

OCCUPATIONAL MEDICINE IN THE EU: THE SPECIALIST DOCTORS' PERSPECTIVE

Introduction

This discussion paper presents the perspective of occupational medicine specialists¹ on their role in supporting occupational safety and health (OSH) compliance in the changing world of work.

Occupational medicine is a Europe-wide recognised medical discipline that examines the complex interaction between work and health of the individual. Occupational medicine specialists play a key role not only in preventing health risks, but also in promoting good health at work and supporting OSH compliance. In some countries, the majority of specialists are employed within OSH preventive services (generally occupational health services), in others they may operate independently as external consultants.

This discussion paper is part of 'Supporting Compliance',² a programme initiated by the European Agency for Safety and Health at Work (EU-OSHA) in 2020. The main objective of this programme is to provide high-quality data to researchers and policy-makers in order to foster a greater understanding of how to support OSH compliance and to better inform policy-making. This paper builds upon an initial high-level review of OSH compliance (EU-OSHA, 2021a), a literature review on the same topic (EU-OSHA, 2021b) and a discussion paper focusing on the role of OSH professionals in supporting compliance (EU-OSHA, 2024).

The aim of this paper is to provide an overview of how occupational medicine specialists are supporting OSH compliance in Europe. It offers an outline of the practices, challenges and added value of occupational medicine, based on a recent survey carried out by the European Union of Medical Specialists Occupational Medicine (UEMS-OM) Section (see Box 1).

The UEMS-OM Section invited its members to participate in a survey. The goal was to collect up-to-date information on occupational medicine from a range of European countries. The national occupational medicine associations from 22 countries were involved and provided answers to the survey questions. Within this discussion paper, the responses of specific relevance are presented and analysed.

The structure of this paper addresses the most relevant topics included in the survey. The Background section provides essential definitions and historical perspectives. The Methodology section explains how the survey was carried out, with the findings detailed in the Results section. The Conclusions section briefly summarises the main messages from the survey.

Background

According to the definition of the World Health Organization (WHO), 'occupational health is an area of work in public health to promote and maintain [the] highest degree of physical, mental and social well-being of workers in all occupations'.³ The main objectives are the following:

- the maintenance and promotion of workers' health and working capacity;
- the improvement of working conditions and the working environment;
- the development of work organisation and working cultures that improve OSH.

¹ Occupational medicine specialists obtain their title after completing specific postgraduate training. Occupational physicians are medical doctors with appropriate competence in occupational medicine who work in occupational health services (regardless of their medical specialisation).

² More information is available at: <https://osha.europa.eu/en/themes/good-osh-is-good-for-business/improving-compliance-osh-regulations>

³ More information is available at: <https://www.who.int/health-topics/occupational-health>

In brief: 'The "raison d'être" of occupational health services has traditionally been the protection of the health of workers in the work environment'.⁴ The science and practice of occupational health involves multiple disciplines, such as medicine, nursing, ergonomics, psychology, hygiene, safety, etc.

Box 1. UEMS-OM Section

Created in 1958, the European Union of Medical Specialists (UEMS) is the oldest medical organisation in the EU, representing the national associations of medical specialists of 38 countries and extending beyond the EU-27. Its activities focus on postgraduate training, continuous medical education and advocacy for medical specialists.

The Section of Occupational Medicine is one of the UEMS's 43 specialist sections and was formed in 1997. Currently, leading national occupational medicine associations from 23 European countries participate in the Section. Its mission is to promote the specialty of occupational medicine in Europe, and to improve the health of workers by supporting excellence in specialist occupational medicine practice. The Section has developed the European Training Requirement (ETR) in Occupational Medicine, which defines the appropriate level of competences required for up-to-date professional occupational medicine practice. Each year the Section organises the European Examination in Occupational Medicine, bestowing the title of Fellow of the European Board in Occupational Medicine on those who pass.

Specialists in occupational medicine play a key role in the prevention of OSH risks, the maintenance of working ability and the promotion of good health at work.

Occupational medicine has a long history. Initially, its role was mainly limited to the treatment of accidental injuries and work-related diseases. The first observations regarding the occurrence of particular diseases in specific groups of workers were reported in the Greco-Roman age, for example in the works of Hippocrates, Lucretius, Pliny the Elder and Galen. However, the first systematic approach to the association between work and health disorders was presented in the *De Morbis Artificum Diatriba*, published in Modena in 1700, and the first standalone text of occupational medicine. Its author, Bernardino Ramazzini, is universally regarded as the father of occupational medicine. Over the years, the role of occupational medicine changed, and the focus progressively moved from the recognition and treatment of occupational diseases to the prevention of adverse health effects in workers, the maintenance of working ability and the promotion of health at work.

The *Encyclopaedia Britannica* defines occupational medicine as 'the branch of medicine concerned with the maintenance of health and the prevention and treatment of diseases and accidental injuries in working populations in the workplace'.⁵ Occupational medicine is, therefore, both a medical science and a medical speciality. A medical doctor working in this field is called an occupational physician. The title of occupational medicine specialist, however, is limited to a medical doctor who has completed appropriate speciality training and provided evidence of their specialist competence.

The everyday practice of medical professionals working in the occupational health services is strictly guided by medical ethics, along with the principles of integrity, impartiality, respecting people's dignity and privacy, professional independence and working according to the highest standards (ICOH, 2014). The International Code of Ethics, published by the International Commission on Occupational Health, also refers to competence, equity, non-discrimination and communication (ICOH, 2014).

Occupational medicine specialists play a very important role as the OSH actors that bring together:

- knowledge of work environments and risk factors (hazard identification and assessment);
- access to individual health data and the necessary medical skills (clinical experience, toxicology, ergonomics, industrial hygiene, etc.) that enable a complex understanding of the worker's health status and the identification of the health effects of work;
- the ability to liaise with the personnel and institutions involved in health prevention and promotion activities.

⁴ More information is available at: <https://www.ilo.org/resource/occupational-health-services>

⁵ More information is available at: <https://www.britannica.com/science/occupational-medicine>

Meanwhile, the continuous evolution in the world of work requires that occupational medical specialists are constantly updating their knowledge. A further relevant need is that high standards of practice should be harmonised across Europe. These are among the specific activities of the Occupational Medicine Section⁶ of the European Union of Medical Specialists (UEMS-OMS).⁷

Methodology

In 2024, the UEMS-OM Section set up a working group with one representative from the Northern, Eastern, Southern and Western European countries respectively. This working group conducted a literature review of occupational medicine practice and occupational health services in Europe. In cooperation with EU-OSHA, the UEMS-OM Section developed a survey questionnaire to collect data with the aim of obtaining an up-to-date picture of the European occupational medicine ecosystem. A draft survey questionnaire was circulated among the Section members for comments. In early 2025 the Section's president sent the survey to presidents of the national societies to collect local information. The survey encouraged respondents to give references and interpretations of the answers in order to build a deeper understanding of the various national specificities (referring to national studies and reports, including 'grey literature'). All countries represented within the Occupational Medicine Section in 2024 provided a response and thus a total of 22 questionnaires were completed (see Table 2 for the list of countries involved in the study).

The questions within the questionnaire were centred around eight themes (Table 1). They were formulated based on findings from the high-level review of the 2021 OSH compliance report (EU-OSHA, 2021a) and tailored to address current occupational medicine challenges.

Table 1. Themes of the survey carried out by the UEMS-OM Section

Themes, number of questions and topics addressed
General Overview of Occupational Health Services (7 questions)
Requirements — Coverage — Workforce — Service delivery
Occupational Medicine and Its Role in Supporting OSH Compliance (3 questions)
Eligibility — Drivers — Financing
Activities of Occupational Medicine Specialists (5 questions)
Partners — Tasks — Occupational diseases — COVID-19 — Challenges
Occupational Medicine in OSH Compliance and Policy-Making (5 questions)
Policy — Marketisation — Compliance
Occupational Medicine Workforce and Future Trends (4 questions)
Shortages — Training — Licences — Digital technologies
Monitoring and Evaluation of Occupational Health Services (2 questions)
Quality — Cost-effectiveness
SWOT Analysis of Occupational Medicine (4 questions)
Strengths — Weaknesses — Opportunities — Threats
Interaction with the EU-OSHA National Focal Point (1 question)

Source: The authors.

⁶ More information is available at: <https://uems-occupationalmedicine.org/>

⁷ More information is available at: <https://www.uems.eu/>

Following the collection of the questionnaires, the data was collated in a single table. The working group invited the Section delegates to help analyse the results. Draft versions of the text were circulated among the delegates to confirm the accuracy of their responses. The EU-OSHA provided regular feedback, which was incorporated into the final document.

The survey has its limitations. A few European countries had no delegates to the Section and therefore were not involved in data collection. The answers represent the views of the participating national occupational medicine associations; other national stakeholders may have different opinions. In some cases, the responses may have been influenced by the specific historical, cultural, legal or linguistic contexts prevailing in the country.

Results

In this section the main findings of the survey are presented. The section is structured around the following 11 themes:

- Qualifications and training in occupational medicine;
- Legal framework for practising occupational medicine;
- Drivers of occupational medicine provision;
- Occupational healthcare coverage and lack of occupational medicine specialists;
- Internal and external occupational medicine services and quality indicators;
- Occupational medicine specialists' interaction with stakeholders;
- Occupational medicine specialists' practice – with reference to the ILO C161 Convention;
- Occupational medicine during the COVID-19 pandemic;
- Market trends in occupational medicine;
- Challenges currently facing occupational medicine;
- SWOT analysis of European occupational medicine systems.

Only survey questions and themes were analysed that provided relevant information. The focus was on the fundamental descriptors of occupational medicine practice and the factors that can be linked to OSH compliance.

Qualifications and training in occupational medicine

Occupational medicine is a distinct medical specialty that integrates individual healthcare with the protection of workforce health at the population level. Unlike many other medical specialties, occupational medicine focuses on the interaction between health and the work environment, addressing prevention, safety and functional capacity through a comprehensive biopsychosocial approach.

The recognition of specialist qualifications within the EU is governed by Directive 2005/36/EC, which outlines the minimum training standards for medical specialties. This directive ensures the automatic recognition of occupational medicine qualifications among EU Member States, facilitating professional mobility while upholding the quality and transparency of training systems across Europe (European Parliament and Council, 2005).

Deriving from the directive, the Sections within UEMS develop detailed documents known as European Training Requirements (ETRs). ETRs can give practical guidance to national training institutions in the creation of harmonised curricula for their specialist medical training programmes. The Occupational Medicine Section developed its ETR in 2013. The revision of this ETR is currently ongoing.

Including training on occupational medicine in medical curricula is essential. Every doctor needs a certain level of knowledge on the health effects of work (Martinez-Jarreta & Gobba, 2025). Furthermore, undergraduate courses can also stimulate medical students' interest in choosing occupational medicine as a specialisation (Larrosa et al., 2025).

European Training Requirements

The ETRs, developed by the UEMS-OM Section, define the core structure and standards for occupational medicine specialist training. These recommendations aim to ensure consistency in educational content, clinical exposure and assessment methods across Europe. According to the ETRs (UEMS-OMS, 2013), the training programme for occupational medicine specialists spans four years and includes:

- the acquisition of theoretical knowledge across 10 core domains;
- supervised clinical and workplace-based experience;
- portfolio-based, work-focused assessment tools.

The 10 domains are:

1. Framework for Practice;
2. Clinical Practice;
3. Fitness for Work, Rehabilitation and Disability Assessment;
4. Hazard Recognition, Evaluation of the Health impact and Risk Control;
5. Business Continuity, Disaster Preparedness and Emergency Management;
6. Service Delivery and Quality Improvement;
7. Leadership, Policy Development and Professionalism;
8. Epidemiology and Preventive Healthcare;
9. Research Methods;
10. Effective Teaching and Educational Supervision.

This training model supports the development of scientific competence, ethical insight and practical skills. These domains are broadly accepted as common core competencies, even outside the EU (Lalloo et al., 2016).

A number of features differentiate occupational medicine from other medical specialties:

- Occupational medicine is an etiological specialty: it always seeks to characterise the relationship between human health and the external factors (hazards) inherent in the employees' working conditions.
- It has a preventive orientation and is focused on minimising occupational illnesses and injuries.
- Occupational physicians have a special responsibility towards both the worker and the employer, which requires ethical and legal knowledge. In order to carry out this dual responsibility, they have to be able to deal with the specific health issues of an individual worker (a person-centred approach) but also to analyse the health of the population employed by the company (a population-based approach).
- A systemic perspective is required that considers not only individual clinical findings but also the organisational and societal determinants of health.
- Strong interdisciplinary collaboration with other professionals, such as hygienists, psychologists, safety engineers and human resource experts, is important.
- Occupational physicians operate in a wide range of settings, addressing both physical and psychosocial risks, and frequently serve as strategic advisors within organisations.
- Training in occupational medicine follows a unique structure and skills progression, with a competency-based model structured over two phases:
 - Early phase (Years 1–2): Emphasises theoretical foundations, supervised consultations and familiarisation with workplace environments;
 - Advanced phase (Years 3–4): Involves greater autonomy in individual risk assessments (including fitness-for-work), diagnosing work-related diseases, medico-legal issues, project leadership and research.

Trainees are assessed through performance-based tools, including direct observation and case-based discussions. This approach fosters reflective learning and ensures readiness for real-world clinical and organisational challenges.

A notable innovation in medical education is the adoption of Entrustable Professional Activities (EPAs), which define discrete, observable units of clinical work (e.g., issuing a fitness-for-work certificate, managing a critical incident, conducting a workplace audit).⁸ Once competence is established, the trainee may perform these tasks independently (Ten Cate & Scheele, 2015).

⁸ More information is available at: <https://www.uems.eu/web/content/2296>

The EPA model enhances:

- relevance to daily clinical practice;
- supervisors' confidence in entrusting responsibilities;
- transparency in training objectives and assessment outcomes.

EPAs are increasingly recognised as a future-oriented tool for specialist evaluation in occupational medicine and other medical disciplines.

The evolving nature of work and health demands a commitment to Continuing Medical Education (CME) and Continuing Professional Development (CPD). Participation in structured CPD programmes is often mandatory for specialist revalidation and is essential for maintaining alignment with contemporary scientific knowledge, ethical standards and regulatory expectations (UEMS, 2020).

To further enhance harmonisation and quality assurance, the UEMS-OM Section, in collaboration with the European Association of Schools of Occupational Medicine (EASOM),⁹ introduced a European Examination. This examination:

- offers a voluntary demonstration of advanced competence;
- serves as a benchmark aligned with ETR standards;
- facilitates professional recognition and mobility across Europe.

It includes written assessments, case-based tasks and components evaluating professionalism, clinical reasoning and ethical judgement.

Specialist and undergraduate training in countries across Europe

National training systems for medical specialists differ. Based on the findings from the survey, three out of the 22 countries (Austria, Finland and the UK) reported that occupational medicine specialist training lasts for six years. In five countries (Denmark, Germany, Norway, Poland and Switzerland), the duration of training is five years. In the majority (14 countries), the training runs for four years, which is the minimum duration prescribed in Directive 2005/36/EC. This variation reflects the fact that there are different needs, functions and traditions in relation to occupational medicine across Europe.

The content of the training also varies between countries, and achieving full harmonisation in this field is not currently possible. While other medical specialists (e.g., surgeons, gynaecologists, etc.) mostly depend only on the science of their discipline in the course of their work, occupational medicine practice is also very much embedded in the legal and social systems of the host country. Therefore, training programmes not only teach the science of occupational medicine but also the practical needs within the given country. The occupational medicine specialist must be familiar with the national OSH legislation and procedures, organisations and stakeholders. Consequently, as long as the OSH frameworks remain so different among the Member States, the mobility of occupational medicine specialists in Europe may face constraints. The European Examination in Occupational Medicine can only substitute in part for the national examinations in occupational medicine. At the moment it should be considered a mark of excellence for specialists, conferring the title 'Fellow of the European Board in Occupational Medicine'.

There are countries where specialist training has different levels; 10 countries reported that shorter courses are available for doctors who already have another specialisation. These diplomas can have limited authorisations, for example they may not allow the carrying out of certain complex tasks. The term occupational physician encompasses full specialists as well as those who have passed a shorter course, and can even include those doctors who have not (yet) acquired any of the above certifications.

Here, we need to take a brief detour regarding the place of occupational medicine in the undergraduate training of medical doctors. Several surveys have confirmed that this is seen as insufficient. This situation can jeopardise the ability of non-occupational medicine specialists to identify possible work-related health impairments and to understand the interaction between the working environment, specific job tasks and the worker's health (Eu et al., 2020; Bazas, 2022; Laloo et al., 2024; Larrosa et al., 2024).

In conclusion, the training and qualification pathways of occupational medicine specialists in Europe are undergoing a strategic and structured evolution. Anchored in Directive 2005/36/EC, guided by the ETRs, reinforced by lifelong learning initiatives and modernised through the European Examination and the implementation of EPAs, occupational medicine training is increasingly harmonised and fit for the

⁹ More information is available at: <https://www.easom.eu/>

demands of contemporary workplaces. The diversity in current training curricula and durations reflects the different legal and social contexts of the countries.

Legal framework for practising occupational medicine

The most common setting in which occupational medicine specialists operate are the occupational health services. Basic information on the provisions regarding occupational health services is detailed below.

The European OSH Framework Directive (Directive 89/391/EEC) refers to 'protective and preventive services' in a broad, generic manner (European Council, 1989). The required number of professionals, capabilities and competencies are set out at Member State level. Consequently, there is no European-level regulation governing the use of occupational health services. In contrast, the reason for mandatory occupational health services can be seen to come from the tradition of a European welfare state model and the tripartite (or labour movement) approach.

Constitutions in most countries establish the right to a workplace that is safe and does not endanger health. Since 2022, the International Labour Office (ILO) has also included 'safe and healthy working environment' among its Fundamental Principles and Rights at Work (ILO, 2022). As health is an inseparable part of OSH, occupational health services are also implicitly part of concerns of the ILO approach, which can also contribute to national-level commitments. The ILO Occupational Health Services Convention (C161) outlines the functions, organisation and conditions of operation for such services. It has been ratified by 12 European countries so far (ILO, 1985a). However, in certain countries with a long tradition of occupational medicine (like France and Italy), the national obligation was achieved without the ratification of C161. The ILO Occupational Health Services Recommendation gives more details and emphasises that the role of occupational health services should be essentially preventive (ILO, 1985b).

When states – through mandatory legislation – oblige companies to arrange for occupational health services there is usually some national-level goal they want to achieve (e.g. reduction of sick leave and disability, improved health of the working population). In the meantime, they pass on the costs to the employers. The responses to our survey confirmed that the costs of occupational health services are paid primarily or exclusively by the employer. However, in Croatia the costs of periodic medical examinations and training are borne by the national healthcare system, with only the remaining expenses paid by the employer. In Austria insurance companies cover the costs of specific examinations and surveillance at companies with fewer than 50 employees. In Portugal it is theoretically possible that the national healthcare system could cover the costs for the self-employed, apprentices, seasonal and domestic workers, employees in small-scale fishing and low-risk micro enterprises; however, such procedures have not yet been established.

Drivers of occupational medicine service provision

In most European countries it can be an act of OSH compliance when employers arrange for occupational health services. The high-level review of the OSH compliance report (EU-OSHA, 2021a) identified several factors that can be a source of compliance. In the survey carried out by UEMS-OMS, national organisations were asked to detail the drivers of employers seeking occupational health/medical services. Respondents were tasked with ranking the following drivers according to their importance: Legal obligation; Enterprise standards; Supply chain demand; Corporate social responsibility; Economic incentive schemes (e.g. cost of insurance); Business case (e.g. reducing turnover, keeping the workforce healthy and productive); Other.

The vast majority of respondents (19 out of 22 countries) put the legal requirement first (and sometimes as the only one). Italy ranked it second, and Ireland and Switzerland third. This points to the fact that the legal obligation is the key driver in most countries.

Healthcare is a delegated authority in the EU, which means that Member States generally enact their own healthcare legislation. On the one hand, as a health area, occupational health is not strongly regulated at EU level. On the other hand, the OSH Framework Directive and related individual directives contain provisions with certain implications for occupational medicine and occupational health services. These mostly address occupational hygiene and workers' health surveillance. EU directives are flexible legal instruments: Member States are required to implement them but retain a margin of discretion in their transposition into national law. Directives establish minimum requirements, allowing Member States to adopt more stringent provisions. For occupational medicine, the result is a huge variety in workers' health surveillance at the national level and little convergence among national practices, despite the introduction of the OSH Framework Directive (Colosio et al., 2017). The flexibility that the OSH Framework Directive offers enables Member States to continue their traditional ways of promoting

preventive services, which are effective in the national context. However, in this context, the drive for a common approach is low, which is reflected by, for example, legal provisions regarding occupational health services depending on company size.

The idea behind the state obliging businesses to arrange for occupational medicine/health services is that the employer usually does not have the necessary specialist knowledge to tackle health (and safety) risks at work. The legislator, therefore, may mandate the arrangement of preventive services, which could feature occupational medicine. This top-down approach in legislation, where the state sets every aspect of occupational medicine, can make occupational medicine vulnerable to political changes. Several countries ranked deregulation first among the challenges faced by occupational medicine, most specifically as one that threatens occupational medicine practice.

Finally, there is growing evidence that occupational health services can provide significant tangible and intangible benefits for individuals, the workforce, employers and the wider economy (Nicholson, 2022).

Occupational healthcare coverage and lack of occupational medicine specialists

The coverage of the working population by occupational health services varies hugely. The diversity of social, OSH, public health and insurance systems between countries results in national legislations that may assign different functions to occupational health services and occupational medicine. Therefore, the population that by law should be provided with occupational health services can vary depending on the country. The level of coverage of the entire European workforce has been criticised by EU trade unions (Kempa, 2014). A recent study found that the ratio of occupational physicians to workers can reflect the availability of occupational health service for workers and is also correlated with certain economic parameters of the country. It was concluded that the ratio 1:5,000 is reasonable for countries with a GDP per capita above USD 30,000 (Krakov et al., 2023).

The UEMS-OM survey inquired about the existence of statistical data or estimates for the coverage of the working population by occupational health services in the different countries. Official data is scarce and our respondents mostly provided estimates. The range of answers to the question 'What percentage of the workforce receives an occupational health service?' was wide: from an estimated 5-10 % in Switzerland to the legally mandated (theoretical) 100 % in Hungary, Luxembourg, Poland, Romania and Spain. Here the national representatives reported that companies follow the rules (arranging occupational health services for every worker who is subject to the national legislation), and therefore coverage is 100 % in their country. The majority of the figures fell between 65 and 90 per cent.

This could be due to several reasons: private entrepreneurs, farmers and platform workers are subject to far fewer legal obligations as regards OSH, and respondents calculated only using the workforce (usually employees) who work in companies that must provide this service. Ignoring these uncovered workers can lead to missed opportunities in policy-making for the entire workforce. Although ILO C161 aims to 'develop progressively occupational health services for all workers, including those in the public sector and the members of production co-operatives, in all branches of economic activity and all undertakings', this is not common, even among countries that ratified the Convention. The Netherlands indicated that 12 % of the Dutch workforce were self-employed. In theory, they have access to occupational medicine; however, in practice, most self-employed workers rarely consult an occupational physician. Additionally, small and micro enterprises may not arrange for an occupational health service because it is not mandatory (e.g. in Greece) or they are unaware of this legal duty, or wilfully neglect it. Germany and Switzerland emphasised that coverage is dependent on the size of the company. The size phenomenon is also reflected in the European Survey of Enterprises on New and Emerging Risks (ESENER) surveys (EU-OSHA, 2023).

Respondents from Austria, Denmark, Greece, Luxemburg, Portugal and Switzerland expressed that the ESENER 2019 survey results do not adequately represent the situation of occupational medicine coverage in their respective countries. However, their explanations differed and suggest that this topic would be worth a deeper analysis. Different understandings of coverage could also be the reason for this mismatch. Some understood that the question was asking about the ratio of the workers who have to be covered by law (mostly employees). This is strictly a matter of compliance with the legal standards. Others understood the question as relating to the entire workforce (including all types of employment), which is a broader public health issue.

The survey also highlighted that there are differences between national OSH systems in how they rely on medical doctors practising occupational medicine. If the legislation mandates the coverage of a wider range of workers, there will be a demand for more physicians. If the response to this is to authorise physicians without an occupational medicine specialisation to carry out occupational health activities,

the consistency of specialised care and, consequently, the health of workers can be jeopardised. Another option is the rethinking of responsibilities and the delegation of certain tasks to healthcare workers (e.g., occupational nurses in the UK). This latter approach is in line with reactions to labour shortages and the rising costs of medical doctors, which is seen in other medical specialities as well.

The majority of respondents (19 out of 22 countries) perceived that there was a shortage of occupational medicine specialists in their country, highlighting the ageing of the practising population in this area. Some respondents could provide precise national registration data, while other figures are estimates only (Table 2).

Table 2. Numbers of occupational medicine specialists; perceived shortage of specialists; number of doctors working in occupational medicine services regardless of specialisation

Country	Doctors having an occupational medicine specialisation	Is there a shortage of occupational medicine specialists?	Employed population in 2025* (thousand persons)	Doctors currently engaged in occupational medicine practice (with/without specialisation)
Austria	2000	yes	4489	1200
Belgium	1000	yes	5165	1000
Croatia	166	yes	1700	140
Czechia	100	yes	5218	3000
Denmark	171	no	3085	132
Finland	850	yes	2629	1650
Germany	4400	yes	42397	9000
Greece	180	yes	4376	549
Hungary	1758	yes	4661	1963
Ireland	80	yes	2798	300
Italy	8400	no	24133	5300
Latvia	298	yes	889	280
Luxembourg	42	yes	330	32
Netherlands	1500	yes	9839	2000
Norway	200	yes	2915	400
Poland	3461	no	17144	5793
Portugal	1168	yes	5219	1359
Romania	800	yes	7728	1000
Slovenia	203	yes	989	200
Spain	6894	yes	22253	5500

Country	Doctors having an occupational medicine specialisation	Is there a shortage of occupational medicine specialists?	Employed population in 2025* (thousand persons)	Doctors currently engaged in occupational medicine practice (with/without specialisation)
Switzerland	120	yes	4835	n.a.
United Kingdom	570	yes	34214	977

Sources: Authors' collection; * Eurostat, Office for National Statistics (UK).

Austria, Finland, Hungary, Italy and Spain are the countries with the highest number of occupational medicine specialists in relation to the size of the national workforce. In all these countries the state requires companies to provide their employees with occupational health services, including occupational medicine specialists.

At the other end of the spectrum, with fewer occupational medicine specialists, are the United Kingdom, Czechia, Switzerland, Ireland, Greece and Denmark. The reasons for this situation are various: an occupational medicine specialisation is required only for a narrow range of tasks (UK); the relevant medical services can be provided by non-specialists (Czechia, Ireland); or, simply, there is a severe lack of specialists (Greece). In the latter case the legally mandated demand does not meet the available specialist supply. Consequently, the number of practising doctors is usually many times higher, representing the non-specialised doctors. This phenomenon can be identified in other countries too (Germany, Poland, Finland). In Denmark, although non-specialists can work in occupational health services, there are only a few occupational health services left, and the specialists work in hospitals.

There can be two reasons why in some countries there appear to be more specialist doctors than the number actually practising in this area. Firstly, some might have retired but are still on the register of medical specialists. Secondly, occupational medicine specialists can work in another medical field: they still have their diploma but do not practise occupational medicine.

Internal and external occupational medical services and quality indicators

As mentioned in the high-level review of the OSH compliance report (EU-OSHA, 2021a), OSH services can be internal or external. Similarly, occupational medicine specialists usually provide their expertise for companies within external or internal occupational health services. Both options have advantages and disadvantages. An (outsourced) external provider is cost-effective for smaller enterprises, while bigger companies can afford to employ doctor(s), nurse(s) and other specialists. Internal services can be more easily integrated into the company, being present day-to-day, and therefore offer a more specific, responsive and timely service. In the era of outsourcing and enterprises focusing on their core activities, having a doctor on the payroll is becoming increasingly rare. Furthermore, a medical career is often pursued as an independent freelancer or as a private entrepreneur.

All in all, (primary) occupational health services can be provided in three major ways: direct employment of healthcare personnel; engaging a healthcare company (an external occupational health service); or by contracting a private entrepreneur (freelance) medical specialist (normally known as a 'consultant'). Precise figures are lacking from many countries, as these contractual relationships are not subject to mandatory data collection. Thus, only 12 respondents provided official statistics or estimates. These figures reflected that the most common approach is to hire an external healthcare company (lowest: 30 % in Croatia; highest: 92% in Luxemburg; with the other countries – Austria, Belgium, Finland, Latvia, Netherlands, Portugal, Romania, Spain, Switzerland, UK – falling in between). The percentage of employers contracting a doctor (private consultant) range from 0 % (Spain) to 70 % (Croatia). A small proportion (from 0 % in Croatia, Poland and Slovenia to 30 % in Spain) arrange for an in-house service. There are many reasons behind companies choosing external occupational health services: contracts can be planned, procured and terminated easily, the risk of non-performance is low (replacement of personnel), and larger service providers may have access to more specialists and can offer added services (e.g. health promotion). A Dutch study, however, found that in-house services offered the highest quality of provision (De Valk et al., 2006).

This leads to the issue of the quality of the services provided. In the business world, standards, audits and quality indicators often govern management processes. Medical services can also be assessed against specific standards. On a national level, however, the use of quality indicators to monitor the performance of occupational medicine specialists or services is uncommon. Most of our respondents answered that there they had no such indicators. Many were referring to unspecific legislative requirements, such as the need for the specialist diploma to provide occupational health services, mandatory continuous medical education, the obligations to provide a service set by the health authorities and have inspections carried out by such authorities (ministries, chambers of physicians, accident insurance bodies). The Dutch and the Belgian responses to the survey question mentioned that occupational health services use the quality management system ISO 9001:2015.

Since 2010, there has been an accreditation scheme in the UK and in Ireland for providing Safe Effective Quality Occupational Health Service (SEQOHS), which was developed by the UK Faculty of Occupational Medicine.¹⁰ Norway introduced approval and inspection measures that were well received by the occupational health services, which reported that they had improved the quality of their services (Lie & Bjørnstad, 2015). In Spain, internal occupational health services, unlike external ones, must undergo periodic external audits by an accredited company. Austria developed a quality assurance system, which started in the autumn of 2025, on a voluntary basis. There is a recognition committee in Belgium, consisting of delegates from employers, workers and experts from professional associations. The applicant services report to this committee on their conformity to a set of criteria and can receive recognition for a period of five years.

In conclusion, a national framework of occupational health service indicators can be a way to improve effectiveness and transparency in occupational medicine. Such a system could help employers to make informed decisions on contracting a provider beyond questions of mere cost. However, the introduction of this type of framework cannot address every aspect of this relationship. Besides quality-assured standard assistance, customers (i.e. companies hiring occupational health service) would also like professional advice tailored to their specific needs (Westerholm, 1999).

Interaction with stakeholders

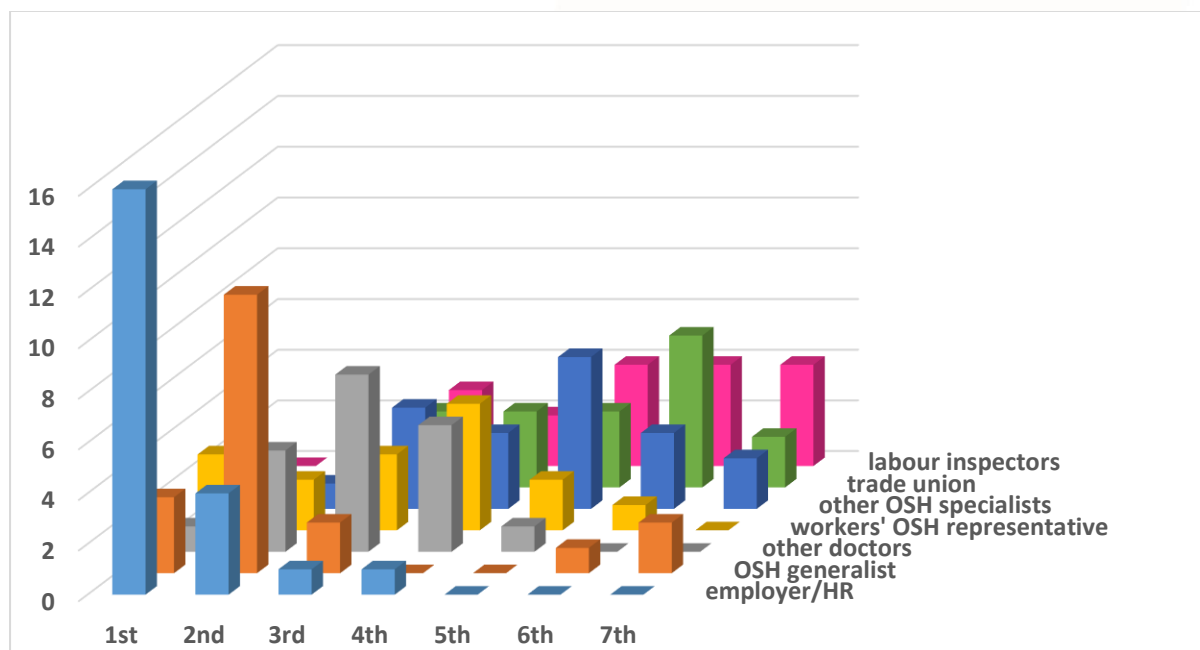
Health and safety are very much intertwined. Occupational health and medicine, therefore, cannot be assigned solely to the health policy area. This is why not only the WHO but also the ILO is addressing occupational health issues, for example the ethics of health surveillance (ILO, 1998; WHO, 2017).

The idea that occupational physicians work on their own is outdated. OSH is a multidisciplinary discipline and requires the strong cooperation of various experts and stakeholders (workers and employers). Depending on the legal requirements set by the state, these players and their level of partnership are different. For example, in Belgium, occupational safety and occupational health must be provided in a single service: doctors and nurses are based in the same prevention team with the other OSH experts. Meanwhile, in Denmark, most occupational medicine specialists work in hospitals and therefore have close relations with other medical doctors and healthcare workers.

The survey inquired about the partners the occupational medicine specialist must interact with most frequently in their day-to-day work. This was done with the intention of mapping the network of stakeholders and those who have a strong influence on the work and outcome of the service provided by occupational medicine specialists. These partners were: the employer and its HR department; workers' OSH delegates (health and safety representatives); trade union representatives; other medical doctors; labour inspectors; the OSH generalist of the company; and other (external) OSH specialists (ergonomists, physiotherapists, toxicologists, OSH laboratory engineers, etc.). Respondents ranked the seven partners by frequency of the collaboration/interaction. Not every country made use of all seven categories and some used a number twice. A visual overview is provided in Figure 1; the horizontal axis shows the ranking and the vertical axis depicts the number of countries that selected that given ranking for the partner.

¹⁰ More information is available at: <https://www.seqohs.org/>

Figure 1. Ranking of cooperating partners by occupational medicine specialists in 22 countries



Source: The authors.

The vast majority indicated that they collaborate mostly with the human resource manager, which means in practice the employer (out of the 22 countries 16 ranked this first and a further 4 put it in second place). This answer is self-evident, since both the occupational health service and the human resource manager work with the firm's employees. The relationship between the company management and the occupational health service is a key factor. It can help in shifting the focus on occupational health from reactive to proactive (Schmidt et al., 2012).

In second place are the OSH generalists (out of 22 countries 3 ranked this category first and 11 placed it second). They know their company in terms of occupational safety and they ensure that the occupational physicians receive adequate information to protect workers properly. Safety and health are inseparable. While Denmark, Spain and Croatia accorded first place to interactions between OSH generalists and occupational medicine specialists, Austria, Finland and Greece reported these as the least frequent.

Other medical doctors (general practitioners and other specialists) came in third place (out of the 22 countries only 1 placed them first and 4 ranked them second, however 7 rated them third). Occupational medicine specialists need to be thoroughly informed on workers' health and functional capacities, for example to assess fitness for work, investigate the work-relatedness of diseases or to promote work ability. Interactive collaboration with the specialists treating the workers is therefore highly important. Latvian colleagues ranked this relationship in first place, while Czech, Greek, Portuguese and Slovenian colleagues placed it second. In contrast to all other countries, the Dutch colleagues gave their lowest rank (fifth) here. This came as a surprise because in the Netherlands there is frequent interaction between the occupational medicine specialist and the specialist treating the worker during return-to-work activities. Overall, in most countries, there is significant room for improvement when it comes to the cooperation between clinical healthcare and occupational healthcare (Oosting et al., 2023).

Considering all 22 responding countries, the workers' OSH representative (OSH delegate) is ranked in fourth place, although they came first in Norway, Denmark and Greece. For the other countries, improved cooperation with workers' OSH representative could be an opportunity to strengthen the links with workers.

In general, other OSH specialists were ranked fifth. However, Spain put this group (including risk prevention senior technicians in safety, hygiene, ergonomics or psychology) in first place. In Finland, they were the second most consulted category. Denmark, the Netherlands, Norway and Switzerland ranked them third. Belgium has a unique system where every employee must have access to an OSH specialist, such as an ergonomist, an occupational hygienist or a psychosocial prevention advisor.

In most countries, the lowest level of interaction was with trade unions representatives and labour inspectors. However, inspectors were ranked third in Portugal, Greece and the UK. Low inspection rates, especially for small and micro enterprises, and the scarcity of medical doctors in labour

inspection may be reasons behind the low interaction with labour inspectors. It should be noted that inspecting medical practice usually falls within the scope of health authorities or insurance bodies.

Occupational medicine specialists' practice

In most European countries, providers of occupational medical services have to be familiar with the impact of the work, the workplace environment and the working conditions on workers' health. Accordingly, they conduct both workplace inspections and preventive medical fitness assessments in order to minimise the risk of accidents, occupational diseases and work-related sickness. Their functions can be complemented by training in first aid and regular surveillance of the workplace (Tuček, 2020).

As mentioned in the 'Background' section above, occupational medicine emerged from a curative function, which can be summarised as a 'clinical-medical' approach towards individuals. The advances in science following the 17th century and the massive changes due to the Industrial Revolution enabled a paradigm shift. In line with the emergence of industrial safety, occupational medicine also developed a preventative approach aimed at individuals and organisational factors.

During the health surveillance of workers, the activities of the occupational health service are driven by public health principles. Medical examinations can identify harmful effects of work on the individual and on groups of workers. This type of medical investigation is unique because the individual does not seek it out. The worker is usually well, and it is legal obligations that set the rules of this visit. Medical data is processed and advice is given to the worker and the employer. The content of the surveillance and the target population is usually defined in legislation. This can lead to rigid systems and a missing evidence base, and consequently to a perception that these processes need revision (Rodríguez-Jareño et al., 2015, 2017).

The clinical-medical approach features the traditional curative role and also encompasses rehabilitation. A self-evident task for occupational medicine specialists is the diagnosing of occupational diseases. This can have legal consequences and employers may have little incentive to contribute to this activity (Raynal, 2015). Return-to-work is a more specific area, including tasks like participating in the rehabilitation process and adapting the work to the worker. Occupational medicine may also provide easy access to primary medical care and advice, similarly to a general practitioner (Kimanen et al., 2010). Furthermore, this traditional medical approach has effects on work too, because diagnosing and treating diseases and looking after workers with chronic conditions can reduce absences, presenteeism and staff turnover.

The hygiene approach has the closest links to OSH. In this domain, the occupational medicine specialist provides an input to risk assessment. It can be generated from medical records (see health surveillance) or measurements of exposures (occupational hygiene). On-site inspections can reveal workplace hazards. There is a mutual interaction between health surveillance and risk assessment; however, this relationship could be better utilised (Rodríguez-Jareño & Montserrat i Nonó, 2017).

The occupational medicine specialist has further functions besides and beyond these three axes, which are closely linked to all their core functions: advising, training and communicating with both the workers and the employer. Workplace health promotion and participation in public-health screenings complement preventive OSH actions.

Occupational medicine specialists mostly work in occupational health services, and, therefore, the framework provided by the ILO C161 Occupational Health Services Convention was used to identify the occupational medicines specialists' activities in the survey. ILO C161 is a key document that outlines the 11 functions of occupational health services (ILO, 1985a), which are listed in Table 3.

Table 3. Functions of occupational health services

ILO C161 definition	Notes and explanation added to the questionnaire
Identification and/or assessment of the risks from health hazards in the workplace	<i>(incl. contribution to the risk assessment process)</i>
Surveillance of the factors in the working environment and working practices which may affect workers' health, including sanitary installations, canteens and housing where these facilities are provided by the employer	<i>(incl. site visits, occupational hygiene tasks)</i>
Advice on planning and organisation of work, including the design of workplaces, on the choice, maintenance and condition of machinery and other equipment and on substances used in work	<i>(incl. counselling the employer)</i>
Participation in the development of programmes for the improvement of working practices as well as testing and evaluation of health aspects of new equipment	—
Advice on occupational health, safety and hygiene and on ergonomics and individual and collective protective equipment	—
Surveillance of workers' health in relation to work	<i>(incl. fitness-for job examinations)</i>
Promoting the adaptation of work to the worker	<i>(incl. return-to-work: short term focus)</i>
Contribution to measures of vocational rehabilitation	<i>(incl. complex rehabilitation/re-employment: long term focus)</i>
Collaboration in providing information, training and education in the fields of occupational health and hygiene and ergonomics	<i>(incl. presentations to workers)</i>
Organising of first aid and emergency treatment;	<i>(incl. first aid trainings)</i>
Participation in analysis of occupational accidents and occupational diseases	<i>(incl. investigation and reporting)</i>
other (please specify):	

Source: ILO C161.

The survey asked the respondents to rank the 11 functions from the Convention by estimating the time dedicated to each. For Denmark, this ranking made no sense because occupational health physicians are primarily employed in hospitals as medical doctors. The UK could not provide a detailed estimation.

Health surveillance of workers is the leading function

In 14 out of 20 countries, health surveillance of workers was ranked in first place, in two countries second and in three countries third. Austria and the UK reported that much less time is spent on this activity. There are multiple reasons why this function comes out on top in most countries. There is a historical tradition of health surveillance of workers, and this has been reinforced by mandatory surveillance stemming from the EU's OSH directives, which require the medical examination of workers and the handling of health data. These activities fall within the authority of health professionals. This explains why the general public tend to identify occupational medicine with the medical examination of

workers (fitness-for-job and health surveillance). However, the occupational medicine community believes that the speciality is about far more than simple health checks.

Further functions can be divided into three groups, according to their rankings.

Observing the workplace

The average rankings of the following functions formed the second group:

- Identification and/or assessment of the risks from health hazards in the workplace (the top function in Austria, Finland and Greece, and the second in Hungary, Luxemburg and Poland);
- Surveillance of the factors in the working environment and working practices which may affect workers' health, including sanitary installations, canteens and housing where these facilities are provided by the employer (rated second in Czechia, Finland, Greece and Slovenia and third in Croatia, Italy and Luxemburg);
- Advice on occupational health, safety and hygiene and on ergonomics and individual and collective protective equipment (ranked second in Croatia, Germany and, Norway, third in Latvia and Poland);
- Promoting the adaptation of work to the worker (placed top in Belgium and the Netherlands, second in Portugal, Romania and Spain).

These functions clearly outline a focus on occupational hygiene (occupational medicine specialists' contribution to the risk assessment, worksite visits) and the role of the medical expert (advising on OSH, and the adaptation of the work to the worker). They require specialist knowledge, as mentioned under the section 'Qualifications and training in occupational medicine' (see above). Worksite visits provide information that is relevant to the health surveillance of workers. One cannot judge a worker's fitness for a job without understanding their working environment. Health examinations, on the other hand, can reveal hidden workplace hazards, therefore providing a valuable input to the risk assessment process. In the Netherlands, the most important activities of occupational health services are centred around rehabilitation, return-to-work and sickness absence management. A key feature of this function is the adaptation of the work to the worker in order to promote early return to work. Sickness absence management was mentioned as the activity which occupied the majority of time in the UK too.

Various functions and the issue of occupational diseases

The third group (by averaged ranking) consisted of the following functions:

- Advising on the planning and organisation of work, including the design of workplaces, on the choice, maintenance and condition of machinery and other equipment and on substances used in work (rated second in Austria, third in Slovenia);
- Contributing to measures of vocational rehabilitation (placed top in Ireland and second in the Netherlands);
- Collaboration in providing information, training and education in the fields of occupational health and hygiene and ergonomics (ranked second in Italy and Switzerland, third in Hungary);
- Participation in analysis of occupational accidents and occupational diseases (rated second in Latvia, third in Switzerland).

The above functions fall under various domains and require one-by-one interpretation.

Giving advice on the planning and organisation of work is an expert role and complements the technological and safety input with perspectives that only a health professional can give.

Vocational rehabilitation measures are complex; however, usually there is an underlying health problem. The biopsychosocial approach explains that medical expertise is very much required to fully address this issue. Sustainable employability is integral to the focus of Dutch occupational health services.

The reason for occupational health services collaborating in the provision of information, training and education is that they are valid and authoritative sources on occupational health and hygiene and on ergonomics. Medical professionals can more easily create trust with workers. The occupational health service can also act as an organiser or coordinator for workplace health promotion activities.

While occupational accidents are primarily investigated by safety specialists, occupational diseases mostly fall within the remit of occupational medicine specialists. The survey results demonstrate a huge diversity in the time spent on the reporting of potential occupational diseases. This can be related to various factors. 'Occupational disease' can also be regarded as a legal term defined by legislation, and

therefore, it can be regulated differently in different countries (UEMS-OMS, 2018). In most countries, medical doctors are obliged to report any disease that they believe could have an occupational origin. However, they may or may not be an occupational medicine specialist. In Switzerland, the employer has to submit such a report after initiation by a stakeholder. In Croatia, general practitioners have to file a report, which is supervised by specialists. In several countries, healthcare system doctors do the reporting. Denmark, Greece, Hungary, Italy, Norway and Portugal emphasised that it is a legal duty of any doctor. However, occupational health knowledge or motivation may be missing among non-specialists. For instance, a Swiss report concluded that some work-related conditions are not systematically investigated by general practitioners, which may be a source of underreporting (Coline et al., 2025). This could explain one of the findings from our survey: in many countries (Czechia, Finland, Italy, Latvia, the Netherlands, Romania and the UK) at least 80 % of occupational diseases are reported by occupational physicians. Note that in Czechia only certain healthcare facilities are authorised by the Ministry of Health to do this. Depending on the country, reporting an occupational disease can have consequences for the employer and the worker too, for example: strict inspection of the employer by the labour authority and sanctions; compensation; a move to another trade/employment or job loss. Moreover, there are ethical and financial conflicts of interest that put the occupational medicine specialist in a difficult position. From a prevention perspective, occupational medicine specialists' active participation in investigations can help to provide a safer work environment in the future.

Functions that demand the least time

The last (fourth) group consisted of the following two functions:

- Participation in the development of programmes for the improvement of working practices as well as testing and evaluating the health aspects of new equipment;
- Organising first aid and emergency treatment (ranked third in Czechia and Romania).

The reason behind the comparatively small amount of time spent in programme development, testing and evaluating may be due to weak embedding in the organisational structure of the workplace. Most occupational medicine specialists work in external prevention services and are not involved in company management. Despite the evidence for its benefits, OSH is not always represented in the management of companies (EU-OSHA, 2010). Bigger enterprises can have their own occupational health expert; however, small companies purchase only basic services, and programme development and equipment evaluation activities may not be included. The small amount of time devoted to first aid organisation may be due to training being outsourced to providers that do it on an everyday basis (e.g., the national ambulance service).

The above figures are estimates only, and it may be that a particular function is not part of the national profile at all. Furthermore, the ratios must be different in each enterprise, and it can be assumed that services feature particular patterns depending on the sizes of the enterprises. Tailored offers can have an effect on the tasks performed, for example in Belgium the prevention units (credits) are spent on the basis of the characteristics and needs of the enterprise. Similarly, in Austria, in companies with over 50 employees, preventative work time can be allocated to different activities; however, medical check-ups can make up only 20 % of it. The Austrian statutory accident insurance provider (AUVASicher) offers free worksite visits for small companies, which is a good practice in supporting micro and small enterprises.

Occupational medicine during the COVID-19 pandemic

The COVID-19 pandemic dramatically reshaped the landscape of work and workplace health, bringing the discipline of occupational medicine to the fore. Occupational medicine played a critical role in responding to the public health crisis while ensuring worker safety and business continuity. One scientific journal editorial claimed that the pandemic was an opportunity to show return-on-investment in real time, concluding that the time had come for corporations to arrange access to a doctor who can provide them with individualised solutions (Iley, 2021).

The questionnaire also addressed the role of occupational medicine specialists during the COVID-19 pandemic through free-text questions. The pandemic reshaped the functions of occupational health services and occupational medicine specialists. Some respondents emphasised that in their countries (e.g. Hungary, Italy, Latvia, Poland) regular occupational health activities (e.g. periodical medical check-ups) were suspended or partly modified (Czechia). New tasks and priorities emerged instead.

The survey results confirmed that during the pandemic the most common function of occupational medicine specialists in Europe was taking on an advisory role in relation to both employers and workers (15 out of the 22 countries). They participated in designing and implementing safety protocols such as

social distancing measures and mandatory mask-wearing, as well as recommending the appropriate use of personal protective equipment and regular sanitation practices in workplaces. Furthermore, occupational medicine teams helped to develop evidence-based protocols for screening and triaging workers for symptoms or exposure, devising isolation and quarantine procedures and safe return-to-work policies after infection or exposure.

The second most frequently mentioned activity was participation in vaccinations against COVID-19 (8 out of the 22 countries). Occupational medicine specialists supported COVID-19 vaccination efforts by organising on-site vaccination clinics, educating workers about vaccine safety and efficacy and prioritising vaccination for essential and vulnerable workers.

Representatives in seven (out of the 22) countries indicated that occupational medicine specialists were also involved in testing workers for SARS-CoV-2 infection or other forms of health status screening. This form of activity also included contact tracing to limit outbreaks within organisations.

Other types of activity during the pandemic concentrated on evaluating the risks of COVID-19 transmission in various workplaces (2 out of the 22 countries), the investigation and reporting of COVID-19 cases as occupational diseases and advising on how to modify workspaces for remote (home) working.

Most respondents confirmed that since the end of the pandemic, they had returned to 'business as usual'.

Occupational medicine specialists played a crucial and multifaceted role during the COVID-19 pandemic. By bridging clinical knowledge and workplace realities, occupational health professionals helped to protect workers, sustain business operations and support public health goals. Their contributions underscored the essential value of occupational health in both crisis response and long-term workplace resilience.

Market trends in occupational medicine

In recent decades, several European countries have transitioned from publicly organised occupational health service models to market-based systems, whereby private providers deliver services directly to employers in a competitive environment. This shift has been driven by broader trends in healthcare privatisation, labour market flexibility and employer-oriented service delivery. While market mechanisms can enhance service responsiveness and efficiency, they also raise significant concerns regarding equity, ethical practice and long-term public health outcomes. Only three countries (Denmark, Luxembourg and Switzerland) reported that their occupational health service sector is not market-driven.

Opportunities, challenges and risks associated with marketisation

Market-driven occupational health service models have been associated with several perceived benefits, particularly from the perspective of employers. Countries such as Latvia and Finland emphasised improved access, greater flexibility, shorter waiting times, extended service hours and even on-site health assessments as benefits of the presence of multiple providers. Competition encourages providers to offer tailored services, integrate digital solutions (e.g., IT systems for tracking health data) and introduce novel approaches to health surveillance. Finally, price competition can drive cost-efficiency, leading to reduced outlays for employers, especially in urban areas with a high density of providers. These advantages align with broader arguments in health economics suggesting that market mechanisms can improve efficiency and responsiveness in service delivery (Saltman et al., 2002; Enthoven, 2009).

However, these benefits often come at the expense of other core principles of occupational health, such as ethical integrity, equity and preventive orientation. According to the survey, in Latvia and Poland, for instance, occupational health services are frequently selected based on price alone. Multiple countries reported that providers might prioritise volume over thoroughness, performing high numbers of health checks with minimal clinical value to meet contractual quotas (e.g. Greece, Portugal, Latvia). This trend reflects a commodification of preventive medicine, where services are reduced to legal compliance ('tick-box exercises') rather than focusing on evidence-based interventions. Competitive pressures may lead physicians to adopt more lenient medical judgements in order to retain clients, potentially undermining the integrity of fitness-for-work assessments. In Latvia and Portugal, this was noted as a growing concern among occupational medicine specialists. Market forces naturally favour densely populated and profitable regions. As a result, remote and rural areas may suffer from reduced access to occupational health services unless providers are subsidised or incentivised to offer services beyond urban centres. Unlike public systems with a population health mandate, private occupational health

service providers may prioritise short-term employer needs over long-term prevention, undermining continuity and coherence in occupational health planning. Based on survey responses, this is an issue in Italy and the UK. These findings are consistent with international literature warning that unregulated market dynamics can compromise the preventive and public health functions of occupational medicine (Rantanen et al., 2004; Benach et al., 2007). When marketisation turns medical practice into a business governed by productivity demands, physicians may start questioning their career path (ACOEM, 2025).

Cross-national patterns and structural trends

Although implementation varies across countries, several structural patterns can be observed. In Finland, over 85 % of occupational health centres are privately owned, operating under a national regulatory and subsidy framework. Norway has seen a shift from internal, non-profit models to outsourcing and the consolidation of provision into a few large private chains with more or less national coverage, although services are more sparsely available in remote areas, particularly in the northern part of the country. The German, Greek and Portuguese survey responses identified declining service quality and ethical concerns linked to cost-driven provision. The Latvian, Polish and Hungarian respondents described a two-tier market, with low-cost, low-quality providers working alongside more comprehensive services for large or well-resourced employers. The Italian response highlighted both the potential benefits of market flexibility and the risks associated with short-termism and conflicts of interest.

The systems for occupational health services are not widely implemented in Denmark and Switzerland. In these countries, occupational health service provision remains largely absent outside of certain high-risk sectors, resulting in low national workforce coverage figures (see the above section 'Occupational healthcare coverage and lack of occupational medicine specialists'). The absence of a structured national model may leave large parts of the workforce without preventive health surveillance, particularly in smaller enterprises.

The marketisation of occupational health services in Europe has introduced greater flexibility and responsiveness for employers, particularly in systems where regulation ensures minimum standards and quality oversight. However, this shift also creates systemic vulnerabilities, notably in relation to professional ethics, quality assurance and equitable access. Furthermore, in countries with minimal occupational health service provision, the lack of structured services may represent a missed opportunity for the prevention of and early intervention in work-related health issues.

Challenges currently faced by occupational medicine in Europe

The world of work is evolving, presenting challenges to everyone, including occupational medicine specialists. In our survey all but one country stated that they were facing challenges. Afterwards, respondents were asked to rank the nine challenges listed in Table 4 and could suggest further ones. The answers provided a clear order of importance, however, national rankings featured specific patterns for individual countries.

Table 4. Challenges that can affect occupational medicine practice in the order of ranking by the survey respondents

Averaged ranking	Challenge
1	Ageing workforce
2	Changing employment relations (e.g. platform work and the gig economy, zero-hour contracts, outsourcing and 'forced self-employment')
3	Non-national workers (e.g. language barriers, different cultures)
4	Novel technologies (e.g. unknown/trade-secret processes)
5	Novel chemicals (e.g. missing toxicological information)
6	Deregulation/decreasing enforcement
7	Artificial intelligence
8	Climate change
9	Global supply chains

Source: Compilation by the authors.

The challenge from the list that the respondents felt was the most important was clearly the ageing workforce: nine (out of the 22) countries put it in first place and a further six in second place. Only in Denmark and Poland was it ranked as a lesser issue. In Poland, occupational medicine specialists focus on fitness-for-work, and in this context, workforce ageing is considered a phenomenon over which doctors have little influence. However, an ageing workforce is an important issue for Polish employers.

The challenges related to changing labour relations and non-national workers were the next most commonly mentioned issues. Changing employment relations were put in first place in Germany and Italy and second in Croatia, Greece, Norway and the UK. The challenge related to non-national workers was placed first in Belgium and Denmark and second in Austria, Latvia, Slovenia and Spain. Workers undertaking platform work or with zero-hour contracts, and those who are active in the gig economy or outsourced to 'forced self-employment' may not be subject to national OSH legislation and therefore can be left without (mandatory) safety and health provisions (Kuijpers & Laurier, 2022). This includes the lack of free access to an occupational medicine specialist or occupational health service. Non-national workers may come from different safety cultures. They may not even speak the language of the country and may be working illegally. These workers face job insecurity and are often found performing so-called 3D tasks (dirty, dangerous and demeaning). All these factors can have serious health consequences for the individual (Matsaganis et al., 2025). Such workers may not receive adequate occupational healthcare, if any. Nevertheless, occupational health services need to be prepared to address these issues.

According to the survey results, novel technologies and novel chemicals (e.g. unknown/trade-secret processes and formulations) were the next most important challenges, achieving almost the same averages in the ranking. The respondents from Denmark, Luxembourg and Poland gave these high ratings. Although a growing number of scientific publications are available on innovations in these areas, a knowledge gap can be seen as evident: detailed and reliable information on their effects on human health, especially in the long term, is missing. The surveillance of workers who are exposed to such chemicals or technologies is challenging, as a standardised approach may not yet exist.

The average calculated from the respondents' rankings put deregulation initiatives in sixth place. In Czechia, Hungary, Portugal and Switzerland, however, deregulation was deemed the top challenge to occupational medicine. Hungary has just witnessed a regulatory downgrading of access to medical check-ups that was decided without professional and social partners' support (Nagy, 2024). Policy-makers may opt for a more flexible labour market to increase global competitiveness. This can include the deregulation of OSH and consequently occupational medicine too. As occupational medicine is

strictly governed by legislation, any attempt to relieve the employer's burden can end up downgrading workers' access to occupational healthcare.

In general, respondents felt less concerned about artificial intelligence and climate change. However, these two phenomena were seen by the Netherlands as the top challenges. Finland and Germany ranked AI in second place. The challenge posed by global supply chains was among the last to be mentioned by every country.

Respondents also provided free text on their perceived challenges. In Ireland, while young doctors are seeking to enter the speciality, there are not yet enough training places available in occupational medicine. Portugal and Romania pointed to the following overarching risks: a lack of legal protection for occupational medicine specialists and financial dependency on the employer. Trade unions believe that, as stated in the ILO C161, occupational medicine should be an independent prevention service provided to/for the workers (van Veelen, 2014). Finland and the UK emphasised workers' mental health issues.

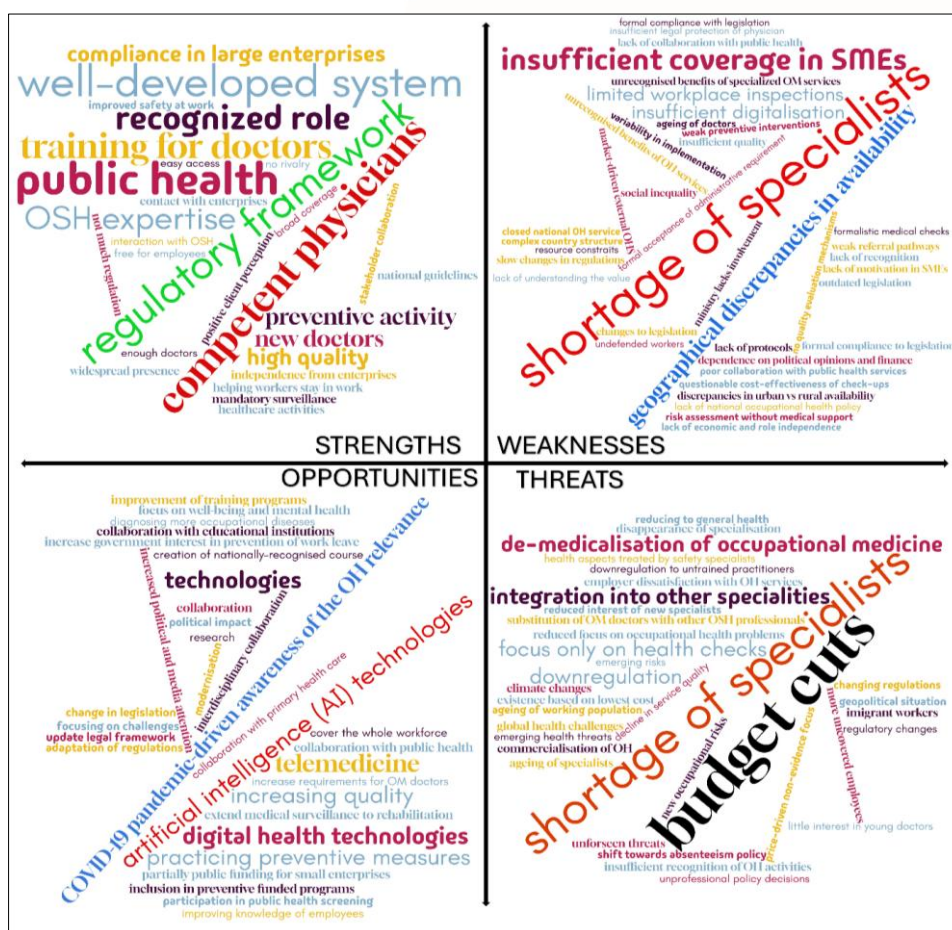
A UK publication on neurodiversity (Doyle & Medhurst, 2022) has highlighted that this is a growing UK mental health challenge. The term 'neurodiversity' is defined in several different ways, and there is no universal agreement on what it encompasses. In the context of occupational health, it is often used in the relation to Autism Spectrum Disorder (ASD) as well as other developmental conditions such as Attention Deficit Hyperactivity Disorder (ADHD) or learning disabilities. It is interesting to note that while neurodiversity is seen as a major clinical challenge in occupational health in the UK and Ireland, none of the respondents in other European countries mentioned it as a current issue in the free text section.

Occupational medicine specialists have first-hand experience of the challenges brought about by the ageing society, economic transformation, migration and advances in technology. As the functions are mostly set in legislation, national politics can be a risk to service continuity. When decision-makers neglect input from the occupational medicine community and focus on short-term results they can be easily seduced by simplistic solutions. In certain countries, experts wish to focus solely on reducing a perceived 'administrative burden', which can lead to the degradation of a well-functioning system.

SWOT analysis

Aiming for a deeper understanding of the strongest and weakest points in the occupational medicine systems of various European countries, the respondents were asked to complete a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of their current occupational health provision. Overall, answers from 20 countries (out of the 22) could be analysed using thematic categorisation. Recurrent themes were extracted and summarised for each SWOT category and further visualised in word clouds (Figure 2).

Figure 2. SWOT analysis of occupational medicine systems: bigger font size means more quotations in the survey



Source: The authors.

According to the survey results, the main strength of the occupational medicine systems under review appears to be the delivery of a high level of expertise in OSH, assured by experienced, competent and well-educated doctors (highlighted by 8 out of 20 countries, e.g. Belgium, Czechia, Denmark, Italy). A well-developed regulatory framework aligned with EU directives was also mentioned (by 7 out of 20 countries, e.g. Czechia, Finland, Poland). The regulatory framework supports the effective functioning of the occupational medicine system and its recognition by stakeholders. Strong collaborative links with employers (e.g. Norway, Latvia) and with trade unions (e.g. Belgium, Finland) were seen as further strengths of the occupational medicine system. In addition, occupational medicine was shown to be an important medical speciality with a positive attitude towards the system of occupational health service in some countries (e.g. Finland, Norway). A further strength of the occupational medicine system in many countries is its integration with public health initiatives, including participating in preventive activities, improving safety at work, reducing health risks, decreasing illness and generally supporting people to stay in work. To ensure all these functions, an extensive and effective training system for young doctors has been developed (e.g. in Denmark and Italy) and national guidelines have been produced with support from active national occupational medicine associations in a number of countries.

With regard to the weaknesses of the national occupational medicine systems, more than half the respondents indicated a shortage of occupational medicine specialists due to an ageing staff and insufficient replacement (e.g. Latvia, Czechia, Ireland, Italy, Norway) as a major problem. Additionally, geographical discrepancies in the availability of occupational health services in rural areas was mentioned. A lack of involvement and interest in, and coverage of, small and medium-sized enterprises by occupational health services was mentioned by 4 out of 20 countries (Portugal, Latvia, Czechia, Finland). Low recognition of the important role and value of occupational medicine in public health by policy-makers and employers frequently co-existed with problems regarding legislation (slow changes, deregulation, etc.), the box-checking of legal requirements and poor quality of services. Additionally, limited resources in occupational medicine did not allow for extensive workplace visits and proper

assessments of workplace risk factors. Certain respondents indicated the dependence of occupational medicine systems on political opinions, decisions and finances. In some countries, insufficient digitalisation of the occupational health services and weak referral pathways were mentioned.

In line with the reported negative internal factors and weaknesses of national occupational medicine systems, the following external threats were identified:

- An ageing occupational medicine specialist workforce, as well as a lack of new occupational medicine specialists, underscoring the difficulties in attracting new specialists and insufficient interest in occupational medicine (mentioned in 11 answers out of the 20 countries);
- Changing political priorities, moving away from prevention, and the lowering of requirements in occupational health, as well as delegating duties of occupational physicians to unqualified OSH and medical professionals (appeared in 10 responses out of the 20 countries);
- Economic pressures reducing the occupational health budgets of employers and/or the government (seen in 5 answers out of the 20 countries);
- The commercialisation of occupational medicine services, with a shift to the lowest cost services, price-driven decisions and solutions lacking scientific evidence (3 responses out of the 20 countries);
- The narrowing of occupational health services to health check-ups, with limited interventions and the de-medicalisation of occupational medicine (4 answers out of the 20 countries).

And finally, summarising all the above-mentioned threats, in the answers of the majority of respondents, a rising concern regarding the declining quality of occupational medicine services was noticed.

On the other hand, plenty of opportunities for the development of the occupational medicine system were suggested to counteract the weaknesses and threats. Various technological advancements were proposed, including the introduction of digital and telemedicine services and continuing with the use of new artificial intelligence technologies. Another opportunity appears in the form of collaboration with educational institutions, through interdisciplinary cooperation and improved training programmes, or by extending occupational medicine services to participating in public health screening, for example in cardiovascular health (Bensadon & Barbezieux, 2014). Influencing policy-makers can also be an opportunity for the development of the occupational medicine systems.

Below are some solutions that the respondents provided:

'By increasing the quality and focusing on new challenges occupational medicine could improve the productivity of the companies [and subsequently] interest to invest more in occupational health services.' (Finland)

'Inclusion of occupational health services in preventive programs financed with public funds.' (Poland)

'The current development by the EU Commission and the intended revision and update of a legal framework of occupational health services may provide a boost to improve occupational health services at the national level.' (Portugal)

'Extend the medical surveillance to the proper rehabilitation of persons with chronic diseases.' (Romania)

'The shortage of occupational medicine specialists and the social pressure to address occupational health after the pandemic, offer a window of opportunity to reform the specialty, enhance comprehensive prevention, and leverage digital technologies to expand its reach and efficiency.' (Spain)

Summarising the SWOT analysis findings, it can be said that the occupational medicine systems across Europe share many common challenges, including significant specialist shortages and a lack of recognition for the specialty among society and policy-makers, yet they also show strong foundations in training and regulatory systems. Integration with public health is often seen as a goal, but

unfortunately rarely achieved. There are significant opportunities and scope for improvements through technological innovations, international and interdisciplinary collaboration, and the expansion of the occupational medicine role to meet future workplace health demands. A coordinated European strategy could significantly strengthen the field.

Conclusions

The survey results provided valuable and up-to-date information on the status of occupational medicine in Europe. Obtaining responses from 22 European countries greatly exceeded initial expectations.

Appropriate training in occupational medicine provides the knowledge that forms the foundation for how occupational medicine specialists can support compliance. The survey confirmed that the duration of postgraduate medical training is at least four years. Council Directive 2005/36/EC provides for mutual recognition of specialist diplomas. National curricula, however, also take into account national legal frameworks (labour, health, social insurance, etc.) and their specific requirements. The European Training Requirements and the Examination both act as a mark of excellence. A further observation is that workers' health could benefit from a stronger focus on undergraduate occupational medicine teaching in medical schools.

Only some OSH directives provide for occupational health services. The study shows that the cost of occupational health services is largely borne by employers.

The survey highlighted that the most important driver for occupational health services is the legal obligation to provide these facilities.

Data showed that mostly it is only the employed population that is covered by mandatory occupational healthcare provision. Workers in flexible employment relations and in micro enterprises are seldom included, leaving them in a vulnerable position. Furthermore, most countries reported existing or expected future shortages of occupational medicine specialists.

The most common way of providing an occupational health service to workers is by the employer hiring an external healthcare company, while in some countries private self-employed doctors are contracted. In-house doctors are generally only employed by large employers. Quality indicators are rarely used. However, a (mandatory) national framework of occupational health service indicators could provide significant benefits.

The survey explored occupational medicine specialists' relationships with other stakeholders. It confirmed that most see the human resource manager and/or employer as the most relevant partners in their everyday practice. OSH professionals and other medical doctors were ranked second and third. The remaining stakeholders were prioritised only in certain countries.

The functions of occupational medicine specialists were mapped on the basis of ILO C161. The health surveillance of workers was unambiguously seen as the most relevant task. There are also, however, important occupational hygiene, advisory and clinical/rehabilitation functions. Surprisingly, reporting occupational diseases does not constitute a particularly large part of the everyday practice in most countries. Some respondents mentioned that the proportions of the duties involved also varies among enterprises.

The survey results confirmed that occupational medicine specialists actively participated in the protection of workers, as well as promoting business continuity and supporting public health goals, during the COVID-19 pandemic. As businesses returned to normal after the pandemic, sometimes such contributions were forgotten.

The recent marketisation of occupational health services in Europe can have consequences that are both positive (flexibility and responsiveness) and negative (conflicts of financial and ethical interests, commercialisation, quality and accessibility issues). The latter would need more attention to prevent service degradation.

Overall, respondents to the survey considered the ageing of the general (working) population as representing the greatest challenge to occupational medicine. Changing employment relations and non-national workers came next, followed by new chemicals and technologies. Some countries highlighted the risk of deregulation, artificial intelligence or climate change as their biggest challenge.

Answers to the SWOT analysis highlighted the well-established regulatory framework and the competence of doctors as key strengths. A shortage of specialists and the access of small enterprises to occupational health services were viewed as leading weaknesses. Respondents saw opportunities

in the advances in digital technologies. The shortage of specialists was again seen as a threat, as were other political, legislative or financial measures that can downplay the effectiveness of occupational medicine.

Occupational physicians have the credibility and skills to evaluate the health of workers and take a holistic view. Furthermore, occupational health specialists are trained to identify health hazards at work and contribute to risk assessments. No other OSH specialist can claim to have such a combination of skills, which makes them a valuable member in a multidisciplinary OSH team.

As the world of work transforms, through challenges such as climate change, psychosocial risks, technological integration and demographic shifts, occupational medicine professionals are uniquely positioned not only to respond but to lead with regard to issues in the workplace. Their evolving training framework equips them to shape healthier, safer and more sustainable work environments across Europe. In most countries, occupational physicians can be the most easily accessible medical doctors for the employed population. Therefore, in addition to their preventive remit, and in light of the role of occupational medicine in promoting workers' health, they can also actively contribute to primary care and public health initiatives, including but not limited to health screenings and seasonal vaccination programmes. These activities may also benefit the employers.

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