a year						P
	≤ 50	51–100	101–500	501–1 000	1 001–1 500	> 1 500	
In the companies in which you are an OP, how many times have you been involved by the ER in the following activities [%]: – cont.							
organization of training courses regarding the occupational risk factors							0.001
always	32.7	20.6	15.0	10.1	10.5	17.2	
often	17.3	25.4	25.2	26.7	32.7	32.2	
sometimes	21.1	31.7	28.3	36.9	34.0	33.3	
almost never	19.2	11.1	22.4	18.0	19.1	12.6	
never	9.6	11.1	9.1	8.3	3.7	4.6	
identification of emergency procedures							0.004
always	20.0	15.0	10.4	3.3	4.9	6.6	
often	4.0	13.3	10.8	12.1	15.3	14.8	
sometimes	30.0	28.3	23.3	26.0	30.7	32.7	
almost never	26.0	21.7	30.1	31.2	28.2	25.7	
never	20.0	21.7	25.3	27.4	20.9	20.2	

Abbreviations as in Table 1 and 3.

DISCUSSION

The realization of the national surveys relating to the OM is a very useful instrument of knowledge since it allows us to understand how the OP's theoretical knowledge is put into practice in a national context. Consequently, the information provided by those surveys has a high intrinsic value, both nationally and internationally. In fact, at a national level that data may be used to redefine learning outcomes for higher specialist training and modernize educational curricula or address the professional updating of OPs according to their daily practical needs. On the other hand, at an international level, the analysis and comparison of those results may provide useful indications to achieve continual improvement of the discipline, which in turn ensures the ability to adequately deal with new challenges

imposed by the constant changes and technological advances in the world of work.

According to our findings, most of the participants were male, aged 55–64 years old, specializing in the OM and self-employed. Most of the surveyed OPs carry out their activity in a number of companies exceeding 50 (usually do those companies have a number of employees below 50) and carry out health surveillance on more than 1500 workers. With regard to the occupational risk factors, the most frequent ones in workplaces are the VDUs, MHL and noise. An interesting result is that only 1/3 of respondents work exclusively as OPs, while important percentage rates of participants also carry out other medical activities. This finding is in good agreement with the results provided by other previous studies [1,11,18] and supports the hypothesis that many OPs

enter the specialty after they have worked in other specialties [29,30].

General practitioners and OPs have several overlapping work fields (preventive medicine, health promotion, rehabilitation) and consequently it is obvious that better cooperation is in the workers' interest in terms of shortening illness-associated absenteeism, improving reintegration into the workplace and preserving employability [31]. About 16% of surveyed physicians besides working as OPs are also general practitioners suggesting that there is a fruitful collaboration between these 2 professional profiles. Nevertheless, the results of our survey (data not shown) have demonstrated the need to achieve a better cooperation between general practitioners and OPs [31–33]. Currently, the Italian CME program is not considered to be sufficiently adequate to ensure effective updating of OPs. The main reasons for this negative assessment were identified by the participants as the high cost of training and updating events and as discussion of topics that are only distantly related to issues of daily professional practice. Therefore training and updating courses, in order to be considered actually effective, should provide useful operational guidance to addressing the problems that OPs experience carrying out their professional tasks on a daily basis [34].

In this regard, our results provide a very accurate description of the information demands of Italian OPs, showing that they consider training and updating on topics like practical aspects of health surveillance, risk assessment, medical-legal obligations and legislative changes or on specific occupational risk factors like the MHL, chemicals, upper limb biomechanical overload, carcinogens and work-related stress to be particularly important. Evaluation of information demands, training and updating needs offers insights into what core competencies and knowledge areas are considered to be most important by OPs.

In this context, national surveys, previously conducted both in the United States and in Europe, provided similar

results to those obtained in this study [1,11,16,18,20,35]. The great interest of OPs in some specific occupational risk factors such as the MHL, upper limb biomechanical overload and work-related stress is probably explained by the fact that currently musculoskeletal disorders, fatigue and stress, are some of the main symptoms reported by workers both in Italy [36] and the rest of Europe [26,37]. This hypothesis is also supported by the results of the studies conducted by Harber et al. [16] on a sample of North American OPs, highlighting that health conditions most frequently involved in the OP's activities were non-spinal and spinal musculoskeletal disorders [11,16,20].

To communicate with a variety of professionals and being able to function in an interdisciplinary team, OPs are widely acknowledged to have core competencies for their practice [1,10,16,18]. The importance of having those skills is also supported by the findings of this survey (the majority of surveyed OPs stated that they had a collaborative working relationship both with the occupational health and safety manager of the companies and the workers' health and safety representative). In the opinion of most Italian OPs, collaboration with other professionals is considered to be so important that in most cases it begins even before establishing a working relationship with a company.

Hence, according to this data, it could be assumed that in Italy the health and safety of workers is actually guaranteed by the presence of an integrated system of prevention and protection in which health and safety professionals collaborate with each other. However, the analysis of the results regarding the characteristics of professional activity has shown that the situation is slightly more complex since the collaboration between the ERs/occupational health and safety management and OPs is only fully realized in certain activities (redeployment of workers unfit for a specific task and application of measures for the protection of the health and physical and psychological integrity of the EEs). The degree of involvement of the OPs by the ERs in various activities related to the protection

of health and safety of workers is a good indicator for attempting to understand what specific core areas of knowledge are most important for the ERs. Interestingly, the tasks for which the ERs most frequently involved Italian OPs were somewhat similar to core competencies that were previously identified by the US and UK OPs [1,38]. Statistically significant differences were observed dividing the sample according to the legal requirements to perform the professional activity of an OP. For example, it is noteworthy that 100% of OPs under the age of 35 years old specialized in the OM. This would seem to indicate that in recent years the decision to pursue a career as an OP has been conscious and well thought-out and has not been a stopgap that is chosen after completing a specialization in hygiene or forensic medicine. On the other hand, the data regarding the number of companies and their size seems to suggest the hypothesis that physicians who have specialized in hygiene or forensic medicine do not work primarily as OPs, while this professional activity would rather represent a source of additional income.

With regard to training and updating needs, statistically significant differences were observed for 3 different updating methodologies/tools. In particular, OPs who have specialized in the OM showed greater interest in scientific literature, consultation of databases and discussion of case-studies than other subgroups, thus demonstrating a greater aptitude for evidence-based medicine [22]. For the same methodologies/tools, a similar pattern was also observed dividing the sample according to a company size. In this case, the highest ratings were given by OPs who worked for large or very large companies, probably suggesting that the frequency and complexity of questions arising from their daily practice required a greater use of evidence-based medicine.

Finally, the professional activity of OPs seems to be significantly affected by the number of companies for which they work, a company size and the total number of workers visited in a year. With regard to the number of companies for

which OPs worked it was not possible to identify a single trend for each item taken into account. However, generally speaking it has been possible to assume that an increase in workload has a negative influence on professional performance since the frequency with which certain activities are carried out and the degree of involvement in specific tasks progressively decrease as the number of companies increases.

A similar pattern, although to a lesser extent, was observed in relation to the total number of workers visited in a year by OPs. By contrast, the analysis of the results with respect to a company size demonstrates that there is a direct proportionality between this parameter and the frequency with which specific tasks and activities are performed by OPs. This result is probably due to the fact that in large companies the management system of workers' health and safety is organized in a systematic manner, uses highly specialized and trained professionals and in most cases to achieve its aims takes advantage of the cooperation of OPs.

CONCLUSIONS

In the last 30 years the practice of OM has significantly changed in response to several economic, technological, healthcare, social and legislative factors [18,39]. Consequently, the need appears evident to periodically re-evaluate areas of knowledge and core competencies of the discipline in order to actualize the OM residency training and to provide helpful operational tools and timely updating programs. In this context, the results of this study may help to guide future discussion on alternative and additional instruments and/or methodologies that may be adopted to implement the quality and effectiveness of the OM practice in Italy.

In particular, our findings point out that:

1. To improve the Italian CME program it is absolutely necessary to organize training and updating courses to deal with topics that meet the OP's practical needs.

2. Italian OPs updating should be more targeted towards the practical aspects of health surveillance and risk assessment and management.
3. Paying particular attention to specific occupational risk factors (mainly the MHL, chemicals, upper limb biomechanical overload and work-related stress).
4. Italian OPs should be encouraged to improve their communication and interpersonal skills to be able to work at their best in a multidisciplinary team.

With regard to the latter issue, considering that our results suggest that the cooperation between OPs and other professionals is more theoretical than practical, we consider it appropriate to sensitize all health and safety professionals in order to allow the realization of an integrated system of prevention and protection that is really effective and appropriate to workers' needs.

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