

E. Wood*

TRAINING OF OCCUPATIONAL MEDICINE PHYSICIANS AND ALLIED OCCUPATIONAL SAFETY & HEALTH PROFESSIONALS IN THE USA

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SUMMARY: Professionals have been working in occupational safety and health (OS&H) in the United States since at least the advent of the Industrial Revolution. Formal educational in OS&H began in earnest with passage of the Occupational Safety and Health Act (OSHA) of 1970 that included provisions for funding training in OS&H disciplines.

A study conducted by the National Institute for Occupational Safety and Health (NIOSH) in 2011 estimated that there were over 48,000 (2.3/10,000 working age adults) OS&H professionals working in the US. Employers surveyed in this study reported a need to hire over 25,000 OS&H professionals in the next 5 years. OS&H training programs were projected to graduate less than 13,000 students in that period.

Core knowledge and skills in the various OS&H disciplines typically includes academic training in epidemiology, biostatistics, administration & management, behavioral health science, industrial hygiene, ergonomics, and foundation courses in occupational injury and disease prevention. Employers report interest in additional training in communication, technical writing, leadership, cross-disciplinary training, emerging hazards, and knowledge of regulations and compliance.

Funding of OS&H programs has been a persistent challenge. A lack of student awareness of training and career opportunities poses additional challenges for recruitment of qualified applicants. While hiring demands and career prospects remain high for most OS&H disciplines, the support for training programs, and the supply of new graduates presents ongoing challenges for OS&H educators.

Key words: *Occupational Safety and Health, Occupational Medicine, Safety, Industrial Hygiene, Education and Training, OSHA, NIOSH*

INTRODUCTION

Occupational safety and health (OS&H) emerged as a concern in the United States at least as early as the 19th century. With the transformation of the US economy during the Industrial Revolution, a labor market developed, and the rise of industrial workers grew in prominence. Indus-

trialization, particularly in the heavy industries, presented another high risk for serious injury to workers. Recognizing the need to address these concerns, many companies began to develop occupational health services, including employment of surgeons, particularly in rural areas. These surgeons in turn became the forerunners of what came to be known as "industrial medicine" physicians. A nascent safety profession emerged in the early 20th century and the first national conference on industrial diseases was held in 1911 by the American Society of Safety Engineers (*Gochfeld,*

*Eric Wood, MD, MPH, (eric.wood@hsc.utah.edu), Rocky Mountain Center for Occupational and Environmental Health, University of Utah, Salt Lake City, UT 84108.

2005). The first US occupational medicine meeting, now known as the American Occupational Health Conference, was held in 1915.

Perhaps the most widely recognized figure in occupational health from the US is Alice Hamilton, MD (1869-1970). Hamilton was the first female faculty member of Harvard University and specialized in toxicological diseases of workers. She integrated medicine, occupational hygiene and the social fabric of the era to influence a change in the approach to occupational safety and health of workers. Her autobiography, *Exploring the Dangerous Trades* (1943) provides a vivid portrayal of occupational safety and health during this period.

Workers' Compensation insurance emerged in most states across the US between 1910 to 1920 to address injuries, although recognition of occupational illnesses as compensable diseases did not begin until the 1930s. The Walsh-Healy Act (1936) established the first federal legislation providing protection of workers from hazardous working conditions for companies doing business with the federal government (*Gochfeld, 2005a*). Probably the most significant legislation impacting OS&H in the US was passage of the Occupational Safety and Health Act (OSHA) in 1970 that established a federal standard for health and safety throughout the US (*United States Department of Labor..., 1970*).

A key feature of the OSHA Act was the creation of the National Institute for Occupational Safety and Health (NIOSH) and included provisions for funding training in OS&H disciplines. NIOSH recognizes nine distinct disciplines of OS&H: Occupational Safety, Industrial Hygiene, Occupational Medicine, Occupational Health Nursing, Ergonomics, Health Physics, Occupational Health Epidemiology, Occupational Health Psychology, and Occupational Injury Prevention. Training occurs in undergraduate, graduate and post-graduate settings. The majority of training programs in the US are affiliated with institutions that receive funding by NIOSH (2011) through one of the 18 Education and Research Centers (ERCs) and Training Program Grants (TPGs).

CURRENT STATUS AND FUTURE DEMAND FOR OS&H PROFESSIONALS

Shortages of OS&H professionals in the US have been widely recognized for many years. A report commissioned by the US Secretary for Health Education and Welfare in 1980 was among the first to call attention to the large deficit of occupational medicine physicians in the US workforce. In 1990, the Institute of Medicine proposed expanding primary care training to incorporate occupational medicine and attempt to address the shortfall of occupational medicine specialists (*Gochfeld, 2005a*). More recently, the 2011 NIOSH Workforces study determined the current status and future demand for OS&H professionals in the US. Employers and directors of training programs throughout the country were surveyed with a goal to help determine resources needed to address future needs.

NIOSH estimated there were over 48,000 OS&H professionals working in the US across the nine recognized disciplines. The distribution of this workforce was approximately 59% safety professionals, 15% industrial hygienists, 9% occupational health nursing, 3% occupational medicine physicians, and lesser amounts in the remaining disciplines.

Employers surveyed in the study reported a need to hire over 25,000 OS&H professionals in the next five years. Results from OS&H training program directors led NIOSH to project that there would be less than 13,000 students graduating in that same period. An additional concern for the future needs of OS&H professional is a trend towards attrition of the current cohort of OS&H professionals. Employers surveyed in the NIOSH study estimated retirement of safety professionals at a rate of upwards of 10% per year. At the same time, there is recognition of a "greying" of the professional OS&H workforce, particularly among occupational medicine physicians and nurses with large numbers of these professionals over age 50 (*NIOSH, 2011*).

US WORKING POPULATION DEMOGRAPHICS AND DISTRIBUTION

Training of OS&H students also needs to address the changing nature of the US workforce in order to provide appropriate skills and knowledge for OS&H graduates. There are approximately 205 million working age adults (age 16-64 years) out of a total of 326 million population in the US (*United States Department of Labor...*, 2018). The US working population is gradually aging with the median age of 36.3 in 1990, and a projected median age of 40.2 in 2020. Workers age 55 and older made up 13% of the labor force in 2000, and this is projected to increase to 20% by 2020. (*Toossi, 2002*). The gender structure of the workforce has also seen significant change with the share of women in the US workforce having grown from approximately 30% in 1950 to almost 47% in 2000. (*Toossi, 2002*). The distribution of how people work across the US labor force is changing as well. Currently, service industries employ approximately 46.6% of the US population with healthcare (13.8%), and wholesale and retail trade (13.4%) making up the remaining majority of workers. Projections indicate that there will be an increasing demand for workers in the service industries over the coming decade with largest growth in personal care, health aids, registered nurses, food preparation, serving workers, and retail salespersons (*United States Department of Labor...*, 2018). There is also an increasingly recognized role of work in informal employment arrangements, and contingent work assignments with fewer employees working as regular full-time status for organizations (*Nightingale, Wandner, 2011*).

EDUCATION AND TRAINING OF OS&H STUDENTS IN THE US

Education and training of OS&H students occurs in undergraduate, graduate and post-graduate institutions. There is a wide breadth of educational course work expectations across the nine OS&H disciplines dependent on the specialty, the

accreditation requirements of various governing bodies, and the professional certifications obtained after graduation. Despite this diversity of training requirements, there is a common core of academic course work that is shared by most if not all of the disciplines. These core requirements typically consist of a combination of the following foundation subjects:

- Occupational Epidemiology
- Biostatistics
- Administration and Management of Health and Safety Programs
- Behavioral Health Science
- Industrial Hygiene
- Ergonomics
- Occupational Safety and Health
- Occupational Injury and Disease Prevention.

While a detailed presentation of training across all nine OS&H disciplines is not possible for this review, an overview of training of Occupational Medicine (OM) physicians may provide context to contemporary state-of-the-art OS&H training in the US. Training to become a physician in the US requires four years of medical education in either an allopathic (MD degree) or osteopathic (DO degree) medical school. Admission to US medical school is a highly competitive process that typically requires completion of an undergraduate Bachelor degree, completion of healthcare-related experiences, and high scores on the Medical College Admission Test among other criteria.

Following completion of medical school, graduates matriculate in post-graduate residency training programs that range from three to eight or more years in length. OM residents are required to complete a minimum of three years of post-graduate residency training. The first year of training is generally termed the "intern year" and provides foundational clinical training in general medicine. The next two years comprise the specialty training in OM and include graduate course work leading to a Master of Public Health (MPH) or equivalent graduate degree. Core academic ed-

education leading to the MPH or equivalent degree includes the courses listed above with additional focus on both clinical and population-based care and management of occupational health injuries and diseases. In addition to the academic course work, OM residents train in clinical settings with experienced OM faculty physicians where they learn the specialty practice of OM. Additionally, residents typically "rotate" in specialty clinics at hospital or community-based settings and train under physician faculty in related disciplines required for successful clinical practice of OM (e.g. orthopedics, pulmonology, dermatology, etc.). OM residents also train in population-based settings (e.g. OSHA, Departments of Health, etc.), and industrial-based programs (e.g. corporate occupational medicine, military occupational medicine, etc.). In the US, residency training programs are accredited by the Accreditation Council for Graduate Medical Education (ACGME), where OM residency programs are housed within the specialty of Preventive Medicine. There currently are 25 OM residency programs in the US accredited by the ACGME (2018). OM residency programs typically train between 2-10 residents at any given time. There were approximately 130 residents matriculated in the US in the 2016-2017 academic year (Pratt, Gochfeld, 2017).

Upon completion of OM residency training, graduates are considered eligible to become Board Certified by the American Board of Preventive Medicine (ABPM). The ABPM administers an examination in the fall of each year for qualified candidates, and if the candidate passes the examination, they are considered Board Certified in Preventive Medicine in the specialty of Occupational Medicine. Although approximately half of the 50 US states do not require ongoing continuing medical education to maintain medical licensure, retention of the designation as a Board Certified OM physician requires performing continuing medical education in the specialty, as well as re-examination every 10 years (American Board of Preventive Medicine, 2018).

Residency trained OM physicians are in high demand throughout the US. As demonstrated in the NIOSH survey of 2011, employers expected

to hire over 25,000 OS&H professionals in the next 5 years. While OM physicians constitute a minority of OS&H professionals in the US workforce (approximately 3% of the 48,000 employed OS&H professionals), demand for OM graduates has been characterized with career opportunities described as "a tsunami of hiring." (Personal Communication..., 2017). Virtually all residency-trained OM graduates have opportunities for multiple job offers prior to graduation.

ADDRESSING FUTURE NEEDS

In the NIOSH survey of 2011, employers rated the state of training of graduates in all nine OS&H disciplines with high satisfaction. Employers also identified several areas of emerging interest for focus of training for current students. One area that was identified as important for all disciplines was the desire for new OS&H graduates to have cross-training in other allied OS&H disciplines. Additional topics that employers identified as relevant for focus of training included communication, technical writing, leadership, emerging hazards, and knowledge of regulations and compliance (NIOSH, 2011).

Funding of OS&H training programs has been a persistent challenge despite the recognized need for graduates in all OS&H disciplines. Unlike most US residency programs, occupational medicine is ineligible for federal funding support by the Centers for Medicare & Medicaid Services. The major sources of funding of OS&H training include NIOSH, the US military, private institutions, the US Health Resources and Services Administration, foundation support, private donations and individual student's self-supported tuition. Recently, there have been increased pressures on funding of education and training with an apparent overall decline at institutional levels, and ongoing threats of reduced funding from federal sources. OS&H advocates continually strive to find support for OS&H education and training.

Another challenge in addressing the shortage of OS&H professionals is attraction of qualified students to the field. OS&H programs gradu-

ated approximately 2,845 OS&H students at the Bachelor's degree and higher level in 2011. At that time, program directors projected that approximately 13,000 OS&H students would graduate in the next five years with 69% Safety, 12% Industrial Hygiene, 3% Occupational Medicine, and 3% Occupational Health Nursing graduates in each field (*NIOSH, 2011*). Yet, despite a well-recognized need and an abundance of well-paid career opportunities among employers for graduates, there appears to remain a significant lack of awareness or interest of training and career opportunities in OS&H among potential student candidates. This poses additional challenges for recruitment of qualified applicants into these training programs. So, while hiring demands and career prospects remain high for most OS&H disciplines, the support for training programs, and the supply of new graduates presents ongoing challenges for OS&H educators.

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OSPOSOBLJAVANJE LIJEČNIKA MEDICINE RADA I STRUČNJAKA ZAŠTITE NA RADU U SAD-u

SAŽETAK: U Sjedinjenim Američkim Državama zaštitom na radu (OHS) stručnjaci se bave od samog početka Industrijske revolucije ako ne i ranije. Formalno i ozbiljno obrazovanje iz zaštite na radu ustanovljeno je prihvaćanjem Zakona o zaštiti na radu 1970. godine koji uključuje i odredbe o financiranju osposobljavanja za područja zaštite na radu.

Nacionalni institut zaštite na radu proveo je 2011. godine studiju koja je pokazala da u Sjedinjenim Državama radi 48,000 (2,3 na 10.000 odraslih zaposlenih) stručnjaka zaštite na radu. Poslodavci uključeni u studiju izrazili su potrebu zapošljavanja 25.000 stručnjaka zaštite na radu u narednih pet godina. Projekcije pokazuju da će u navedenom razdoblju programi osposobljavanja obrazovati tek 13.000 stručnjaka.

Temeljna znanja i vještine iz različitih disciplina zaštite na radu obično uključuju akademsko obrazovanje iz epidemiologije, biostatistike, administracije i upravljanja, poznavanje zdravstvenog ponašanja, industrijske higijene, ergonomije i temeljna znanja o ozljedama na radu i prevenciji bolesti. Poslodavci su zainteresirani za dodatnu izobrazbu iz područja komunikacije, tehničkog pisanja, vodstva, interdisciplinarnih znanja, mogućih opasnosti i poznavanja i poštovanja regulative. Financiranje programa osposobljavanja za zaštitu na radu stalni je izazov. Nedovoljna svijest studenata o mogućnostima obrazovanja i zapošljavanja u tom području predstavlja dodatni problem u pronalaženju kvalificiranih kandidata. Iako je potražnja za kadrovima velika, a i mogućnosti za karijeru također, u većini područja zaštite na radu, potpore programima i premalen broj diplomiranih stručnjaka stalan su izazov nastavnim osobama.

Ključne riječi: zaštita na radu, medicina rada, sigurnost, industrijska higijena, školovanje i osposobljavanje, OSHA (Zakon o zaštiti na radu), NIOSH (Nacionalni institut zaštite na radu)

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