

The Future of Occupational and Environmental Medicine

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Introduction

Occupational and environmental medicine (OEM) has been practiced since at least 3000 BC, when injured pyramid workers were offered care and compensation, documented in the Edwin Smith Papyrus.^{1,2} Bernardino Ramazzini (1633-1714) who identified numerous workplace hazards and associated diseases, documented in *Diseases of Workers*, 1632, is considered the father of occupational medicine. Alice Hamilton (1869-1970) was one of the first physicians to bring attention to the health hazards that workers in the newly industrialized United States (US) endured, paving the way for OEM as we know it today. OEM is the field where medicine and public health intersect. Emphasizing work and the environment as important social determinants of health, OEM professionals employ a multidisciplinary approach to recognize, diagnose, treat, and prevent injury and illness that arise from exposures at work, home, and the environment. OEM physicians work to improve the health, well-being and safety of employees and their communities, locally and globally.

The historic and catastrophic SARS-Cov-2 pandemic has required rapid interpretation of complex public health data and timely development and implementation of public health and workplace guidelines. Physicians with multidisciplinary OEM expertise have been essential to the pandemic response. With their training, the OEM physician understands the risks our work force faces from infectious and environmental hazards, and how to identify, manage, mitigate, and prevent. The ability to keep employees safe and healthy is of optimum importance and enables our society and economy to continue to function and flourish. The OEM physician is critical to this mission. This article addresses the current state of OEM practice and education, and the challenges faced regarding the training of future OEM physicians.

Value of OEM

The value of OEM as a specialty is broad reaching. OEM physicians possess the comprehensive skillset essential to protecting the health and well-being of employees and the broader public. They routinely work in multidisciplinary teams with the task of integrating the expertise of the various stakeholders in order to recognize, manage and prevent work-related injury and illness effectively, as well as provide guidance on complex causation determinations and return to work issues.

A specialty within the realm of preventive medicine, OEM residency training involves education in clinical medicine, epidemiology, biostatistics, risk assessment, industrial hygiene, safety, toxicology, and organizational management. Essential competencies for board certification in OEM include clinical occupational and environmental medicine, OEM related law and regulations, environmental health, disaster preparedness and emergency management, public health, surveillance, and disease prevention, and OEM related management and administration.³ OEM physicians learn to recognize occupational and environmental hazards, develop strategies to mitigate such hazards, and also manage those who are impacted by hazardous exposures, whether from work or from the general environment (Table 1).³ Additionally, OEM physicians are trained to conduct workplace site visits, where hazards can be identified and mitigated. This can lead to improvements in worker health and safety, the interaction an immersion also resulting in improved communication with employers and employees. Such workplace engagement rarely occurs by physicians of other specialties.

Clinical OEM	Hazard Recognition, Evaluation, and Control
OEM-related Law and Regulations	Disaster Preparedness and Emergency Management
Environmental Health	Health and Productivity
Work Fitness and Disability Management	Public Health, Surveillance, and Disease Prevention
Toxicology	OEM-Related Management and Administration

Table 1. Ten core competencies of training of an occupational and environmental medicine physician. OEM: Occupational and Environmental Medicine.

Employers gain multiple benefits from engaging OEM physicians, not the least of which is returning employees to work safely, minimizing workers' compensation (WC) costs. OEM physicians appreciate that illness and injury – work-related or not – can have social, practical, and financial impact on employers.^{4,5} The value of returning to work, even in a restricted fashion, is reduced WC costs, both medical and indemnity, and reduced long-term disability. This is not generally appreciated or managed well outside of OEM. OEM physicians, expert in disability management, know how to control work-related injury and illness, and understand how claims are handled, what is compensable, and how disputes are resolved. They can lead a team of key stakeholders, which include physician specialists, non-physician providers, human resources, safety specialists, case managers, adjusters, insurers, and employers.⁶

WC is a parallel and independent insurance system in the US. While unfamiliar to many physicians of other disciplines, OEM physicians are intimately familiar with this system.⁶ WC is one of the oldest forms of social insurance in the US and the third-largest source of support for disabled workers after Social Security and Medicare.⁷ It is not one unified system but consists of multiple different compensation systems governed by various laws, depending on the state, federal, or employer jurisdiction. This no-fault system provides compensation for medical and rehabilitation costs for certain work-related injuries and illnesses to employees.⁷

Insurers that handle WC and other types of claims and benefits (eg, medical, social security disability, or personal injury) appreciate the OEM physicians' expertise in public health, population health, disability, and medical causation. OEM physicians can critically review claims, OSHA reports and other data to identify risk factors for workplace injuries or illness that are amenable to intervention. Outcomes of this analysis can result in significant cost savings for the employer.⁸ OEM physicians are ever cognizant that workplace injuries may impact insurance rates, affect worker productivity and morale, and trigger regulatory action, and as such can help mitigate these effects. Insurers also have a need for medical review of complex injuries or illnesses, which OEM physicians can provide including preparing evidence based expert causation reports.⁹

Attorneys rely on OEM physicians to provide medical expertise regarding issues of causation and disability, even outside of WC, which can be contentious. OEM focus on functional outcomes can provide useful input in resolving these issues.^{10,11} In particular, the complexities of WC law, which varies by state, territory or federal work setting, merit OEM expertise, which is necessary for certain work tasks such as assigning disability ratings to particular medical impairments.

The workplace can be an effective environment for preventive health interventions and workplace wellness and prevention initiatives are often developed by or in conjunction with OEM physicians. Such population health programs are designed to prevent and control chronic disease as well as improve worker physical and emotional well-being. Recognizing the interplay between work, home and community exposures and health is important towards achieving improved health outcomes.^{12,13}

OEM physicians are also poised to deliver efficient, value-based leadership especially in times of crisis, which became apparent during the SARS-CoV-2 pandemic. The pandemic has exposed organizational deficiencies and shown where improvements in structure and communication are needed. The pandemic brought a clearer vision to organizations of the role of OEM in protecting their employee health. The pandemic has also forced organizations to look for public health expertise to help contain the virus and has demonstrated the value of occupational safety and health professionals, in particular OEM physicians. With public health, employee health, population management, and epidemiology skills, as well as already formed strong relationships with key stakeholders within the institutions they serve, OEM expertise has been sought out and highly valued.

Throughout the pandemic OEM physicians have provided invaluable assistance in multiple arenas, including exposure management, workplace safety practices, personal protective equipment allocation, COVID-19 surveillance and testing, and return-to-work guidance in accordance with local, state, and federal public health guidance.¹⁴⁻¹⁸ The beneficial impact of OEM physicians has had, has indelibly underscored the need for more OEM physician specialists in multiple sectors of our society. One of the features of highly reliable organization (HRO) is deference to expertise, which is possessed by OEM physicians around public health and population management. OEM physicians are poised to deliver efficient, value-based leadership, especially in times of crisis, which became is now ever apparent, on account of the SARS-Cov-2 virus.¹⁹

State of the OEM Physician Residency Training

Despite OEM having one of the highest satisfaction indices among medical specialties and a robust market of available positions, there is a long-standing shortage of formally trained OEM physicians, well documented by the National Academy of Medicine.²⁰⁻²⁵ There is also a paucity of public training funds.^{22,26} OEM residency training programs are typically 2 years in length, after applicants have completed a minimum of 1 post graduate clinical year. OEM is listed as a preventive medicine specialty. The Center for Medicaid Services (CMS), which funds most US residency programs, does not fund OEM residencies. Funding is needed to support resident stipends, benefits, master's in public health tuition, and other expenses related to training OEM residents. Much like pediatrics and addiction medicine, OEM training programs seek funding from other sources with most receiving little or no funding from their home institutions. Currently the main funding sources for OEM residency training programs are the National Institute for Occupational Safety and Health (NIOSH) within the Centers for Disease Control and Prevention (CDC), the Health Resources Service Administration (HRSA), the Department of Veterans Affairs (VA), and individual institutional support.

Overall, funding for OEM residencies has decreased over the past 20 years. NIOSH funds have been reduced while resident stipends and benefits have increased year by year. For example, in the Association of American Medical Colleges' national 1994-1995 survey year, the mean annual actual stipend was \$30,753. Contrast that to 2020, the mean actual annual stipend has almost doubled at \$58,921, an increase of 3.0% over the prior year.²⁷ Although when accounting for inflation, the stipend amount for residents has changed little, there has been an undue hardship to programs as the funding allocations have not grown at even the same rate as the stipends paid. Corporate donations and scholarships that used to be available, eg, the Occupational Physicians Scholarship Fund (1994-2004), have largely disappeared.²⁸ Although some institutions more recently have received HRSA and VA funding these newer sources of funding remain inadequate to meet the training needs of the field. Currently, of the 23 existing OEM training programs, 18 receive partial funding support from NIOSH and 3 receive funding from HRSA.^{14,29} Subsequent to the reduction in funding and increase in costs, the number of US residency training programs has declined over the past two decades, from a high of 40 programs in the 1970s to currently two. Residency program closures were most notable after the year 2000, comprising 95% of closures.³⁰

In 1991, an Institute of Medicine report noted that "funding is not presently adequate to support graduate training in occupational and environmental medicine and recommended that "a significant infusion of federal monies is needed in a field that is almost exclusively an outpatient specialty and generates relatively few patient care dollars."³¹ Today, four decades later the funding issue remains, only about one-half of available training positions have had the necessary funding (Figure 1).³²

The OEM specialty has pioneered a "Train-In-Place" program approach that allows mid-career physicians from specialties outside preventive medicine to train in the place where they live and work in OEM without incurring a significant loss of income. Supervised training in the community setting is combined with intensive training at an academic or governmental institution and the cost per trainee is reduced as the physician is able to maintain a salary during OEM residency training. This Train-in-Place program has taught about 7% of new American Board of Preventive Medicine (ABPM) occupational medicine diplomates in the field over the past decade.³²

Given that funding has declined over the past several decades, the number of American Council for Graduate Medical Education (ACGME) approved residency positions have been filled at a little over half capacity (Figure 1). Whereas other residency positions have increased, over the past couple decades, for all medical specialties overall, including internal medicine and family medicine, the number of ACGME-accredited residency positions for OEM have remained stagnant (Figures 1-4), and significantly underfunded, hence the reduced filling of these positions.^{33,34} Whereas for other US medical specialties the ability for residency positions to be filled is based on demand by graduating medical students, in OEM the issue is not primarily demand, but rather the inability of OEM training programs to fund positions for which they are accredited. Qualified applicants are turned away. Funding coupled with lack of institutional support and resolve, resources to support electives, which would increase demand for OEM residency are lacking. Again, qualified medical students are anecdotally turned away. In general, the shrinking number of programs as well as the inability to fund all accredited positions is one of the factors affecting the pipeline for residency trained, board certified OEM physicians.

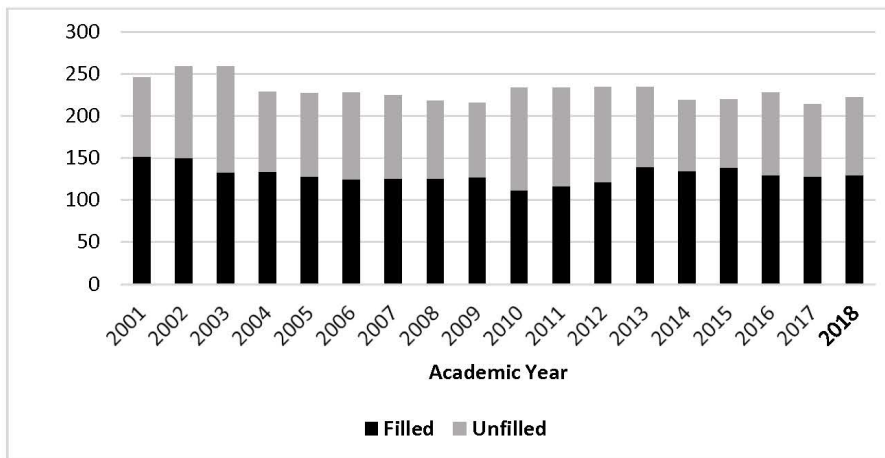


Figure 1. Filled and unfilled residency positions in US occupational and environmental medicine training programs, 2001-2019. Data from the American Council for Graduate Medical Education (ACGME).

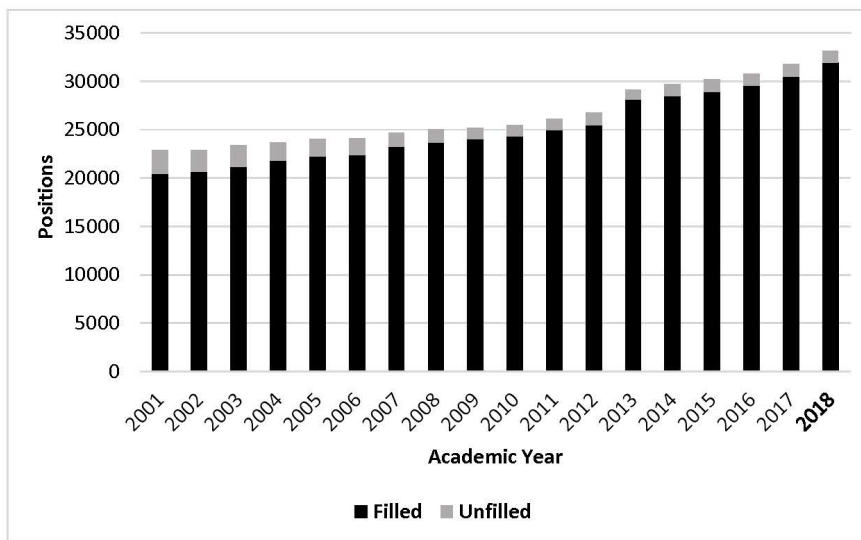


Figure 2. Filled and unfilled residency positions in US medical specialty training programs participating in the Match, 2001-2019. Data from the National Resident Matching Program (NRMP).

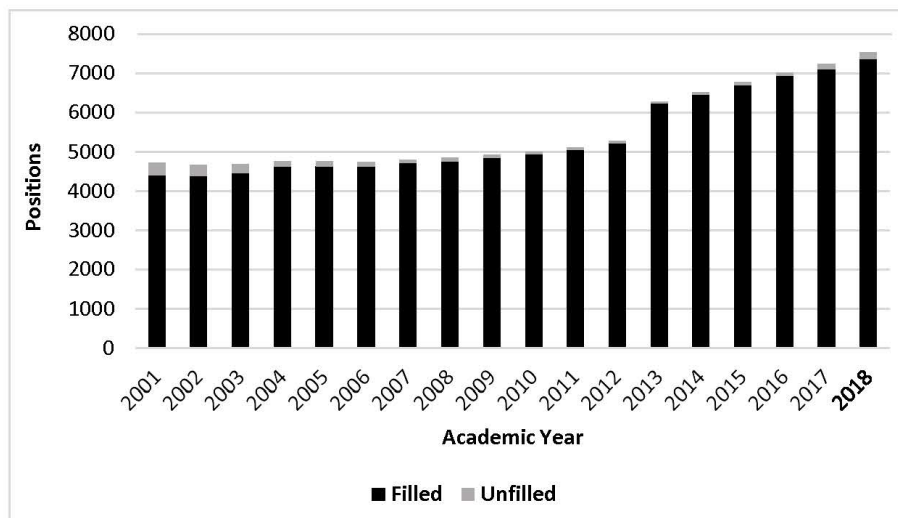


Figure 3. Filled and unfilled residency positions in US categorical internal medicine training programs, 2001-2019. Data from the National Resident Matching Program (NRMP).

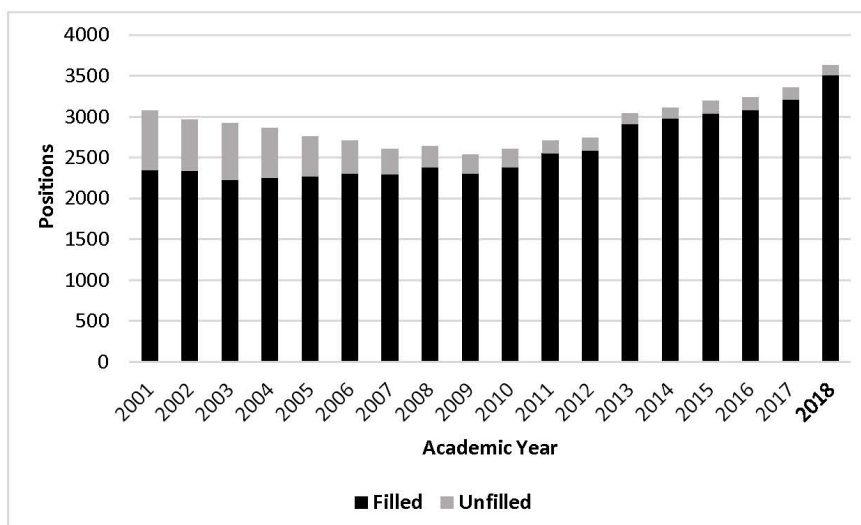


Figure 4. Filled and unfilled residency positions in US family medicine training programs, 2001-2019. Data from the National Resident Matching Program (NRMP).

There are other factors that contribute to the shrinking OEM physician workforce, not the least of which is limited visibility of OEM among medical students, residents and practicing physicians. Many physicians are unaware of OEM until after years of practice in another field.^{35,36} They may enter the field mid-career, having already achieved board certification in other areas of medicine, such as internal medicine and emergency medicine, at a stage of life when return to formal education as a full-time resident is generally not a feasible option.²⁸ This results in a limited number of applicants to training programs contributing further to the inadequate OEM pipeline. The Train-in-Place program is able to somewhat mitigate this issue as physicians are able to train where they work.

The number of newly board-certified OEM specialists declined from a high of 229 in 1997 to 90 in 2021, falling below 100 for the first time in 2001, and remaining below 100 since (Figure 5).³⁷ Current projections estimate a loss of 1,655 OEM-certified physicians over the next 10 years due to retirement. ACOEM projects a net workforce reduction of 891 (33%), from 2015 to 2025.³⁸ This shortage of formally trained physicians is reflected in the specialty board certification of American College of Occupational and Environmental Members (ACOEM) members, the professional society for OEM. One-half of the membership (active and retired, excluding student members) are diplomates of ABPM certified in occupational medicine,³⁹ and about 65% are board-certified in another specialty, many being diplomates of more than one board.⁴⁰ Concerns regarding the supply and demand for occupational safety and health (OSH) professionals in the US is not new.

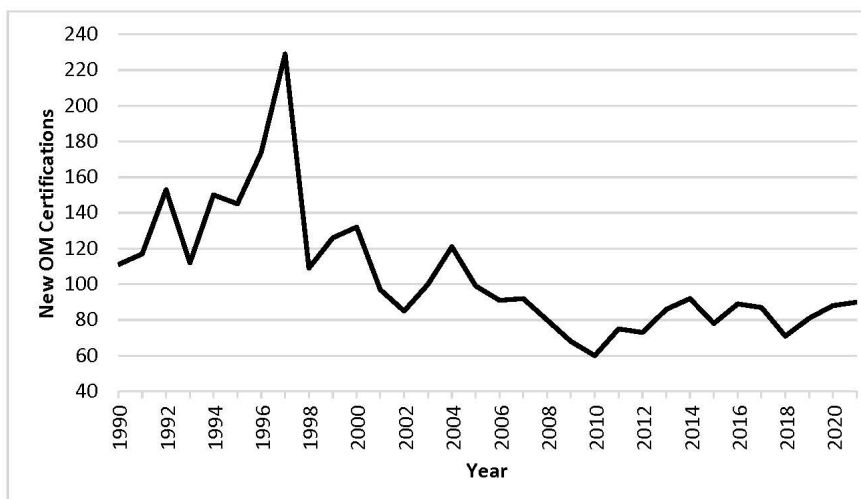


Figure 5. Number of new certifications in occupational medicine (OM) per year, 1990-2021. Data from the American Board of Preventive Medicine (ABPM).

In 2011, NIOSH commissioned a National Survey of the Occupational Safety and Health Workforce, one of the most comprehensive surveys of the occupational safety and health (OSH) workforce. This survey estimated that OEM physicians comprised 3% of all (N = 48,000) OSH professionals, an estimated 1,440.⁴¹ The report predicted a bleak forecast of inadequate OSH professionals with the necessary training, education, and experience to meet future national demand for OSH. As the number of US workers continue to grow, from 62 million people in the labor force in 1950, to 146 million people in 2000 to 160 million at present, the shortage of OEM physicians promises to worsen.^{42,43} The pandemic has laid this dearth bare.

The lack of funding and visibility have perpetuated the shortage of OEM physicians. Despite limited training opportunities, resident surveys suggest that residents are satisfied with their training and that the training meets their needs.³⁶ Residency trained physicians also have more opportunity for advancement and for securing senior leadership and executive positions than those who practice OEM without formal training.⁴⁴

Conclusion and Call for Action

Despite these challenges, OEM residency programs continue to produce highly qualified, well trained physicians who go on to become leaders in corporate medicine, regulatory agencies, public health departments, governmental agencies, managed care companies, health systems, and academic institutions, providing clinical care and population health management to employees, their families and their communities.^{35,36,44} Yet the number of OEM physicians remains limited compared to other specialties. The National Academy of Medicine called for US residencies to train physicians to meet the nations' needs.⁴⁵ This charge is not being met as regards OEM physicians in that there is a long standing and well documented need for significantly more board-certified OEM physicians than are available today, in order to secure the health and safety of our current and future workforce as well as to meet the inevitable public health and environmental health threats. Readiness and preparation are keys to success to this end.

In the midst of the largest pandemic of our lifetime, OEM physicians have been developing and overseeing screening and return-to-work programs for COVID-19 in industries, academic institutions, hospitals, schools, etc. Unfortunately, many industries and companies lack board-certified OEM physicians, and have been left to figure out how to resume safe workplace operations, sometimes with deadly results.⁴⁶ As we have witnessed in this pandemic, we cannot have a strong and growing economy without a healthy and well-protected workforce.¹⁴⁻¹⁸ Our employees are a priority.

These interdependent challenges at the system level have hampered efforts to address the shortage of OEM physicians. Successful efforts to reduce this shortage will need to bring diverse stakeholders together including government, payers, and educators. Solutions include integrating OEM into required learning for medical students, increasing the footprint of OEM in US medical licensing examinations (USMLE), expanding funding to adequately support training programs, improving opportunities and funding for midcareer professionals to train in the field, and greater emphasis on OEM board-certification to full OEM positions. Above all, the increasing demands for OEM physicians in the US cannot be met by the current inadequately funded OEM residency training programs.

The story of OEM continues to unfold within the changing landscape of industry and public health demands. Qualified, trained OEM practitioners remain at the intersection of worker, environment, and public health. With financial resources matched to the task at hand – to train future OEM physicians, this specialty can continue unencumbered to firmly manage the reins in furthering the occupational and environmental safety and health of our workforce.

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