

## American College of Occupational and Environmental Medicine's Occupational and Environmental Medicine Competencies—2014

*ACOEM OEM Competencies Task Force\**

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In 1998, the American College of Occupational and Environmental Medicine (ACOEM) recognized the need for defining important competencies for occupational and environmental medicine (OEM) physicians and published its original set of *OEM Competencies*,<sup>1</sup> which were updated in 2008.<sup>2</sup> The evolving US health care system, along with recently published research on how OEM physicians actually practice medicine,<sup>3-8</sup> the increasing globalization of the workplace, and changes in the way US medical residency programs define clinical competency,<sup>9-15</sup> all contributed to the need for a fresh look at *OEM Competencies*, presented in this revised document.

Occupational and environmental medicine focuses on the interactions between work and health, and physicians who practice OEM need to understand how to prevent, evaluate, and manage adverse health effects from work and environmental hazards. This is the traditional view of OEM as “industrial medicine.” Increasingly, however, OEM physicians have become the leading experts on mitigating the impact of health conditions on work. In practice, this includes managing employee absences, evaluating work capacity, preventing work disability, assessing fitness for work, advising on appropriate work restrictions, and implementing employee wellness programs.

The preventive medicine foundation of occupational medicine impacts all the different practice areas of OEM, whether it involves preventing illness related to a hazardous exposure, treating injury due to an employee health condition, or addressing unnecessary work disability after an occupational injury.

The OEM physicians are required to effectively interact with a wide range of other professionals and provide guidance not only to patients but also to other clinicians and occupational health nurses, employers, safety and industrial hygiene professionals, human resource managers, attorneys, labor unions, and public health care professionals. In these interactions, OEM physicians should follow a strict code of ethics related to matters of confidentiality and potential conflicts of interest. Detailed guidance in this area is provided in *ACOEM Code of Ethics*.<sup>16</sup> Effective communication in OEM includes risk communication, patient education, workforce education, development of policy and guidance documents, and medical/legal document preparation.

Physicians practicing OEM typically have a much more diverse background than those practicing in most other areas of medicine. The paths toward board certification in occupational medicine are via the American Board of Preventive Medicine or the American Osteopathic Board of Preventive Medicine. Nevertheless, most physicians engaged in the practice of OEM (and most ACOEM members) are not board certified in occupational medicine but are certified in other medical fields. Thus, the *OEM Competencies* use the term OEM physician generically without specification of board certification. Physicians without occupational medicine board certification can take advantage of several training courses available through ACOEM and other organizations that are designed to help such physicians learn the basics of OEM, or develop highly specific content knowledge required to effectively deliver OEM-related clinical services, such as medical review officer (MRO), commercial driver medical examination, or performance of impairment rating examinations.

Board certification in occupational medicine provides training related to each of the core competencies described in this document and establishes the foundation for OEM specialists to rapidly expand their competence in focused areas during the trajectory of their career. The public may confirm whether an OEM physician is board certified via the American Board of Preventive Medicine (<http://www.theabpm.org>), which maintains a list of board-certified allopathic (MD) occupational medicine physicians, or the American Osteopathic Board of Preventive Medicine (<http://www.aobpm.org/index.cfm>), which certifies doctors of osteopathy (DO) medicine.

Recent research<sup>3-5,15</sup> on OEM careers and environments has shown that OEM physicians practice in three broad clinical areas, which can be loosely categorized as follows: (1) clinical care (eg, workers' compensation injury care and work-related examinations), (2) clinical subspecialty care (eg, toxicology evaluations, medical/legal work, and case management), and (3) management/population health (eg, corporate employee health program management and OEM research). It is important for physicians who are board certified in occupational medicine to be prepared to work in all of these practice environments—many OEM physicians' practices include all three focus areas. Nevertheless, not all physicians practicing OEM need equivalent competency in these diverse areas.

This document organizes the topic areas relevant to OEM practice and describes the expected basic competency within that area for all OEM physicians. This is then followed by the knowledge areas and skill sets for each of the 10 core competencies for OEM physicians, with examples of how this clinical competency is reflected on the basis of whether they practice in patient care settings as clinical OEM subspecialty experts or in program or population health management. Physicians who are board certified in occupational medicine are expected to already have (or be prepared to rapidly develop) the skills and knowledge

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sets needed to deliver care in any of the three clinical subsets of care.

This document also indicates which of the Accreditation Council for Graduate Medical Education (ACGME) six core competencies are primarily addressed by the specific OEM competency area. These six core competency areas are (1) ACGME Patient Care, (2) Medical Knowledge, (3) Practice-Based Learning and Improvement, (4) Interpersonal and Communication Skills, (5) Professionalism, and (6) Systems-Based Practice. Appendix 1 contains the text for the ACGME competencies related to OEM practice. Appendix 2 contains a link to the 30-page *Preventive Medicine Milestone Project: Occupational Medicine* for training in occupational medicine board certification. These should be considered reference documents, relevant to the current training of new OEM physicians seeking board certification. Appendix 3 is related to competency in techniques and methodologies of research and education.

For the purpose of this document, *competency* is defined as possession of sufficient physical, intellectual, and behavioral qualifications (ie, knowledge, skills, abilities, and attitudes) to perform a task or serve in a role that adequately accomplishes a desired outcome. In order for OEM physicians to have a solid identity with employers, government agencies, health care organizations, and other health care practitioners, a short list of core competencies is essential. This document presents a list of 10 core competencies that identify the areas of medicine that are the basis of the OEM specialty.

A systematic process was used to arrive at the competencies. The task force that developed this document represents diverse practices, including academic, corporate, private practice, and government. The prior competencies document was reviewed. Then, the OEM competencies in use by other organizations and countries were evaluated,<sup>17</sup> as were other current publications as outlined in the references. Input was sought by experts in specific content area. Finally, review and input were solicited from the ACOEM Special Interest Sections.

## OEM CORE COMPETENCIES

A physician specializing in OEM is expected to be competent in all 10 core competencies, with knowledge and skills that are specific to the area of clinical practice focus. The OEM physician should endeavor to apply evidence-based best practices (eg, shared medical decision-making), outcome measurements, and continuous quality improvement, as the medical system evolves to incorporate such standards of care.

### Clinical OEM

The OEM physician should have the knowledge and skills to provide evidence-

based clinical evaluation and treatment of injuries and illnesses that are occupationally or environmentally related. The OEM physician's expertise is also applied to evaluating the impact of personal medical conditions on the ability to perform work tasks. Throughout the course of care, the physician should seek to maximize the patient's functional recovery. Clinical expertise is applied in face-to-face care of patients, as well as in activities such as case management and peer-to-peer discussions. (*ACGME core competencies addressed: ACGME Patient Care, Medical Knowledge, Interpersonal and Communication Skills, and Professionalism.*)

### OEM-Related Law and Regulations

The OEM physician should have the knowledge and skills necessary to comply with regulations important to occupational and environmental health, as well as the wide range of laws and regulations related to the interactions between work and health. As recognized experts on issues relating to the causation of occupational and environmental injuries and illnesses, as well as ability to perform work with or without reasonable accommodations, OEM physicians are frequently called on to provide expert testimony, write expert opinion reports, and provide peer review. The OEM physician needs to interact knowledgeably with nonmedical professionals, including human resources managers, operations managers, safety professionals, union leaders, government officials, and legal professionals, and should understand the rules of these worlds. (*ACGME core competencies addressed: ACGME Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice.*)

### Environmental Health

The OEM physician should have the knowledge and skills necessary to recognize potential environmental causes of concern to the individual, as well as to community health. Environmental issues most often include air, water, or ground contamination by natural or artificial pollutants. The physician should know about the health effects of the broad physical and social environment, which includes housing, urban development, land use and transportation, industry, and agriculture. (*ACGME core competencies addressed: ACGME Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice.*)

### Work Fitness and Disability Management

The OEM physician should have the knowledge and skills to determine whether a

worker can safely be at work and complete required job tasks. The physician should be able to assist the patient in identifying personal functional goals, and develop a treatment or management plan that attempts to align the patient's goals with the job requirements. The physician should have the knowledge and skills necessary to provide guidance to the employee and employer when there is a need for integration of an employee with a disability into the workplace, or when there is a need to pursue other avenues such as vocational rehabilitation or disability benefits. (*ACGME core competencies addressed: ACGME Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice.*)

### Toxicology

The OEM physician should have the knowledge and skills to recognize, evaluate, and treat health effects of exposures to toxic agents at work or in the general environment. The physician should also have the knowledge and skill to develop, evaluate, and manage medical surveillance and biological monitoring programs for toxicological exposures. (*ACGME core competencies addressed: ACGME Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Professionalism, and Systems-Based Practice.*)

### Hazard Recognition, Evaluation, and Control

The OEM physician should have the knowledge and skills necessary to assess whether there is risk of an adverse event from exposure to physical, chemical, biological, ergonomic, or psychological hazards in the workplace or environment. The OEM physician should be prepared to collaborate with industrial hygienists or other qualified safety and health care professionals and interpret measurements and reports from such professionals in context. If there is a risk with exposure, then that risk can be characterized with recommendations for control measures or medical surveillance. The OEM physician should demonstrate an understanding of the core principles of industrial hygiene, ergonomics, occupational safety and risk/hazard control, and communication, and apply the principles of the Hierarchy of Controls to protect the health of individual workers, patients, and the public from the range of known chemical, physical, biological, and radiological hazards. (*ACGME core competencies addressed: ACGME Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, and Systems-Based Practice.*)

## Disaster Preparedness and Emergency Management

The OEM physician has a critical role in emergency preparedness and emergency management, with responsibility for protecting employed individuals and the national workforce from health and economic consequences of disasters. The OEM physician should have the knowledge and skills to collaborate with the employer management team to plan for workplace response to natural or man-made disasters. Emergency management planning includes resource mobilization, worker population tracking, communication contingency planning, and collaboration with local, state, or federal agencies. (*ACGME core competencies addressed: ACGME Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, and Systems-Based Practice.*)

## Health and Productivity

The OEM physician should be able to identify and address individual and workplace organizational factors to optimize the health of the worker and enhance productivity. These issues most often include absenteeism, presenteeism, health enhancement, and population health management. (*ACGME core competencies addressed: ACGME Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, and Systems-Based Practice.*)

## Public Health, Surveillance, and Disease Prevention

The OEM physician should have the knowledge and skills to develop, evaluate, and manage medical surveillance programs for the workplace, as well as the general public. The physician should be able to apply primary, secondary, and tertiary preventive methods. (*ACGME core competencies addressed: ACGME Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

## OEM-Related Management and Administration

The OEM physician should have the administrative and management knowledge and skills to plan, design, implement, manage, and evaluate comprehensive occupational and environmental health programs and projects. OEM physicians need an understanding of health care benefits, workers' compensation systems, and electronic health records and knowledge of the laws and regulations applicable to the jurisdiction, industry, and population of interest. OEM physicians in all practice settings are expected to

be sensitive to the diverse needs and cultural backgrounds of those they serve, and anticipate meeting diverse needs in setting up their practices. (*ACGME core competencies addressed: ACGME Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice.*)

## ACOEM OEM CORE COMPETENCIES KNOWLEDGE AND SKILL SETS

### Clinical OEM

The OEM physician should have the knowledge and skills to provide evidence-based clinical evaluation and treatment of injuries and illnesses that are occupationally and/or environmentally related. Throughout the course of care, the physician should seek to maximize the patient's functional recovery. Clinical expertise is applied in face-to-face care of patients, as well as in activities such as case management and peer-to-peer discussions. (*ACGME core competencies addressed: ACGME Patient Care, Medical Knowledge, Interpersonal and Communication Skills, and Professionalism.* Also see *ACOEM Code of Ethics*,<sup>16</sup> and ACOEM position statement on *Confidentiality of Medical Information in the Workplace*.<sup>18</sup>)

### Clinical OEM Care Focus

Physicians practicing in occupational health centers, whether free-standing, hospital-based, employer-based, or part of a network, provide patient care services. They should be competent in performing a careful history and physical examination, developing and delivering appropriate treatment plans, and managing patients toward functional recovery, while minimizing unnecessary work disability. Clinical OEM physicians typically provide work injury and illness care, medical surveillance examinations, preplacement examinations, fitness-for-duty evaluations, and various other clinical services related to specific work hazards or work fitness questions. OEM clinicians should have a general medicine knowledge base comparable to a primary care doctor caring for adult patients, because there is a need to manage a wide range of conditions both in relation to urgent care presentations and to determine the impact of a condition on ability to perform a given job.

### OEM Clinical Specialist

The clinical specialist is often engaged in a focused area of practice, for example, impairment evaluation, hazardous exposure evaluation, work capacity evaluation, toxicology consultation, or workers' compensation case management. OEM clinical specialists often provide medical/legal consultation and

assist companies in developing, implementing, or evaluating their occupational health or injury management procedures.

### OEM Population Management

Many OEM physicians serve as corporate medical officers or work in academic or government settings with responsibility for employee health. These roles require competency in health information management, trend analysis, chronic disease management, and preventive medicine principles. OEM physicians are often responsible for disability management programs and employee wellness programs. Clinical competencies for OEM population management include understanding health risks, clinical practice guidelines for chronic disease management, and current practices in disease detection, prevention, and treatment, as well as disability management principles. (See ACOEM position statement on *Optimizing Health Care Delivery by Integrating Workplaces, Homes, and Communities*.<sup>19</sup>)

### Clinical—General

The OEM physician should provide clinical care with an understanding of the workplace, work exposures, and relevant statutes, such as workers' compensation. The OEM physician should understand and identify interactions between personal and occupational health conditions and risk factors.

### Core Knowledge and Skills

1. Obtain appropriately detailed patient histories, with an emphasis on occupation and exposure.
2. Identify the potential relationship between patient symptoms and occupational and environmental exposures; effectively communicate and support an opinion about work relatedness.
3. Diagnose and treat, or refer and manage occupational/environmental illnesses and injuries with the use of consultants in related disciplines when indicated.
4. Manage a workers' compensation case treatment plan from first visit to closure, including provision of required medical documentation, following the relevant jurisdictional rules.
5. Identify nonoccupational/environmental factors that may contribute to occupational and environmental disease or injury.
6. Elicit patients' concerns about exposures and establish a therapeutic alliance incorporating risk communication.
7. Report all findings to affected individuals and pertinent information to organizations and employers as appropriate (considering medical confidentiality issues), advocating for the health and safety of patients and employees.

8. Work as a team member with other professionals to identify and evaluate occupational or environmental hazards and recommend methods to reduce exposure, mitigate risk, and improve worker health and productivity.
  9. Apply evidence-based clinical practice guidelines in one's practice of medicine. (See ACOEM position statement on *Ensuring Quality of Care in Workers' Compensation Programs: Fair Fee Schedules and Evidence-Based Guidelines*.<sup>20</sup>)
  10. Use clinical knowledge to assess impact of personal medical conditions on ability to perform work tasks and advise about modifications or accommodations that would permit continued employment.
2. Evaluate a person's ability to perform exertional work after a cardiac event (such as myocardial infarction, stent/angioplasty, arrhythmia, placement of pacemaker or implantable cardioverter defibrillator, coronary artery bypass graft surgery).
  3. Apply knowledge of cardiac risk factors in employee risk assessment and patient counseling.
  4. Interpret electrocardiogram for ischemia, evidence of infarction, conduction disorders, and arrhythmias.

### **Additional Knowledge and Skills**

Some OEM physicians have additional knowledge and skills in the following area, not considered core for all OEM physicians: Perform cardiovascular evaluations such as stress testing to assess fitness for duty.

### **Clinical—Dermatology**

Occupational dermatoses are among the leading causes of occupational disease in the United States. Dermatoses occur also as a result of exposure to hazardous compounds in the home environment. OEM physicians should provide early recognition, diagnosis, and management of these disorders and make necessary recommendations to minimize their occurrence both in the workplace and at home.

### **Core Knowledge and Skills**

1. Differentiate occupational skin disorders by history, examination, and diagnostic evaluation.
  - i. Diagnose and determine the cause of allergic contact dermatitis and allergic contact urticaria (and other related Immunoglobulin E–mediated allergic responses), particularly those caused by common antigens such as latex, epoxy monomer, nickel, and rhus.
  - ii. Diagnose primary irritant-induced dermatoses.
  - iii. Diagnose potentially contagious skin conditions (varicella/zoster, herpes, Methicillin-resistant *Staphylococcus aureus*, or other skin infections).
2. Manage occupational and environmental skin injuries and dermatoses.
  - i. Treat and prevent recurrence of contact dermatitis.
  - ii. Treat chemical burns, including those caused by caustics, acids, including hydrofluoric acid.
  - iii. Manage occupational bullae and caluses.
  - iv. Prevent and manage solar radiation–associated skin injury in outdoor workers.
  - v. Manage folliculitis barbae in workers who may be required to shave.

### **Additional Knowledge and Skills**

Board-certified occupational medicine specialists and physicians practicing as OEM clinical specialists should have the following additional knowledge and skills, referring to dermatologists for assistance as clinically indicated:

1. Diagnose actinic skin damage, as well as photosensitization dermatitis, including cases due to exposure to coal tar, psoralens, and polychlorinated biphenyls.
2. Diagnose occupational acne, including chloracne.
3. Differentiate work-aggravated dermatoses.
4. Diagnose occupational cutaneous infections (eg, herpetic whitlows).
5. Identify skin neoplasias, especially as caused by coal tar, ultraviolet radiation, hexavalent chromium, or ionizing radiation.
6. Diagnose occupational pigmentary disorders, including vitiligo.

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians:

1. Patch testing for diagnosis of allergic contact dermatitis and other atopic conditions.
2. Skin biopsy.

### **Clinical—Emergency Medicine and Surgery**

OEM physicians should have the knowledge and skills to provide acute medical care for a wide variety of common injuries and illnesses, as well as to stabilize and refer individuals for emergency care. (See ACOEM position statement on *Automated External Defibrillation in the Occupational Setting*.<sup>21</sup>)

### **Core Knowledge and Skills**

1. Establish emergency procedures and protocols for the clinical management of individuals involved in hazardous materials incidents, including substance-specific first aid and medical management protocols.
2. Recognize and secure appropriate emergency care for life-threatening respiratory, central nervous system, renal, cardiac, or other target organ failure, pending the identification of a specific exposure agent.
3. Diagnose and manage the work-related implications of surgical conditions and assist in safe return-to-work accommodations.
4. If working in urgent care setting, perform incision and drainage of abscesses, suturing of simple lacerations, and provide other simple wound care.

### **Additional Knowledge and Skills**

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians:

1. Perform independent medical evaluations.
2. Perform impairment rating examinations by using specific sets of guidelines.
3. Training and certification for the National Registry of Certified Medical Examiners—examination of commercial motor vehicle operators.
4. Perform Federal Aviation Administration examinations.
5. Perform specialized evaluations to assess functional capacity.
6. Review drug tests as an MRO. A listing of more specific competencies of the MRO can be found at [www.mrocc.org/MROComp.pdf](http://www.mrocc.org/MROComp.pdf).

### **Clinical—Cardiology**

Individuals with underlying cardiac risk factors and disease may encounter special concerns in safety-sensitive jobs, while working around certain chemical agents, and in performing exertional labor. OEM physicians engage in primary prevention of cardiac disease via involvement in employee wellness programs and counseling. OEM physicians assist patients, employers, primary care physicians, and cardiologists in the secondary and tertiary prevention of cardiac disease, as well as the accommodation of workers with cardiac concerns. The perspective of the OEM physician is particularly useful in placing workers in special assignments, such as emergency response, hazardous waste, commercial driving, forklift, and respirator use.

### **Core Knowledge and Skills**

1. Recognize, evaluate, and manage the cardiac effects of chemical asphyxiants such as carbon monoxide, methylene chloride, and cyanide.

5. Manage the effects of exposure to physical hazards, including heat, cold, and radiation exposure.
6. Understand locally relevant emergency preparedness programs and triage concepts.

### Clinical—Endocrinology

The OEM physician should be aware of the endocrine conditions that can present as or complicate work-related conditions or interfere with fitness for work, and be able to select appropriate initial diagnostic tests and manage workplace issues related to common endocrine conditions.

#### Core Knowledge and Skills

1. Consider endocrine conditions (eg, hypothyroidism and diabetes) that may contribute to conditions attributed to work (eg, carpal tunnel syndrome).
2. Manage work fitness decisions related to poorly controlled endocrine conditions, especially diabetes mellitus.
3. Recognize metabolic syndrome and counsel patients about lifestyle management to prevent progression to related endocrine and cardiac disease.

### Clinical—Gastroenterology

The OEM physician should be able to evaluate abnormal liver function enzymes in the context of evidence of exposure to workplace or environmental toxins, personal risk of such exposure, and as evidence of an underlying medical condition for which fitness for duty may be an issue (eg, alcoholism).

### Clinical—Hematology/Oncology

Occupational and environmental exposures may have potential to cause adverse hematological effects or may be carcinogenic. The OEM physician should have the knowledge and skills to evaluate, diagnose, and prevent the hematological and carcinogenic effects of occupational and environmental exposures.

#### Core Knowledge and Skills

1. Interpret hematological laboratory studies in the context of medical surveillance and postexposure examinations.
2. Perform clinical evaluations to detect the health effects of exposure to hematological toxins such as benzene, lead, and arsine.

#### Additional Knowledge and Skills

Board-certified occupational medicine specialists and physicians practicing as OEM clinical specialists should have the following additional knowledge and skills: Evaluate patients, clinical data, and exposure data to render opinions regarding causation in cases of suspected occupational or environmental cancer.

### Clinical—Infectious Disease

Blood-borne, waterborne, food-borne, and airborne pathogens pose unique challenges for travelers and in occupational, environmental, or both settings. Early recognition and preventive action, including, when appropriate, contact investigations, screening, prophylaxis, and health risk communication, by the OEM physician can minimize their spread, health effects, and recurrences.

#### Core Knowledge and Skills

1. The OEM physician should be prepared to identify, manage, treat, or refer for treatment, and prevent the following:
  - i. Blood-borne, airborne, waterborne, food-borne, and fomite-borne pathogen exposure and associated illnesses
  - ii. Infestations and zoonotic conditions
  - iii. Transmission risk in food service workers with active infectious diseases spread by fecal/oral route
2. Understand and follow recommendations from public health authorities, such as the US Centers for Disease Control and Prevention (CDC) and World Health Organization, for immunization of the working populations seen clinically.
3. Apply CDC recommendations for tuberculosis surveillance and exposure evaluation, including contact investigation and testing for latent tuberculosis infection.

#### Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians:

1. Sexually transmitted infections.
2. Diseases of travelers.

### Clinical—Musculoskeletal

Musculoskeletal injuries comprise most of the acute occupational injuries seen by the OEM physician and cause major productivity, financial, and human losses for employees and employers alike. Thorough understanding of the anatomy, physiology, and pathology of the musculoskeletal system, as well as appropriate diagnostic and management skills, is essential. OEM physicians should be able to correlate clinical conditions with functional capacity in relation to activities of daily living and work. Applying the principles of epidemiology and ergonomics enables the OEM physician to facilitate the development of programs to prevent these conditions.

#### Core Knowledge and Skills

1. Perform focused and comprehensive musculoskeletal evaluations, including the history, physical examination, appropriate

imaging or laboratory studies, and the investigation of occupational risk factors.

2. Select appropriate treatment and management of patients with musculoskeletal conditions, using evidence-based guidelines.
3. Identify, manage, and prevent acute and chronic musculoskeletal disorders and their associated disabilities, and determine when such conditions are work-related. Conditions of particular interest are as follows:
  - i. Spine disorders, including low back pain
  - ii. Cumulative trauma disorders, with attention to specificity of diagnosis and etiology, and both occupational and nonoccupational risk factors
  - iii. Joint and extremity injuries and disorders
  - iv. Degenerative diseases of bones, joints, and connective tissue related to aging
4. Recommend ergonomic interventions or prescribe industrial hygiene/safety evaluation to evaluate and correct worksite ergonomic issues.
5. Prescribe appropriate rehabilitation services for an injured worker.
6. Identify delayed recovery and manage chronic musculoskeletal pain syndromes.

#### Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians:

1. Joint and other injections.
2. Epidural injections.
3. Joint aspiration.

### Clinical—Neurology

Occupational and environmental exposures can cause acute and chronic effects on the central and peripheral nervous systems. The OEM physician should have the skills and knowledge to evaluate, diagnose, and prevent exposure-related neurological conditions and to facilitate the placement of workers with neurological disorders.

#### Core Knowledge and Skills

1. Perform focused neurological and mental status examinations in the evaluation of occupational and environmental injuries or illnesses.
2. When indicated, select and utilize the results of neurological and mental status examination procedures or consultations in the evaluation of occupational or environmental injuries or illnesses, or for personal neurological conditions that may be impacting the ability to perform work tasks. Such studies may include imaging, electrodiagnostic or electrophysiological

studies, or neuropsychological/neurocognitive testing.

3. Assist specialists, primary care providers, and employers in safely returning workers with neurological conditions to the workplace.

### Clinical—Ophthalmology

The OEM physician should have the clinical and administrative knowledge and skills to manage occupational eye injuries and oversee vision screening and protection programs.

#### Core Knowledge and Skills

1. Identify the need for specialized ophthalmological services and surveillance (eg, lasers and ethambutol use).
2. Perform basic eye examination, including visual acuity and color/depth tests; use information from the eye examination to assist in the proper placement of workers.
3. If working in an urgent care or occupational health clinic setting, OEM physicians should be able to recognize and treat occupational eye diseases and injuries, refer to an ophthalmologist when appropriate, and coordinate return to work planning and needed follow-up.
  - i. Diagnose and manage infectious and irritant conjunctivitis.
  - ii. Diagnose and treat ultraviolet photokeratitis.
  - iii. Identify superficial foreign bodies from the eye, and remove or refer for removal.
  - iv. Identify and treat or refer as appropriate ocular chemical exposures and burns (including alkali, acid, and hydrofluoric acid).
  - v. Use fluorescein stain to evaluate the cornea when indicated.

#### Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians:

1. Slit lamp examination.
2. Intraocular pressure measurement.

### Clinical—Otolaryngology

The OEM physician should have the clinical knowledge and skills to identify, evaluate, diagnose, and manage the care of patients with common occupational and environmental otolaryngological conditions.

#### Core Knowledge and Skills

1. Diagnose and manage nasopharyngeal conditions caused or aggravated by occupational and environmental exposure, including allergies, rhinitis, or pharyngitis.
2. Evaluate and manage a patient with hearing loss or other occupationally related

otological conditions (see ACOEM position statement on *The Role of the Professional Supervisor in the Audiometric Testing Component of Hearing Conservation Programs*<sup>22</sup>):

- i. Identify, clinically manage, and prevent further injury to individuals with noise-induced hearing loss.
  - ii. Evaluate and manage individuals with external otitis related to, or complicated by, the use of hearing protection.
3. Interpret an audiogram, identify a standard threshold shift, and implement appropriate treatment and preventive interventions.
  4. Support safety and industrial hygiene professionals in the design and implementation of hearing conservation programs and selection of appropriate hearing protection options for employees.

#### Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following area, not considered core for all OEM physicians: Perform an audiogram.

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Develop, implement, and manage an occupational hearing conservation program.
2. Perform hearing loss causation analysis based on review of longitudinal audiometric measurements.
3. Evaluate and manage patients with complicated nasopharyngeal conditions caused or aggravated by occupational and environmental exposure, including vocal cord dysfunction, laryngeal polyps, neoplasms, and granulomata.

### Clinical—Pain Management

The OEM physician should be familiar with the issues and pitfalls associated with the treatment of various types and presentations of pain.

#### Core Knowledge and Skills

1. Understand the difference between acute and chronic pain, including the neurological pathways mediating each.
2. Use treatment approaches that will help patients with pain maintain optimal function.
  - i. Establish expectations for working within physical limits appropriate for the diagnosed condition.
  - ii. Focus on improved function as the stated goal, rather than pain relief.
  - iii. Prescribe exercise, activities, and work within appropriate limitations as part of the treatment plan.

- iv. Prescribe physical therapy approaches that emphasize patient movement and participation.
  - v. Refer for behavioral counseling, for example, cognitive behavioral therapy, in cases that require additional emotional support to overcome fear/avoidance behavior, disability mindset, or pain catastrophization; use therapists familiar with the short-term work-focused cognitive behavioral therapy approach or other treatment approaches that help the patient learn to cope and function better.
3. Follow evidence-based treatment guidelines related to acute opioid prescription and chronic opioid management. Available resources include the ACOEM *Practice Guidelines* and ACOEM's guidance statement *Principles for Ensuring the Safe Management of Pain Medication Prescriptions by Occupational and Environmental Medicine Physicians*.<sup>23</sup> The following concepts are drawn from this statement and should be familiar to the OEM physician:
    - i. Use principles of informed choice with patients before starting opioid therapy.
    - ii. The provider should set expectations for discontinuation and limit quantity to that which is medically appropriate.
    - iii. Recognize the transition point from subacute to chronic use and initiate chronic opioid treatment guidelines (eg, ACOEM) at this point (typically 90 days).
    - iv. The providers should be familiar with and utilize their state's prescription drug monitoring program.
    - v. Set functional goals and assess at every visit. If no functional improvement, take steps to discontinue opioid treatment.
    - vi. Appropriately use drug screening for drugs of abuse and metabolites of the drug(s) being prescribed.
    - vii. Carefully weigh the risks and benefits of chronic opioid use and set clear rules for their use.
  4. When referring patients with pain to pain management specialists, collaborate on a treatment plan that includes functional restoration and return-to-work planning, offering concurrent care if the system permits.



#### Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians:

1. Manage chronic opioid therapy.
2. Manage outpatient opioid detoxification.

### Clinical—Psychiatry

The OEM physician should have the clinical and administrative knowledge and skill to recognize, evaluate, and assist in the management or triage of workers with psychological or drug-related problems presenting in the workplace, and to identify occupational and environmental factors that may affect mental hygiene.

#### Core Knowledge and Skills

1. Identify the troubled or psychologically impaired employee and manage or refer appropriately to community resources, including employee assistance programs.
2. Identify and interpret danger signs of the violent, homicidal, or suicidal employee, manage the situation, and refer appropriately. Participate in the design of violence prevention and response programs.
3. Diagnose and manage workers who may be under the influence of psychoactive chemicals at work (eg, industrial exposure, medications, recreational drugs, and alcohol).
4. Support access to psychological care, such as work-focused cognitive behavioral therapy, for patients at risk for disability due to behavioral risk factors, such as pain catastrophization, disability beliefs, and fear/avoidance behavior.
5. Identify and manage the impact of psychological conditions on ability to work and on the natural history of occupational/environmental injuries or illnesses (see ACOEM position statement on *The Personal Physician's Role in Helping Patients with Medical Conditions Stay at Work or Return to Work*<sup>24</sup>):
  - i. Take a psychiatric and psychosocial history and perform a mental status examination.
  - ii. Specify restrictions and accommodations for employees with psychiatric conditions or taking psychotropic medications.
  - iii. Identify and treat or refer individuals with psychopathology aggravating, presenting as other medical conditions, or both.

#### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Identify and assist in the management of psychological stressors in the workplace.
2. Advise managers about the medical literature related to autonomy, flexibility, and other work management issues that can impact employee productivity, morale, and disability.

### Clinical—Pulmonary

With a thorough understanding of the anatomy, physiology, and pathology of the respiratory system, the OEM physician should be able to assess the causes and occupational impact of respiratory disorders and pulmonary impairment.

#### Core Knowledge and Skills

1. Prevent, identify, diagnose, treat, and/or refer occupational/environmental lung disorders, including the following:
  - i. Work-related asthma, including occupational asthma (eg, toluene diisocyanate sensitization, exposure to inhaled allergens, byssinosis, reactive airways dysfunction syndrome, irritant-induced asthma) and work-exacerbated asthma
  - ii. Pneumoconioses (eg, silicosis, coal workers' pneumoconiosis, asbestosis, hard-metal disease, benign radiopaque pneumoconiosis, chronic beryllium disease)
  - iii. Irritant inhalations (eg, acids, alkalis, oxides of nitrogen, phosgene, and phosphine)
  - iv. Chronic obstructive pulmonary disease
  - v. Hypersensitivity pneumonitis
2. Manage work restrictions and accommodations for both occupational and nonoccupational lung diseases.
3. Interpret a spirogram according to American Thoracic Society/European Respiratory Society standards.
4. If providing spirometry examinations, refer to the ACOEM position statement on *Spirometry in the Occupational Health Setting—2011 Update*.<sup>25</sup>
5. Perform respirator certification examinations tailored to the anticipated workplace exposures, to the exertional demands of the job, and to the type of respiratory protection used.
6. Advise on appropriate respirator options, in consultation with an industrial hygienist if needed, in consideration of clinical conditions (eg, use of pressure demand respirator in patient with cardiac disease).

#### Additional Knowledge and Skills

Board-certified occupational medicine specialists and physicians practicing as OEM clinical specialists should have the following additional knowledge and skills:

1. For the work-up of occupational or environmental related pulmonary conditions, order or refer for and interpret the appropriate diagnostic tests, including the following:
  - i. Peak-flow testing and postshift spirometry in the assessment of exposure-related bronchoreactivity

- ii. Postbronchodilator pulmonary function testing in the assessment of bronchoreactivity
  - iii. Methacholine and specific challenge testing in the assessment of exposure-related bronchoreactivity
  - iv. Exercise tests in the assessment of pulmonary impairment
  - v. Other pulmonary function testing such as measurement of diffusing capacity and lung volumes
  - vi. Imaging studies (eg, chest radiographs, magnetic resonance imaging, computed tomography)
  - vii. Allergy testing
2. Interpret radiograph results reported by a B reader using the International Labour Organization system.

Some OEM physicians have additional knowledge and skills in the following area, not considered core for all OEM physicians: Perform International Labour Organization B readings.

### Clinical—Reproductive Medicine

The OEM physician has the clinical knowledge and skill to advise patients about reproductive risks of occupational and environmental exposures; the effects of exposure and work on fertility, pregnancy, and the fetus; and the ability of the pregnant worker to perform work.

#### Core Knowledge and Skills

1. Identify potential adverse reproductive outcomes to both men and women from chemical, biological, physical, biomechanical, and psychological exposures and provide advice to employees and employers regarding the management of such exposures.
2. Identify and utilize up-to-date sources of reproductive toxicology information.
3. Recommend appropriate restrictions and accommodations for pregnant or lactating employees.

#### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills: Advise on policies and procedures relating to the protection of fertility for both men and women and for placement of pregnant or lactating workers. (See ACOEM position statement on *Reproductive and Developmental Hazard Management Guidance*.<sup>26</sup>)

### Clinical—Sleep Medicine

The OEM physician should recognize patients with sleep disorders and be prepared

to refer for testing and manage the work fitness/safety aspects of this condition.

### Core Knowledge and Skills

1. Recognize patients at risk for, or having symptoms of, sleep apnea.
  - i. Refer for testing and diagnosis, and monitor response to treatment.
  - ii. Manage the work fitness aspects, especially safety considerations if in a safety-sensitive position.
  - iii. Understand the system implications of this diagnosis, for example, in the military disability evaluation system.
2. Prevent, manage, and recognize circadian dysrhythmias, such as shiftwork sleep disorders and those associated with transmeridian travel over multiple time zones; provide appropriate recommendations to the patient and the employer (see ACOEM guidance document on *Fatigue Risk Management in the Workplace*.<sup>27</sup>)

### OEM-Related Law and Regulations

The OEM physician should have the knowledge and skills necessary to comply with regulations important to occupational and environmental health, as well as the wide range of laws and regulations related to the interactions between work and health. As recognized experts on issues relating to the causation of occupational and environmental injuries and illnesses, as well as having the ability to perform work with or without reasonable accommodations, OEM physicians are frequently called on to provide expert testimony, write expert opinion reports, and provide peer review. The OEM physician needs to interact knowledgeably with other medical professionals and nonmedical professionals, including human resources managers, operations managers, safety professionals, union leaders, government officials, and legal professionals, and should understand the rules of these worlds. (*ACGME core competencies addressed: Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice*.)

### Clinical OEM Care Focus

The clinical OEM physician should be familiar with the laws and regulations related to the local workers' compensation jurisdiction, as well as those governing the delivery of OEM medical services, for example, the examination for commercial drivers, MRO requirements for urine drug testing, medical surveillance standards related to the work hazards for which such examinations are provided, as well as the rules related to patient confidentiality and recordkeeping. (See ACOEM position statements on *Ethical Aspects of Drug Testing*<sup>28</sup> and *Qualifications*

*of Medical Review Officers (MROs) in Regulated and Non-Regulated Drug Testing*<sup>29</sup>).

### OEM Clinical Specialist

OEM physicians providing specialty services are often tasked with developing comprehensive hazard control or medical surveillance plans, a task that requires both breadth and depth of industrial and regulatory knowledge and an understanding of preventive medicine principles. When evaluating a particular clinical or workplace issue, the OEM clinical specialist needs to be able to research details, analyze applications to the specific clinical situation, and synthesize and effectively communicate a rationalized opinion. The OEM clinical specialist often provides medicolegal services that require an in-depth knowledge of expert witness principles such as Daubert.

### OEM Population Management

The OEM population manager should understand health care and health insurance systems and the relevant laws and regulations, including the Affordable Care Act. As advisors to the government, corporations, or other organizations, the OEM physician needs to understand how to measure and analyze trends related to illness or work injury, as well as develop and implement employee wellness programs in compliance with applicable laws. This OEM role also includes advising on policies and procedures related to specific populations of workers in relation to health conditions, for example, immunization policies and medical removal requirements.

### Core Knowledge and Skills

1. Comply with and explain applicable regulations, as well as their interpretation and enforcement, in relation to occupational health practice, to employers, employees, and patients. These include the following:
  - i. Occupational Safety and Health Administration (OSHA) standards and regulations, including the General Duty Clause.
  - ii. Federal Motor Carrier Safety Administration standards for medical fitness.
  - iii. Department of Transportation, Federal Railroad Administration, Federal Aviation Administration, and other transportation-related regulations regarding fitness in safety-sensitive positions where employee health problems may endanger others.
  - iv. The privacy provisions of the Health Insurance Portability and Accountability Act, including exceptions related to workers' compensation and public safety.

2. Understand and protect patients' legal rights to confidentiality of medical records information.
3. Understand the risks of electronic communication and apply appropriate controls in communication and recordkeeping.
4. Maintain complete, timely, and legible records.
5. Recognize and address ethical dilemmas in the practice of OEM, using relevant guidelines, such as those from ACOEM, the Association of Occupational and Environmental Clinics, the International Commission on Occupational Health, and the American Medical Association. Educate employers, clients, attorneys, employees, and their representatives on the ethical issues and the codes that apply to the practice of OEM.
6. If providing workers' compensation-related care, comply with requirements of the relevant statute, including completion of the required forms and cooperation with case management and return-to-work planning.
7. Report cases of occupational injury, illness, and/or death according to existing regulations.
8. Balance ethical principles applicable to individual patient care to those that apply to addressing population health concerns, for example, the need to report a hazard that may impact others, against the wishes of an affected patient.
9. Respond appropriately to impairment in self and other health care professionals.
10. Comply with and explain consensus standards applicable to specific groups of employees, for example, the *NFPA 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments*, and the *ACOEM Guidance for the Medical Evaluation of Law Enforcement Officers (LEOs)*.<sup>33</sup>

### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Comply with and explain applicable regulations, as well as their interpretation and enforcement, in relation to occupational health practice, to employers, employees, and patients. These include the following:
  - i. Legislation and regulations protecting the employment rights of persons with disabilities (eg, the Americans with Disabilities Act [ADA], the ADA Amendment Act, and the Rehabilitation Act of 1973)
  - ii. The Genetic Information Nondiscrimination Act (see ACOEM guidance

- document on Genetic Screening in the Workplace<sup>30</sup>)
- iii. The Family Medical Leave Act
  - iv. Environmental health and safety regulations
  - v. The rules related to the various jurisdictions in which OEM work is done (workers' compensation, veterans' benefits, military disability evaluation, etc)
2. Respond in compliance with the requirements of employee/community right-to-know regulations and advise individuals about their rights to access information.

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians:

1. Provide medical–legal reports and expert opinions and testimony on OEM issues.
2. Participate in the rule-making process by participating in committees or working groups, providing testimony, or other activities for sharing OEM expertise with the decision makers.

### Environmental Health

The OEM physician should have the knowledge and skills necessary to recognize potential chemical, physical, and biological environmental causes of health concern to the individual, as well as to community health. Environmental issues most often include air, water, or ground contamination by natural or artificial pollutants. The physician should know about the health effects of the broad physical and social environment, which includes housing, urban development, land use and transportation, industry, and agriculture. (*ACGME core competencies addressed: Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice.*)

### Clinical OEM Care Focus

The OEM physician should be competent in taking an exposure history that includes environmental as well as occupational sources. The physician should have a basic understanding of not only environmental hazard identification but also how to characterize risk on the basis of an assessment of exposure, including potential routes of exposure and whether a completed pathway of exposure has occurred. Providers should possess the knowledge of dose–response and how to compare environmental and biomonitoring data to published standards. Clinicians should be aware of the approach to clinical and exposure assessment of common clinically significant environmental agents and diseases relevant to the geographic area where they practice, such as lead, asbestos, arsenic, and radon. As important as knowing how to evaluate common environmen-

tal problems is the knowledge of when laboratory tests and treatment approaches (eg, chelation therapy) can be misleading or even harmful to conduct. The OEM role includes knowledge of governmental agencies and private resources to assist the patient in environmental monitoring and mitigation.

### OEM Clinical Specialist

OEM clinical specialists should have a broad knowledge of common contaminants of all environmental media indoors and outdoors and how to assess exposure to these contaminants. They should have the skills to characterize and communicate risk to patients for any environmental contaminant, using published data. Clinically, they should be knowledgeable about the appropriate application and interpretation of environmental and biological monitoring for any environmental contaminant, as well as environmental epidemiology and toxicology studies and health risk assessment. Clinical specialists should understand basic principles of environmental mitigation and should be skilled in the management of clinical disease states where treatments specific to an exposure are relevant.

### OEM Population Management

The OEM physician should have a firm grasp of environmental epidemiology, including the interpretation and design of epidemiological studies in collaboration with other environmental health disciplines. In managing the environmental health of populations, the practitioner should be able to interpret published quantitative risk assessments and the principles of comparative, cumulative, and integrated risk assessment, and understand their limitations. The physician should be skilled in designing and delivering risk communication to populations. The OEM population manager should use the basic scientific tools of toxicology, risk assessment, and environmental epidemiology to provide evidence-based input to the creation of environmental policy in both the private and public sector. Finally, this practitioner should have a deep understanding of risk perception, acceptable risk, and environmental justice as key social sciences fundamental to the practice of environmental health for populations.

### Core Knowledge and Skills

1. Identify sources and routes of environmental exposure and recommend methods of reducing environmental health risks.
2. Recognize common illnesses that may be impacted by environmental exposures.
3. Effectively communicate risk from various exposures:
  - i. Indoor and outdoor air pollution
  - ii. Water pollution
  - iii. Hazardous waste

- iv. Household chemicals
  - v. Ionizing and nonionizing radiation, including radon
  - vi. Ultraviolet radiation
4. Explain the psychological effects associated with acute or chronic exposure to actual or perceived environmental hazards.

### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Understand when to obtain environmental monitoring.
2. Interpret and explain the results of environmental monitoring.
3. Identify and manage individual health effects associated with air, water, or ground contamination by natural or artificial pollutants.
4. Identify and manage population exposure to environmental toxins (eg, heavy metals, solvents, pesticides, asbestos, silica, carbon monoxide, hydrogen sulfide, dioxin, and polychlorinated biphenyls).
5. Identify and manage concerns about the health effects of human exposure to contaminated water, sewage, and human waste.
6. Advise individuals and communities about the reproductive implications of environmental exposure.

### Work Fitness and Disability Management

The OEM physician should have the knowledge and skills to determine whether a worker can safely be at work and complete required job tasks. The physician should be able to assist the patient in identifying personal functional goals and develop a treatment or management plan that attempts to align the patient's goals with the job requirements. The physician should have the knowledge and skills necessary to provide guidance to the employee and employer when there is a need for integration of an employee with a disability into the workplace or when there is a need to pursue other avenues such as vocational rehabilitation or disability benefits. (*ACGME core competencies addressed: Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice.*) (See ACOEM position statement on *Ensuring Quality of Care in Workers' Compensation Programs: Fair Fee Schedule and Evidence-Based Guidelines.*<sup>20</sup>)

### Clinical OEM Care Focus

The clinical OEM physician should collect a comprehensive history from the

patient, obtain additional information from the employer, other providers, and other professionals such as ergonomists, perform hands-on physical examination, and may order laboratory testing as clinically indicated. The physician then integrates this data to define physical and mental impairment in specific terms. On the basis of the worker's impairment, and knowledge about the essential functions of the job, the OEM physician should determine the worker's ability to perform specified job tasks with or without accommodations. The OEM clinical physician communicates practical work restrictions and recommends reasonable accommodations that maximize the worker's ability to remain safely productive. The OEM clinician should be familiar with the behavioral risk factors underlying work disability and understand how to mitigate these risks. Physicians in this role should be familiar with chronic pain management treatment guidelines and prepared to treat, evaluate, or manage cases complicated by chronic pain according to evidence-based guidelines. These physicians should be prepared to engage in case management, including coordination of referrals for needed care with other specialists, while continuing to manage the return-to-work/stay-at-work planning.

### OEM Clinical Specialist

The OEM clinical specialist engaged in work fitness evaluation should have the skills to perform independent medical disability evaluations, rate impairment, and very clearly communicate disability for the purposes of job placement and disability compensation. OEM specialists are often called on to evaluate patients whose recovery, return to work, or fitness for work are complicated by the use of controlled substances. In such cases, the OEM clinical specialist is expected to perform or facilitate appropriate testing and referral to appropriate specialists for definitive care, and support needed follow-up monitoring on return to the workplace. The specialist may also be called on to evaluate a worker's fitness for duty in the face of certain environmental hazards such as toxic chemical exposure or physical hazards (eg, heat stress and radiation). The OEM clinical specialist is expected to be able to evaluate how health problems might be impacted by such environmental conditions and should be able to specify restrictions or recommend reasonable accommodations to keep the worker safely productive in their job or if necessary, an alternate placement.

### OEM Population Management

The OEM physician in the role of managing populations may be called on to establish policies and procedures or design systems to facilitate the employment of individu-

als with disabilities due to either work-related injuries or underlying personal morbidities. The physician should be able to design preventive interventions on the basis of tracking and review of data on injury occurrences and outcomes. The physician may develop programs, such as transitional work or placement programs, to enable those with temporary and permanent disabilities to be placed in productive positions within an organization. Physicians engaged in population management are also often called on to evaluate the effectiveness of OEM medical care delivered by other physicians, and monitor adherence to clinical practice guidelines, as well as outcomes, such as lost work days and the effects of presenteeism.

### Core Knowledge and Skills

1. Integrate work disability prevention and management principles into delivery of clinical care.
2. Establish clinical treatment protocols that include the following:
  - i. Early identification of the employee at risk for delayed recovery.
  - ii. Use of evidence-based guidelines in diagnosis and treatment.
  - iii. Tracking progress against prognostic indicators.
  - iv. Identification and management of delayed recovery.
  - v. Communicating recommendations for temporary (transitional work) or permanent accommodations for disabled workers.
3. Explain and make clinical decisions, as well as placement/accommodation recommendations relating to the concept of "direct threat" as defined under the ADA, and reconcile these decisions with public safety considerations as defined by other systems.
4. Translate impairment assessments into safe work functional capacity statements for the use of employers in placing employees in jobs.
5. Conduct evaluations to determine fitness for duty in compliance with applicable regulations in reference to specific work exposures, work tasks, or public safety concerns.
6. Address employment concerns for patients with identified temporary or permanent medical conditions.
7. Refer to the ACOEM position statements relevant to this topic:
  - i. *A Guide to High Value Physician Services in Workers' Compensation*<sup>31</sup> (published with IAIABC).
  - ii. *The Personal Physician's Role in Helping Patients with Medical Conditions Stay at Work or Return to Work*.<sup>24</sup>
  - iii. *Preventing Needless Work Disability by Helping People Stay Employed*.<sup>32</sup>

- iv. *ACOEM Guidance for the Medical Evaluation of Law Enforcement Officers (LEOs)*.<sup>33</sup>

### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Design and implement integrated systems of work disability prevention and management:
  - i. Design systems to identify and manage the impact of psychological conditions, substance abuse, and family stresses on the natural history of illness and injury.
  - ii. Design and implement protocols for preplacement, stay-at-work, and return-to-work for patients with work-related or personal medical conditions.
  - iii. Develop preventive maintenance plans for employees who have recovered from work injuries and track compliance.
2. Design and implement protocols to evaluate prospective and current employees for conditions creating an undue risk to self or others in the workplace, in compliance with the ADA and the ADA Amendment Act, and consistent with the regulations and standards of the applicable system of evaluation (eg, workers' compensation, Federal Motor Carrier Safety Administration, National Fire Protection Association, etc).

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians: Assess and express impairment in terms required by the relevant legal or benefit systems—for example, the American Medical Association *Guides to the Evaluation of Permanent Impairment*.<sup>34</sup>

### Toxicology

The OEM physician should have the knowledge and skills to recognize, evaluate, and treat health effects of exposures to toxic agents at work or in the general environment. The physician also should have the knowledge and skill to develop, evaluate, and manage medical surveillance and biological monitoring programs for toxicological exposures. (*ACGME core competencies addressed: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Professionalism, and Systems-Based Practice.*)

### Clinical OEM Care Focus

OEM physicians involved in clinical care should be familiar with and able to

use existing resources and databases—for example, safety data sheets (SDS), hazardous substances data bank, threshold limit values (TLVs), etc—to characterize the potential risk from occupational and environmental chemical exposures. These physicians should also be able to interpret industrial hygiene reports and other data describing specific exposure conditions to determine potential routes of exposure and the likely doses received by specific patients to determine possible overexposure. They should be familiar with the adverse effects of such overexposures on the exposed individuals, as well as the standard clinical and biological tests used to confirm such adverse effects. They should be familiar with and able to implement standard components of medical surveillance and biological monitoring appropriate for individuals exposed to specific chemicals. They should also have knowledge of specific legally mandated (eg, OSHA) surveillance and monitoring procedures for those chemicals. These OEM physicians should also understand when to refer exposed patients for specialist assessment and care, how to comply with legally mandated reporting requirements, and how to properly inform employers when workers have suffered work-related toxicological disorders.

### OEM Clinical Specialist

OEM physicians who practice toxicology as a clinical subspecialty should be knowledgeable about chemical toxicities in general and be able to evaluate patients on the basis of their clinical presentation, rather than exclusively relying on foreknowledge of the specific chemicals to which individual patients were exposed. They should be able to develop comprehensive differential diagnoses, including toxicological and nontoxicological etiologies. This requires that they be able to perform technical literature reviews, interpret the toxicology literature, and use the principles of toxicokinetics, risk assessment, and health risk communication to provide specialized guidance and treatment to individual patients. These OEM physicians should be knowledgeable about the preclinical effects of exposures, the potential effects and interactions of chemical mixtures, and the contribution of individual susceptibility (eg, age, diet, and chronic diseases) to adverse toxicological effects. They should be able to manage medical care and secondary prevention for individual patients, and they should be knowledgeable about advanced diagnostic and therapeutic modalities. The OEM clinical specialist should also provide guidance to chemical-using employers and others regarding employment and production decision-making, including chemical selection and appropriate controls; this may include review and interpretation of workplace

industrial hygiene records and review and interpretation of the toxicology literature.

### OEM Population Management

OEM physicians who practice population management should be prepared to guide policies to ensure that appropriate workplace health surveillance and monitoring programs are developed and implemented for workplace chemicals. They should also be able to analyze surveillance and monitoring results to identify workplace chemical hazards and evaluate changes over time. These OEM physicians should participate in review of ongoing industrial hygiene programs to determine their appropriateness and adequacy, and also to ensure that workplace toxicological hazards are identified and addressed. They should also be prepared to review and determine the appropriateness and adequacy of chemical-related workplace safety programs—for example, selection and use of respirators and personal protective equipment (PPE). OEM researchers are often involved in studying and reporting on the impact of specific toxins in population groups. OEM physicians are critical members of public health care agencies responsible for establishing laws and regulations for protecting workers and the public from toxicological hazards. Risk communication is an important skill for the OEM physician practicing population management related to toxicology.

### Core Knowledge and Skills

1. Understand the potential toxicity, including medical surveillance requirements and protection standards related to materials used by working populations routinely served clinically (eg, preplacement/surveillance examinations).
2. Obtain information about hazardous materials implicated or suspected in toxic exposure evaluations (eg, from SDS).
3. Use available information from the patient, employer, and emergency responders, and information sources such as SDS, incorporating information about protective equipment used, to characterize risk of exposure, absorption, and toxic effects.
4. Order clinically appropriate laboratory studies to determine acute organ or metabolic effects.
5. Determine need for referral for specialty evaluation.
6. Recognize conditions that may be sentinel events associated with toxic exposures and take appropriate action to protect the health of others who may be exposed.

### Additional Knowledge and Skills

Board-certified occupational medicine specialists and physicians practicing as

OEM clinical specialists should have the following additional knowledge and skills:

1. Evaluate, treat, and/or properly refer persons whose health may be affected by acute or chronic contact with occupational and environmental chemicals:
  - i. Identify the likely toxic exposure on the basis of clinical signs and symptoms.
  - ii. Identify chronic health effects (eg, hepatotoxicity, asthma, central and peripheral nervous system toxicity, and interstitial fibrosis) resulting from toxic exposure and obtain necessary confirmatory testing. Manage medical care and secondary preventive measures for individuals chronically affected by toxic exposure.
2. Determine whether a person has a health condition that increases risk from the effects of exposure to chemical agents.
3. Distinguish health effects of exposure to chemicals from other sources.
4. Determine the nature and extent of potential occupational and environmental chemical exposures, considering routes of exposure and routes of absorption:
  - i. Use appropriate written and computerized databases to identify the hazardous ingredients and toxicological properties of chemical agents.
  - ii. Identify the physical characteristics of hazardous agents (eg, liquid/gas/vapor/particulate, molecular weight, and vapor pressure) and their impact on the potential for exposure.
  - iii. Estimate the likely degree of absorption on the basis of circumstances of exposure, considering factors such as the nature of the substance, the route of exposure, concomitant exposures, and characteristics of the patient (eg, age, susceptibility factors, and any PPE used).
5. Detect, insofar as possible, preclinical or clinical effects arising from chemical exposure and implement appropriate preventive measures:
  - i. Identify, obtain, and evaluate biomarkers or other tests to assess exposure and/or health effects, when appropriate, including biological monitoring techniques that assay the substance, its metabolites, or other indices.
  - ii. Identify clinical or biochemical evidence of target organ damage when exposure hazard is recognized.
  - iii. Identify chronic health effects (eg, hepatotoxicity, asthma, central and peripheral nervous system toxicity, and interstitial fibrosis) resulting from toxic exposure and obtain necessary confirmatory testing.

6. Assess clinical, worksite, and environmental data, along with literature reviews in the performance of patient evaluations.
7. Obtain and interpret detailed exposure information, including exposure histories, SDS, industrial hygiene reports, and other data.
8. Evaluate the severity of exposure to hazardous agents, considering dose-response relationships.
9. Interpret exposure data in the context of the scientific literature (human and animal) and the patient's presentation.
10. Understand, explain, and be able to apply toxicokinetic data (including routes of exposure, absorption, metabolism, storage, and excretion) to clinical and employment-related decision-making.
11. Conduct a literature search to research the health effects of a chemical substance when more information is needed.
12. Interpret and apply information from medical, toxicological, and environmental health literature.
13. Perform complex causation analysis and provide a rationalized and well-supported written report.
14. Effectively communicate risk, necessary actions, and reassurance to patients.

### Hazard Recognition, Evaluation, and Control

The OEM physician should have the knowledge and skills necessary to assess whether there is risk of an adverse event from exposure to physical, chemical, biologic, ergonomic, or psychological hazards in the workplace or environment. The OEM physician should be prepared to collaborate with industrial hygienists or other qualified safety and health care professionals and interpret measurements and reports from such professionals in context. If there is a risk with exposure, then that risk can be characterized with recommendations for control measures or medical surveillance. The OEM physician should demonstrate an understanding of the core principles of industrial hygiene, ergonomics, occupational safety and risk/hazard control, and communication, and apply the principles of the Hierarchy of Controls to protect the health of individual workers, patients, and the public from the range of known chemical, physical, biological, and radiological hazards. (*ACGME core competencies addressed: Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, and Systems-Based Practice.*)

### Clinical OEM Care Focus

The clinical OEM physician is often engaged in providing medical surveillance examinations, which relate to specific work hazards. Physicians in this role should be

thoroughly acquainted with the regulatory requirements and potential health effects of the work hazards for which they offer surveillance examinations (eg, noise, asbestos, and lead). In addition, the OEM clinician will be called on to evaluate patients who report symptoms they attribute to work exposures, for example, headaches after breathing fumes. The OEM clinician should have a working knowledge of the health effects of commonly used chemicals such as solvents and cleaning agents. The physician obtains a relevant history, including exposure history and information about controls such as PPE, performs appropriate physical examination, and judiciously orders laboratory studies or recommends environmental measurements to help characterize the risk.

The OEM patient care clinician is not usually a toxicologist but should be prepared to synthesize the clinical information in relation to information about exposure to various chemical, physical, biological, ergonomic, and psychological hazards (stressors). The clinical OEM physician should be able to develop a differential diagnosis and properly attribute and make recommendations related to the amelioration of the identified hazards. The clinician should also determine the suitability for continued work in a given occupational setting and address the need for specific control measures (such as PPE). The physician practicing OEM should be able to develop a treatment plan that incorporates medical care, exposure control, and work recommendations on the basis of data (including position description, "job analysis," or both). This physician plays a role in educating both the patient and the employer about the exposures and the methods necessary to control such exposures. The OEM clinician should be aware of regulatory requirements for the evaluation and quantification of the workplace or environment to identify individuals at risk of untoward exposure. The physician practicing OEM should be able to determine when to consult a board-certified OEM physician or other qualified occupational safety and health care expert when specific knowledge or information is not held by the examining physician.

### OEM Clinical Specialist

The OEM clinical specialist has the knowledge and skill to obtain a complete and comprehensive history and perform a physical examination focused on effects of exposure, or physical requirements of an occupation or task (using a position description or job analysis), and available or requested exposure assessment data. The OEM clinical specialist is familiar with the untoward effects of chemical, physical, biological, ergonomic, and psychological hazards (stressors) to individuals that can arise in a specific workplace or environmental situation

and appropriately seeks professional consultation from qualified individuals to evaluate and/or quantify such exposures. The OEM clinical specialist interprets clinical findings and specific directed laboratory analyses, and industrial hygiene/safety data to evaluate health threats related to the identified hazard. The OEM clinical specialist has knowledge of the workplace or environmental conditions, often supported by visits to the workplace, which supports proper prescription of activity or exposure limitations and work disposition. The OEM clinical specialist applies knowledge of the various occupational and/or environmental exposure levels—such as permissible exposure limits, TLVs/biologic exposure indices, recommended exposure limits, Workplace Environmental Exposure Levels<sup>®</sup>, acute exposure guideline levels, minimal risk levels, etc—used to control or correlate exposure and effects, with a firm grasp of their applications and limitations. The OEM clinical specialist identifies populations or subpopulations of individuals with occupational or environmental exposures that place them at a calculable risk of untoward effects, to modify or control exposures and develop a plan for medical surveillance, which is sometimes delineated by regulations governing specific exposures.

### OEM Population Management

OEM physicians who focus on population management should be aware of the regulatory requirements for the evaluation and quantification of exposures in the workplace or environment, to identify individuals at risk of untoward exposure and possible placement in a medical monitoring program. Such physicians understand the breadth of chemical, physical, biological, ergonomic, and psychological hazards (stressors) in individuals that arise in the workplace or environment of interest. Upon the basis of identification and exposure assessments performed by qualified safety and health care professionals, the OEM population manager orchestrates the development of appropriate plans for medical surveillance parameters for pre-placement, baseline, periodic, and termination monitoring. These physicians work with human resources departments to ensure that current and complete position descriptions, job analyses, or both are available for all employees. The OEM physician-director is able to evaluate the results of workplace or environmental assessment(s) as applied to the maintenance of health in such individuals to ensure continued health and productivity, and direct, allocate, and appropriately conserve personnel and fiscal resources. The OEM physician-director should be able to understand the epidemiological methods used to evaluate population trends in monitored individuals and ensure the maintenance of health in the monitored population. The OEM

physician-director should take the lead in the management of the complete and comprehensive program by ensuring the competency of all individuals involved in the assessment and control of exposure(s) in the workplace; proper medical evaluation and clinical management of exposed or monitored individuals (to include the use of PPE, administrative controls such as activity/exposure/work limitations); coordination of the contributions of professional personnel involved with exposure prevention or amelioration; and direction of the overall OEM program to ensure protection and best utilization of the most important asset—people.

### Core Knowledge and Skills

1. Recognize common occupational hazards and appropriate control measures, including PPE.
2. Understand protective measures appropriate for the hazards of interest in the working populations served.
3. Communicate concerns related to health hazards to appropriate employer health and safety professionals; participate in mitigation efforts.

### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Characterize existing and potential occupational and environmental hazards within defined populations:
  - i. Perform a workplace walk-through assessment of occupational health and safety concerns.
  - ii. Perform an environmental site visit.
2. Evaluate and interpret the results of industrial hygiene surveys.
3. Interpret and apply OSHA-permissible exposure limits, the American Conference of Governmental Industrial Hygienists TLVs and biological exposure indices, Environmental Protection Agency standards, and other criteria in the assessment of chemical and physical hazard exposures.
4. Apply ergonomic principles to optimize comfort and reduce risk at work, including evaluation and redesign of hazardous lifting jobs, repetitive motion work, and jobs with special visual demands.
5. Advise employers and employees regarding industrial hygiene controls, such as work practices, respirator use, and engineering controls. Recommend and implement policies and control measures to reduce or mitigate safety and health hazards:

- i. Identify and minimize exposure to ionizing radiation (eg, radon, radio-graphs, and radioisotopes).
  - ii. Identify and minimize exposure to nonionizing radiation (eg, ultraviolet, infrared, microwave, radiofrequency, and extremely low-frequency electromagnetic fields).
  - iii. Collaborate with appropriate health care and safety personnel, including industrial hygienists, safety specialists, radiation protection officers, and health physicists.
  - iv. Prevent, diagnose, and manage health effects associated with high-altitude living and working.
  - v. Explain the hazards of barotrauma and decompression sickness.
6. Design and manage a hearing conservation program for workers exposed to loud noise. (See ACOEM guidance document on *Occupational Noise-Induced Hearing Loss*<sup>35</sup>):
    - i. Advise employees and employers regarding the use of hearing protection.
    - ii. Design programs to comply with the OSHA noise standard.
  7. Assist employees and employers with the management of the effects of shiftwork, jet lag, and other chronobiological stressors.
  8. Perform a risk assessment:
    - i. Explain the basic methodology of risk assessment.
    - ii. Identify exposure-related health hazards.
    - iii. Assess dose–response relationships.
    - iv. Evaluate levels of exposure.
    - v. Characterize risk.
  9. Communicate to target groups, including health care professionals, patients, the public, and the media, in a clear and effective manner both orally and in writing, the levels of risk from real or potential hazards and the rationale for selected interventions. Prepare and deliver a basic hazard/risk presentation. Manage ad hoc risk communication (eg, town hall meetings) and reactions to situations such as:
    - i. A perceived or actual cluster of disease.
    - ii. An episode of mass psychogenic illness.
    - iii. Widespread exposure or perceived exposure to toxic materials.
    - iv. Communities affected by pesticide applications, hazardous waste sites, transportation accidents, and other environmental and industrial exposures.
    - v. The controversies associated with electromagnetic field exposure.
  10. Assess the workplace and environment for potential hazards and address the

need for PPE and other exposure control methods:

- i. Identify and control occupational/environmental risk factors for the development of skin disorders.
- ii. Assess the workplace for potential hazards to the eye and address issues of eye protection, including the use of safety glasses and contact lenses.
- iii. Describe the key elements of a good respirator program.
- iv. Identify the visual requirements for various occupations (including regulatory requirements) and correlate these requirements with job tasks and job hazards in determining fitness for duty and accommodations.

### Disaster Preparedness and Emergency Management

The OEM physician has a critical role in emergency preparedness and emergency management, with responsibility for protecting employed individuals and the national workforce from health and economic consequences of disasters. The OEM physician should have the knowledge and skills to collaborate with the employer management team to plan for workplace response to natural or man-made disasters. Emergency management planning includes resource mobilization, worker population tracking, communication contingency planning, and collaboration with local, state, or federal agencies. (*ACGME core competencies addressed: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, and Systems-Based Practice.*)

### Clinical OEM Care Focus

The specialized dual knowledge of the workplace and medicine offers OEM physicians a unique role in disaster preparation and response. In planning phases, OEM clinicians providing patient care services evaluate workers with first response responsibilities for fitness for such duties. Physicians apply knowledge of personal protection and other applied approaches to health protection and have the skills to evaluate the adequacy of protection at the individual level. OEM clinicians should be able to describe specific threats, including a broad range of chemical, biological, radiological, nuclear, and physical hazards. OEM clinicians are expected to be cognizant of clinical features that suggest exposure to biological, chemical, or radiological weapons and handle these as sentinel events with appropriate notification of authorities. OEM clinicians are also expected to participate in emergency clinical care, which may include triage, first aid services, and delivery of basic emergency medical care.

### OEM Clinical Specialist

The OEM specialist may be called on to respond to threats from intentional assaults (including terrorism), unintentional incidents that may result in mass casualties, infectious disease outbreaks and pandemics, and natural disasters. The knowledge base of the specialist includes detailed knowledge of the hazards specific to those industries included in the physician's practice. The physician uses a systematic approach to monitoring and protecting the health of populations, as well as the health of individual workers and other persons at risk. A working knowledge of regulations, regulatory compliance, and the structure of government agencies responsible for health protection at most relevant levels is imperative. The specialist has expertise in evaluating workplaces for safety and health protection, and expertise in risk management, including risk communication in an emergency. They establish emergency procedures and protocols for the clinical management of individuals involved in disaster incidents, including specific medical management protocols.

### OEM Population Management

OEM physicians have long played a critical and dual role in emergency preparedness and response as both clinicians and public health care officers for employed populations. OEM physicians can add value to the management of catastrophic consequences in many ways, including but not limited to: workforce survival, continuity of business, connectivity to site and community-based resources for assistance in a health-related emergency, surveillance of the workforce and the early detection of an outbreak, surge capacity in the event of a local event requiring mobilization of all available medical resources, population vaccination and chemoprophylaxis programs and other protective measures, assessing fitness of individuals to stay at or return to work, and determining when it is safe to reenter a contaminated site. The population management skills include maintaining a thorough understanding of the National Response Plan and Incident Command Structure and remaining up to date with advances in emergency preparedness. (See ACOEM position statement on the *Role of Occupational and Environmental Medicine Physicians in Emergency Preparedness and Response*.<sup>36</sup>)

### Core Knowledge and Skills

1. Knowledge of local threats, for example, nuclear plants, chemical production facilities.
2. Participate in local emergency response exercises.
3. Understand how to activate/notify others in the emergency response system.

4. Recognize sentinel events that may represent a potential disaster or epidemic.
5. Understand local clinical role in the community emergency/disaster response plan.

### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Describe specific threats, including a broad range of chemical, biological, radiological, and physical hazards.
2. Apply knowledge of personal protection and other approaches to health protection to evaluate the adequacy of protection at the individual level:
  - i. Describe and develop a plan for implementing appropriate personal safety for the responders.
  - ii. Design and implement a plan for addressing the mental health needs of the responders.
3. Participate in the development of emergency or disaster plans for the workplace, the community, or both:
  - i. Applying knowledge of occupational hazards, the workplace, and community resources, work with local medical and community resources in developing an appropriate disaster response plan.
  - ii. Develop emergency response plans ranging from developing patient treatment protocols for a specific chemical to evacuation and community planning for catastrophic industrial emergencies.
4. Establish emergency procedures and protocols for the clinical management of individuals involved in disaster incidents, including specific medical management protocols.
5. Design and implement a plan for the mitigation of a disaster incident at the worksite or general community.
6. Assist in the design and implementation of a medical recovery plan for mass casualty events in industry or general community.
7. Design and/or conduct an outbreak and/or cluster investigation.
8. Design a pandemic preparedness plan for an organization.
9. Maintain a thorough understanding of local, regional, state, and national response plans and the incident command structure.

### Health and Productivity

The OEM physician should be able to identify and address individual and organizational factors in the workplace to optimize the health of the worker and enhance productivity. These issues most often include absenteeism, presenteeism, health enhance-

ment, employee wellness programs, and population health management. (*ACGME core competencies addressed: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, and Systems-Based Practice.*)

### Clinical OEM Care Focus

The OEM clinician providing clinical patient care services may be involved in implementing health screenings and coaching individuals about behaviors that will improve their health. Screening measurements may include not only formal health risk assessments or biometric screenings but also informal assessment of health risk, such as asking about smoking, nutrition, and exercise during encounters for other purposes, and counseling patients about mitigating such risks. The OEM clinician should consider opportunities for addressing health risk reduction in a systematic fashion during clinical encounters for periodic examinations, injury care, or other purposes.

### OEM Clinical Specialist

The OEM clinical specialist should be prepared to provide guidance to an organization about optimal health and productivity programs to consider for the workforce and participate in decisions about contracting for wellness services versus building these services internally. The OEM clinical specialist should be familiar with the research literature on cost/benefit, as well as resources that can help an organization measure its risk and select appropriate components. The physician should be able to assess the scientific evidence that supports the health risk assessment that is administered and any intervention programs. Programs to consider include smoking cessation, physical activity, depression screening and management, nutritional/eating habits, blood pressure management, musculoskeletal care, and weight management. OEM clinical specialists should be prepared to support the organization in creating a culture of behavior change, while ensuring the selected program aligns with the company's business strategy and financial goals. The physician should be familiar with coaching philosophy, methods for engagement and sustaining employee participation, and management of data, including confidentiality and retention. The physician should be part of the team that selects the wellness partner and have an active role in implementation. (See ACOEM position statement on *Depression in the Working Population*.<sup>37</sup>)

### OEM Population Management

The OEM physician in a population management role is expected to participate in measuring risk related to chronic disease

and unhealthy behaviors, and the benefits of health and productivity programs. This includes assessing aggregate data from health risk assessments, health insurance claim data, and changes in measurements over time after implementation of wellness-related programs. The physician should be able to understand the reporting of data and the outcomes that determine a return on investment. The physician should be able to communicate this data to senior management of an organization. In addition to measuring improvement of health risks, the physician should be able to measure other outcomes such as improvement on absenteeism and presenteeism within an organization, with the goal of a healthy, high-performance workforce.

### Core Knowledge and Skills

1. Perform health risk assessments, biometric screenings, or other appropriate interventions to modify health risk behaviors in the clinical setting.
2. Counsel employees about health risks and lifestyle.
3. Use tools and best practices for identifying, measuring, and modifying individual and population health risk behaviors.
4. Accommodate cultural, ethnic, educational, and language variations among workers when providing information on occupational hazard prevention, disease prevention, and health promotion.

### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Design, implement, and evaluate worksite health promotion and disease prevention programs, incorporating Department of Health and Human Services and other authoritative guidelines as appropriate (see *Workplace Health Protection and Promotion: A New Pathway for a Healthier—and Safer—Workforce*.<sup>38</sup>) Understand and apply the concepts of the National Institute for Occupational Safety and Health Total Worker Health™ approach (available at [www.cdc.gov/niosh/twh/](http://www.cdc.gov/niosh/twh/)).
2. Describe the appropriate use and limitations of health risk assessment and screening for healthy populations and the applications of screening, assessment, and early intervention for targeted high-risk groups.
3. Communicate current medical, environmental, and/or other scientific knowledge effectively to target groups, including patients, employees, employers, unions, community groups, and the media.
4. Recognize the effects of cultural, ethnic, and social factors, including health beliefs

and practices, on the health and safety of workers.

### Public Health, Surveillance, and Disease Prevention

The OEM physician should have the knowledge and skill to develop, evaluate, and manage medical surveillance programs for the workplace, as well as the general public. The physician should have the knowledge and skills to apply primary, secondary, and tertiary preventive methods. (*ACGME core competencies addressed: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice.*)

### Clinical OEM Care Focus

Physicians providing OEM clinical care should be conversant with the screening guidelines and immunization and chemoprophylaxis recommendations for workers at various stages of adulthood. This includes the US Preventive Services Task Force guidelines for adult preventive medicine screening and guidelines created by the CDC related to blood-borne-pathogen exposure evaluation and chemoprophylaxis and recommended adult immunizations. Clinical OEM physicians are expected to be conversant with OSHA medical surveillance guidelines and prepared to implement medical surveillance programs, including interpreting data to identify and correct lapses in primary prevention, and take steps to prevent adverse health effects in patients exhibiting evidence of exposure. Clinical OEM physicians also oversee the collection of specimens related to substance abuse, including breath alcohol and urine drug tests; such collection should follow strict rules, including employee training, equipment calibration testing, and chain of custody documentation.

### OEM Clinical Specialist

The OEM clinical specialist should be familiar with the recommendations of government advisory groups (eg, US Preventive Services Task Force, CDC, and hospital infection control advisory committee on immunizations) and incorporate their recommendations in the design of appropriate immunization and screening programs for the workplace. The OEM clinical specialist should have a basic understanding of the statistical concepts of sensitivity, specificity, positive predictive value, and negative predictive value. The OEM specialist should be prepared to apply primary, secondary, and tertiary preventive approaches to individual- and population-based disease prevention and health promotion, and be able to develop, implement, and evaluate the effectiveness of appropriate clinical preventive services for both individuals and populations. The OEM clin-

ical specialist should be able to determine the cost-effectiveness and appropriateness of various tests and also possess adequate skills in occupational and environmental health, including the ability to assess and respond to individual and population risks for common occupational and environmental disorders. These physicians should be familiar with risk communication principles and use these to communicate information related to risk to workers, companies, and the public. OEM clinical specialists who provide MRO services seek training, certification, and ongoing education in this area to appropriately evaluate positive drug test results, make clinically and administratively appropriate decisions, and maintain awareness of schemes used by people to sabotage such testing. Conscientious performance of the MRO role is critical for the protection of public safety when such testing is performed in workers with safety sensitive positions, including commercial driving. (See ACOEM position statement on *Medical Fitness to Drive in the Transportation Industry and the Impact on Public Safety: Recommended Actions*.<sup>39</sup>)

### OEM Population Management

The OEM physician focused on population management should be prepared to guide policies to ensure that workplace health surveillance programs are developed and implemented. Physicians in this role analyze injury and illness data to identify trends and sentinel events. These physicians should know how to perform a cluster analysis if indicated or be able to garner the resources to do such. The OEM physician involved in population management should be able to recognize outbreak events of public health significance and oversee programs for screening to detect substance abuse and other potential behavioral problems affecting worker performance. OEM physicians in this role often participate in relevant research or work for nonprofit, academic, military, or government agencies dedicated to promoting public health and preventing disease.

### Core Knowledge and Skills

1. Implement medical surveillance programs in the workplace to protect workers, ensuring compliance with applicable regulations when appropriate.
  - i. Address specific work classifications, such as hazardous waste workers.
  - ii. Target specific organ systems for prevention of occupational disease, such as lung diseases.
2. Evaluate and manage situations of suspected chemical impairment, including collection of specimens ensuring appropriate chain of custody, in compliance with applicable rules and regulations.
3. Manage incidents of potential blood-borne pathogen, tuberculosis, or other

- occupational infectious disease exposure according to applicable government guidelines.
4. Intervene in response to positive findings when indicated, to measurably improve health outcomes. Also, interpret abnormal laboratory findings in asymptomatic workers and recommend further evaluation, treatment, or both as indicated.
  5. Recognize and report or investigate potential sentinel events.
6. Apply primary, secondary, and tertiary prevention approaches to disease prevention and health promotion to individuals and communities:
    - i. Characterize the population to identify target conditions or exposures.
    - ii. Prioritize areas for prevention and mitigation.
    - iii. Identify efficient and effective interventions.
    - iv. Develop a strategy or plan for intervention.
    - v. Implement the interventions.
    - vi. Evaluate the effectiveness of prescribed interventions.
  7. Recommend and implement policies and control measures to address emerging infectious diseases of concern.

### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM population managers should have the following additional knowledge and skills:

1. Develop, implement, evaluate, and refine screening programs for groups to identify risks for disease or injury and opportunities to promote wellness and mitigate progression in disease management programs:
  - i. Characterize the population to identify target exposures, risk factors, and/or conditions of concern.
  - ii. Assess the utility of screening tools.
  - iii. Identify outcome metrics of interest to assess screening and intervention programs in a standardized fashion.
  - iv. Assess resources and measure return on investment.
  - v. Create structures (clinic staffing, etc).
  - vi. Report results.
2. Design and implement proactive systems of care that effectively reach all members of a population, including those at high risk and those who do not normally seek care.
3. Design and conduct surveillance programs in workplace, community settings, or both:
  - i. Develop and implement medical surveillance programs in the workplace and/or in communities exposed to environmental contamination.
  - ii. Understand basic epidemiological principles such as sensitivity, specificity, positive predictive value, and negative predictive value.
  - iii. Utilize biomarkers to identify exposure, within limitations of the methodology, and interpret results in both clinical and public health contexts.
  - iv. Evaluate the effectiveness of surveillance and screening programs.
4. Review, interpret, and explain the public health and clinical implications of epidemiological studies that address occupational hazards.
5. Apply validated epidemiological and biostatistical principles and techniques to analyze injury/illness data in defined worker and community populations.

ministrators, industrial hygienists, safety professionals, physical therapists, employers, legal experts, human resources professionals, insurance carriers, etc. The clinical OEM physician is a key member of this team and may play an important leadership role in this position.

### OEM Clinical Specialist

The OEM clinical specialist will be called on not only for their expertise regarding OEM topics but also for their management and administrative knowledge related to the field of OEM. OEM clinical specialists often serve as consultants in OEM employee health program development and management for companies, with responsibility for advising on a wide range of issues, for example, staffing, credentials, examination requirements, health records management, and wellness program features. Communicating and sharing such expertise might occur through presentations, talks, and other information sharing venues involving interaction with many different audiences/stakeholders, including employees, employers, unions, administrators, public interest groups, communities, and policymakers. In all communications, the OEM physician will honestly acknowledge uncertainties and will always strive to convey the truth as he or she knows and understands it. An OEM clinical specialist may have a leadership role and/or assume the role of consultant in multiple settings, including case management, administering/developing surveillance programs, evaluating sentinel events or cluster outbreaks, protocol development, and in policy development.

### OEM Population Management

OEM physicians play an integral role in many corporate, academic, and government settings. In such settings, to be optimally effective, the OEM physician will have a large, comprehensive, and well-balanced skill set. Such skills will typically include management skills related to utilization review and quality control/quality improvement activities, maximizing use of information systems for appropriate tracking and benchmarking, and designing and implementing appropriate projects and protocols tailored to the needs of a specific group, audience, or population. OEM physicians play an increasingly critical role in the management of population health and should develop and improve the skills needed to integrate data and trends, design appropriate programs to manage and limit disability, promote safe return to work, appropriately and beneficially modify absenteeism/presenteeism, and assist/educate others in developing and administering health promotion/disease prevention programs that fit into an evolving health care system. (See

### OEM-Related Management and Administration

The OEM physician should have the administrative and management knowledge and skills to plan, design, implement, manage, and evaluate comprehensive occupational and environmental health programs and projects. OEM physicians need an understanding of health care benefits, workers' compensation systems, electronic health records and knowledge of the laws and regulations applicable to the jurisdiction, industry, and population of interest. OEM physicians in all practice settings are expected to be sensitive to the diverse needs and cultural backgrounds of those they serve, and anticipate meeting diverse needs in setting up their practices. (*ACGME core competencies addressed: Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism, and Systems-Based Practice.*) (See ACOEM position statement on the *Scope of Occupational and Environmental Health Programs and Practice.*<sup>40</sup>)

### Clinical OEM Care Focus

The clinical OEM physician is expected to evaluate and implement clinical practice guidelines, quality improvement programs, outcome assessment strategies, and medical informatics programs as they apply to day-to-day clinical patient care. Competencies for the clinical OEM physician include selection and implementation of an appropriate electronic health record compliant with the applicable privacy standards, as well as setting up an ethical and efficient coding and billing system. The physician may be called on to assist with health program education, marketing and promotion activities, and identifying potential customers/patients. It is also an essential skill for a clinical OEM physician to work well as a member of a larger OEM team. Others on the "team" may include physician colleagues, mid-level practitioners, occupational health nurses, ad-

ACOEM guidance and position statements on *Optimizing Health Care Delivery by Integrating Workplaces, Homes, and Communities: How Occupational and Environmental Medicine Can Serve as a Vital Connecting Link Between Accountable Care Organizations and the Patient-Centered Medical Home*<sup>19</sup>; *Healthy Workforce/Healthy Economy: The Role of Health, Productivity, and Disability Management in Addressing the Nation's Health Care Crisis: Why an Emphasis on the Health of the Workforce Is Vital to the Health of the Economy*<sup>41</sup>; *Pandemic Influenza Guidance for Corporations*<sup>42</sup>; and *Guidance for a Reasonably Designed, Employer-Sponsored Wellness Program Using Outcomes-Based Incentives*.<sup>43</sup>)

### Core Knowledge and Skills

1. Establish protocols to manage patient records and protect confidentiality.
2. Work effectively as a team member with administrators, occupational health nurses, nurse practitioners, and physician assistants, demonstrating an understanding of their roles in an occupational health service.
3. Identify potential customers and develop an education and marketing plan for an occupational/environmental health program.
4. Determine management information needs and apply medical informatics, electronic health and patient care data, management information systems, and other computer technologies to an OEM program.
  - i. Apply information systems to medical surveillance programs (eg, scheduling examinations, documenting clinical data, and tracking, reporting, and analyzing outcomes).
  - ii. Apply information systems to track worker disability and return-to-work.
  - iii. Apply information systems to manage medical and exposure records.
  - iv. Apply information systems to manage revenues and expenditures, including departmental budgets, billing, and collections.
  - v. Apply information systems for scheduling of occupational and environmental health care services.
  - vi. Use information technology (eg, e-mail, local and wide area networks, and Internet) to communicate with colleagues, clients, and others.
  - vii. Use information technology to write reports (eg, word processing), as well as to manage and present data (spreadsheets, databases, and presentation graphics).

### Additional Knowledge and Skills

Board-certified occupational medicine specialists, physicians practicing as OEM clinical specialists, and OEM popu-

lation managers should have the following additional knowledge and skills:

1. Design, implement, and evaluate clinical practice guidelines, quality management/quality improvement programs, utilization management, case management, and other activities to enhance an organization's performance.
2. Communicate technical and clinical information to professional and lay audiences. Give presentations to employees, employers, labor unions, and others on occupational and environmental health and safety topics.
3. Recognize potential sources of system or program failure and use root cause analysis to plan solutions.
4. Evaluate health care services provided to employees by determining relevant outcome parameters and by using benchmarks and quality metrics based on the medical literature to measure and improve outcomes.
5. Design cost-containment strategies for workers' compensation, health benefits, pharmacy benefits, retiree benefits, and disability management programs to allocate and manage clinical and financial resources:
  - i. Obtain necessary demographic and cost data.
  - ii. Ensure patient/individual confidentiality in the process.
6. Evaluate the effectiveness and cost-effectiveness of occupational health services and risk reduction methods:
  - i. Design and implement process and outcome measures and be able to benchmark with other organizations.
  - ii. Apply techniques of process improvement.
  - iii. Demonstrate program cost-effectiveness.
7. Work effectively with both labor and management to make system-based changes to maximize workplace health, safety, and productivity.
8. Manage OEM issues in an international workforce, researching geographic variation in disease risk and developing an understanding of cultural and regulatory differences that must be considered in program design.

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### REFERENCES

1. American College of Occupational and Environmental Medicine. American College of Occupational and Environmental Medicine competencies: v 1.0. *J Occup Environ Med*. 1998;40:427-440.
2. American College of Occupational and Environmental Medicine. American College of Occupational and Environmental Medicine competencies—2008. *J Occup Environ Med*. 2008;50:712-724.
3. Harber P, Bontemps J, Saechao K, Wu S, Liu Y, Elashoff D. Career paths in occupational medicine. *J Occup Environ Med*. 2012;54:1324-1329.
4. Harber P, Rose S, Bontemps J, et al. Occupational medicine practice: activities and skills of a national sample. *J Occup Environ Med*. 2010;52:1147-1153.
5. Harber P, Rose S, Bontemps J, et al. Occupational medicine practice: one specialty or three? *J Occup Environ Med*. 2010;52:672-679.
6. Baker BA, Dodd K, Greaves IA, Zheng CJ, Brosseau L, Guidotti T. Occupational medicine physicians in the United States: demographics and core competencies. *J Occup Environ Med*. 2007;49:388-400.
7. McAdams M, Kerwin JJ, Olivo V, Goksel HA. *National Assessment of the Occupational Safety and Health Workforce*. Washington, DC: National Institute for Occupational Health and Safety; 2011.
8. Delclos GL, Bright KA, Carson AI, et al. A global survey of occupational health competencies and curriculum. *Int J Occup Environ Health*. 2005;11:185-198.
9. Lane DS. A threat to the public health workforce: evidence from trends in preventive medicine certification and training. *Am J Prev Med*. 2000;18:87-96. Available at <http://zone.medschool.pitt.edu/sites/programs/AOC/publichealth/Shared%20Documents/Literature/Lane%20DS%202001%20Trends%20in%20preventive%20medicine%20workforce.pdf>. Accessed February 24, 2014.
10. Meyer JD, Becker PE, Stockdale T, Ducatman AM. The West Virginia Occupational Safety and Health Initiative: practicum training for a new marketplace. *Am J Prev Med*. 1999;16:347-350.
11. Dinman BD. Education for the practice of occupational medicine: knowledge, competence, and professionalism. *J Occup Environ Med*. 2000;42:115-120.
12. Guidotti T. Learning objectives for training and continuing education in occupational medicine. *Am J Prev Med*. 1992;8:249-256.
13. Accreditation Council for Graduate Medical Education. *ACGME Program Requirements for Graduate Medical Education in Preventive Medicine, 2010*. Web reference. Chicago, IL: Accreditation Council for Graduate Medical Education; 2010.

14. Ducatman AM, Vanderploeg JM, Johnson M, et al. Residency training in preventive medicine: challenges and opportunities. *Am J Prev Med.* 2005;28:403–412.
15. Harber P, Wu S, Bontemps J, Rose S, Saechao K, Liu Y. Value of occupational medicine board certification. *J Occup Environ Med.* 2013;55:532–538.
16. ACOEM Committee on Ethical Practice in Occupational and Environmental Medicine. *ACOEM Code of Ethics.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2009. Available at <http://www.acoem.org/codeofconduct.aspx>. Accessed February 24, 2014.
17. World Health Organization. *Occupational Medicine in Europe: Scope and Competencies.* Bilthoven, the Netherlands: World Health Organization European Centre for Environment and Health; 2000. Available at <http://www.who.int/occupational.health/publications/eurmedicine/en/index.html>. Accessed February 24, 2014.
18. ACOEM Committee on Ethical Practice in Occupational and Environmental Medicine. ACOEM Position Statement. *Confidentiality of Medical Information in the Workplace.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2012. Available at <http://www.acoem.org/Confidentiality-Medical-Information.aspx>. Accessed February 24, 2014.
19. McLellan RK, Sherman B, Loepcke RR, et al. ACOEM Position Statement. Optimizing health care delivery by integrating workplaces, homes, and communities: how occupational and environmental medicine can serve as a vital connecting link between accountable care organizations and the patient-centered medical home. *J Occup Environ Med.* 2012;54:504–512. Available at: [http://journals.lww.com/joem/Fulltext/2012/04000/Optimizing\\_Health\\_Care\\_Delivery\\_by\\_Integrating.20.aspx](http://journals.lww.com/joem/Fulltext/2012/04000/Optimizing_Health_Care_Delivery_by_Integrating.20.aspx). Accessed February 24, 2014.
20. American College of Occupational and Environmental Medicine. ACOEM Position Statement. *Ensuring Quality of Care in Workers' Compensation Programs: Fair Fee Schedules and Evidence-Based Guidelines.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2011. Available at [http://www.acoem.org/Quality\\_of\\_Care-WorkersCompensationPrograms.aspx](http://www.acoem.org/Quality_of_Care-WorkersCompensationPrograms.aspx). Accessed February 24, 2014.
21. Starr L. ACOEM Position Statement. Automated external defibrillation in the occupational setting. *J Occup Environ Med.* 2012;54:1170–1176. Available at [http://journals.lww.com/joem/Fulltext/2002/01000/Automated\\_External\\_Defibrillation\\_in\\_the.2.aspx](http://journals.lww.com/joem/Fulltext/2002/01000/Automated_External_Defibrillation_in_the.2.aspx). Accessed February 24, 2014.
22. Rabinowitz P, Council of Scientific Advisors (CSA). ACOEM Position Statement. *The Role of the Professional Supervisor in the Audiometric Testing Component of Hearing Conservation Programs.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2007. Available at: [http://www.acoem.org/ProfessionalSupervisor\\_ConservationPrograms.aspx](http://www.acoem.org/ProfessionalSupervisor_ConservationPrograms.aspx). Accessed February 24, 2014.
23. Mueller K, Woo W, Cloeren M, Hegmann K, Martin D; ACOEM Task Force on the Use of Opioids. *Principles for Ensuring the Safe Management of Pain Medication Prescriptions by Occupational and Environmental Medicine Physicians.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2012. Available at <http://www.acoem.org/PainMedicationPrescriptions.aspx>. Accessed February 24, 2014.
24. ACOEM Work Fitness and Disability Section. ACOEM Position Statement. *The Personal Physician's Role in Helping Patients With Medical Conditions Stay at Work or Return to Work.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2008. Available at [http://www.acoem.org/PhysiciansRole\\_ReturntoWork.aspx](http://www.acoem.org/PhysiciansRole_ReturntoWork.aspx). Accessed February 24, 2014.
25. Townsend MC; Occupational and Environmental Lung Disorders Committee. ACOEM Position Statement. Spirometry in the occupational health setting—2011 update. *J Occup Environ Med.* 2011;53:569–584. Available at [http://journals.lww.com/joem/Fulltext/2011/05000/Spirometry\\_in\\_the\\_Occupational\\_Health\\_Setting.2011.16.aspx](http://journals.lww.com/joem/Fulltext/2011/05000/Spirometry_in_the_Occupational_Health_Setting.2011.16.aspx). Accessed February 24, 2014.
26. ACOEM Task Force on Reproductive Toxicology. ACOEM Position Statement. Reproductive and developmental hazard management guidance. *J Occup Environ Med.* 2011;53:941–949. Available at [http://journals.lww.com/joem/Fulltext/2011/08000/Reproductive\\_and\\_Developmental\\_Hazard\\_Management.17.aspx](http://journals.lww.com/joem/Fulltext/2011/08000/Reproductive_and_Developmental_Hazard_Management.17.aspx). Accessed February 24, 2014.
27. Lerman SE, Eskin E, Flower DJ, et al.; ACOEM Presidential Task Force on Fatigue Risk Management. Fatigue risk management in the Workplace. *J Occup Environ Med.* 2012;54:231–258. Available at [http://journals.lww.com/joem/Fulltext/2012/02000/Fatigue\\_Risk\\_Management\\_in\\_the\\_Workplace.17.aspx](http://journals.lww.com/joem/Fulltext/2012/02000/Fatigue_Risk_Management_in_the_Workplace.17.aspx). Accessed February 24, 2014.
28. Hartenbaum N, Martin D. ACOEM Position Statement. *Ethical Aspects of Drug Testing.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2009. Available at <http://www.acoem.org/EthicalAspectsOfDrugTesting.aspx>. Accessed February 24, 2014.
29. Hartenbaum N, Martin D. ACOEM Position Statement. *Qualifications of Medical Review Officers (MROs) in Regulated and Non-Regulated Drug Testing.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2009. Available at <http://www.acoem.org/QualificationsMROs.aspx>. Accessed February 24, 2014.
30. ACOEM Task Force on Genetic Screening in the Workplace. ACOEM Position Statement. Genetic screening in the workplace. *J Occup Environ Med.* 2010;52:763. Available at [http://journals.lww.com/joem/Fulltext/2010/07000/Genetic\\_Screening\\_in\\_the\\_Workplace.15.aspx](http://journals.lww.com/joem/Fulltext/2010/07000/Genetic_Screening_in_the_Workplace.15.aspx). Accessed February 24, 2014.
31. IAIABC–ACOEM Stakeholder Forum on Physician Payment Innovation. *A Guide to High-Value Physician Services in Workers' Compensation.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2010. Available at [http://www.acoem.org/uploadedFiles/Public\\_Affairs/Policies\\_And\\_Position\\_Statements/Guidelines/Library\\_and\\_Reference\\_Material/A%20Guide%20to%20High%20Value%20Physician%20Services.pdf](http://www.acoem.org/uploadedFiles/Public_Affairs/Policies_And_Position_Statements/Guidelines/Library_and_Reference_Material/A%20Guide%20to%20High%20Value%20Physician%20Services.pdf). Accessed February 24, 2014.
32. ACOEM Stay-at-Work and Return-to-Work Process Improvement Committee. Preventing needless work disability by helping people stay employed. *J Occup Environ Med.* 2006;48:972–987. Available at [http://journals.lww.com/joem/Fulltext/2006/09000/Preventing\\_Needless\\_Work\\_Disability\\_by\\_Helping.17.aspx](http://journals.lww.com/joem/Fulltext/2006/09000/Preventing_Needless_Work_Disability_by_Helping.17.aspx). Accessed February 24, 2014.
33. American College of Occupational and Environmental Medicine. *ACOEM Guidance for the Medical Evaluation of Law Enforcement Officers (LEOs).* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2014. Available at <http://www.acoem.org/LEOGuidelines.aspx>. Accessed February 24, 2014.
34. Rondinelli R, Genovese E, Brigham C. *Guides to the Evaluation of Permanent Impairment.* 6th ed. Chicago, IL: American Medical Association; 2008.
35. Kirchner DB, Evenson E, Dobie RA, et al.; ACOEM Task Force on Occupational Hearing Loss. Occupational noise-induced hearing loss. *J Occup Environ Med.* 2012;54:106–108. Available at [http://journals.lww.com/joem/Fulltext/2012/01000/Occupational\\_Noise-Induced\\_Hearing\\_Loss.\\_ACOEM.18.aspx](http://journals.lww.com/joem/Fulltext/2012/01000/Occupational_Noise-Induced_Hearing_Loss._ACOEM.18.aspx). Accessed February 24, 2014.
36. Guidotti T, McLellan R. ACOEM Position Statement. *Role of Occupational and Environmental Medicine Physicians in Emergency Preparedness and Response.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2010. Available at [http://www.acoem.org/OEMPhysicians\\_EmergencyPreparedness.aspx](http://www.acoem.org/OEMPhysicians_EmergencyPreparedness.aspx). Accessed February 24, 2014.
37. Myette L, Garuso G, Stave G; ACOEM Depression in the Workplace Project. ACOEM Position Statement. *Depression in the Working Population.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2008. Available at <http://www.acoem.org/DepressionInWorkingPopulation.aspx>. Accessed February 24, 2014.
38. Hymel P, Loepcke R, Baase C, et al.; Committee and H&P Section. Workplace health protection and promotion: a new pathway for a healthier—and safer—workforce. *J Occup Environ Med.* 2011;53:695–702. Available at [http://journals.lww.com/joem/Fulltext/2011/06000/Workplace\\_Health\\_Protection\\_and\\_Promotion.\\_A\\_New.17.aspx](http://journals.lww.com/joem/Fulltext/2011/06000/Workplace_Health_Protection_and_Promotion._A_New.17.aspx). Accessed February 24, 2014.
39. Hartenbaum N, Janiga D. ACOEM Position Statement. *Medical Fitness to Drive in the Transportation Industry and the Impact on Public Safety: Recommended Actions.* Elk Grove, IL: American College of Occupational and Environmental Medicine; 2012. Available at <http://www.acoem.org/Transportation>.

- PublicSafety.aspx. Accessed February 24, 2014.
40. Corporate Health Achievement Award Committee. ACOEM Position Statement. *Scope of Occupational and Environmental Health Programs and Practice*. Elk Grove, IL: American College of Occupational and Environmental Medicine; 2011. Available at [http://www.acoem.org/Scope\\_HealthPrograms\\_Practice.aspx](http://www.acoem.org/Scope_HealthPrograms_Practice.aspx). Accessed February 24, 2014.
  41. Special Committee on Health, Productivity, and Disability Management. ACOEM Position Statement. Healthy workforce/healthy economy: the role of health, productivity, and disability management in addressing the nation's health care crisis: why an emphasis on the health of the workforce is vital to the health of the economy. *J Occup Environ Med*. 2009;51:114–119. Available at [http://journals.lww.com/joem/Fulltext/2009/01000/Healthy\\_Workforce\\_Healthy\\_Economy\\_The\\_Role\\_of.16.aspx](http://journals.lww.com/joem/Fulltext/2009/01000/Healthy_Workforce_Healthy_Economy_The_Role_of.16.aspx). Accessed February 24, 2014.
  42. Cummings C; ACOEM Emergency Preparedness Task Force. Pandemic influenza guidance for corporations. *J Occup Environ Med*. 2011;53:690–694. Available at [http://journals.lww.com/joem/Fulltext/2011/06000/Pandemic\\_Influenza\\_Guidance\\_for\\_Corporations.16.aspx](http://journals.lww.com/joem/Fulltext/2011/06000/Pandemic_Influenza_Guidance_for_Corporations.16.aspx). Accessed February 24, 2014.
  43. Joint Consensus Statement of the Health Enhancement Research Organization; American College of Occupational and Environmental Medicine (ACOEM); American Cancer Society (ACS) and American Cancer Society Cancer Action Network; American Diabetes Association (ADA); American Heart Association (AHA). Guidance for a reasonably designed, employer-sponsored wellness program using outcomes-based incentives. *J Occup Environ Med*. 2012;54:889–896. Available at [http://journals.lww.com/joem/Fulltext/2012/07000/Guidance\\_for\\_a\\_Reasonably\\_Designed.20.aspx](http://journals.lww.com/joem/Fulltext/2012/07000/Guidance_for_a_Reasonably_Designed.20.aspx). Accessed February 24, 2014.

## APPENDIX 1

### ACGME Six Competencies

The Accreditation Council for Graduate Medical Education (ACGME) is a private, nonprofit council that evaluates and accredits medical residency programs in the United States. The ACGME was established in 1981 and its mission is to improve health care by assessing and advancing the quality of resident physicians' education through exemplary accreditation. In academic year 2008–2009, there were 8734 ACGME-accredited residency programs in 130 specialties and subspecialties. The number of active full- and part-time residents for academic year 2008–2009 was 109,482. The ACGME recommended all residency programs to evaluate their trainees under six core competencies approved by the ACGME Board on February

13, 2007. All residency programs must integrate these competencies into the curriculum:

- Patient Care
- Medical Knowledge
- Practice-Based Learning and Improvement
- Interpersonal Skills and Communication
- Professionalism
- Systems-Based Practice

#### Patient Care

Residents must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health.

#### Medical Knowledge

Residents must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences, as well as the application of this knowledge to patient care. Residents are expected to:

#### Practice-Based Learning and Improvement

Residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care on the basis of constant self-evaluation and lifelong learning. Residents are expected to develop skills and habits to be able to meet the following goals:

- Identify strengths, deficiencies, and limits in one's knowledge and expertise
- Set learning and improvement goals
- Identify and perform appropriate learning activities
- Systematically analyze practice, using quality improvement methods, and implement changes with the goal of practice improvement
- Incorporate formative evaluation feedback into daily practice
- Locate, appraise, and assimilate evidence from scientific studies related to their patients' health problems
- Use information technology to optimize learning
- Participate in the education of patients, families, students, residents, and other health care professionals

#### Interpersonal and Communication Skills

Residents must demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and other health care professionals. Residents are expected to do the following:

- Communicate effectively with patients, families, and the public, as appropriate, across a broad range of socioeconomic and cultural backgrounds.
- Communicate effectively with physicians, other health care professionals, and health-related agencies.
- Work effectively as a member or leader of a health care team or other professional group.
- Act in a consultative role to other physicians and health care professionals.
- Maintain comprehensive, timely, and legible medical records, if applicable.

#### Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Residents are expected to demonstrate the following:

- Compassion, integrity, and respect for others.
- Responsiveness to patient needs that supersedes self-interest.
- Respect for patient privacy and autonomy.
- Accountability to patients, society, and the profession.
- Sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation.

#### Systems-Based Practice

Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care, as well as the ability to call effectively on other resources in the system to provide optimal health care. Residents are expected to do the following:

- Work effectively in various health care delivery settings and systems relevant to their clinical specialty.
- Coordinate patient care within the health care system relevant to their clinical specialty.
- Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population-based care as appropriate.
- Advocate for quality patient care and optimal patient care systems.
- Work in interprofessional teams to enhance patient safety and improve patient care quality.
- Participate in identifying system errors and implementing potential systems solutions.

Additional information about ACGME is available on line at <http://www.acgme.org/acWebsite/home/home.asp>.

## APPENDIX 2

### The Preventive Medicine Milestone Project: Occupational Medicine Link

*The Preventive Medicine Milestone Project: Occupational Medicine* is a joint initiative of the Accreditation Council for Graduate Medical Education and the American Board of Preventive Medicine published in August 2013.

The milestones are designed only for use in evaluation of resident physicians in the context of their participation in ACGME-accredited residency or fellowship programs. The milestones provide a framework for assessment of the development of the resident physician in key dimensions of the elements of physician competency in a specialty or subspecialty. They neither represent the entirety of the dimensions of the six domains of physician competency, nor are they designed to be relevant in any other context.

The *Preventive Medicine Milestone Project* is available on line at [www.acgme.org/acgmeweb/Portals/0/PDFs/Milestones/PreventiveMedicineMilestones-OccupationalMedicine.pdf](http://www.acgme.org/acgmeweb/Portals/0/PDFs/Milestones/PreventiveMedicineMilestones-OccupationalMedicine.pdf).

## APPENDIX 3

### OEM Research and Education

The profession of medicine requires ongoing scholarly inquiry, lifelong learning, and the ability to teach others. If an OEM physician participates in research or education, competence in the techniques and methodologies of research and education is required.

1. Design and conduct a scientific investigation:
  - i. Formulate a hypothesis.
  - ii. Perform a literature review.
  - iii. Select and apply research design methods, including knowledge of biostatistics and epidemiology when applicable.
  - iv. Seek and secure human or animal subjects for panel approval when indicated.
  - v. Identify and secure necessary resources.
  - vi. Collect and prepare data for analysis.
  - vii. Analyze data and present results in tabular, graphical, and verbal formats.
  - viii. Draw conclusions and discuss the implications limitations of the research findings.
2. Write a report suitable for publication.
3. Identify learning needs, design a curriculum, conduct a course, and evaluate learning outcomes.
4. Interpret and present technical and clinical data for various audiences:
  - i. Apply principles of adult learning.
  - ii. Handle oral presentations in a professional manner.
  - iii. Prepare effective written reports for various audiences.
  - iv. Defend conclusions and recommendations, using appropriate data and logical reasoning.
  - v. Evaluate learning outcomes.