

ACOEM OEM Core Competencies: 2021

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Competency is defined as possession of sufficient physical, intellectual, and behavioral qualifications to perform a task or serve in a role which adequately accomplishes a desired outcome. Recognizing the need for defining competencies essential to occupational and environmental medicine (OEM) physicians, the American College of Occupational and Environmental Medicine developed its first set of OEM Competencies in 1998. Later updated in 2008, and again in 2014, the increasing globalization and modernization of the workplace, along with published research on OEM practice, required an update to ensure OEM physicians stay current with the field and practice of OEM. Delineation of core competencies for the profession provides employers, government agencies, health care organizations, and other health practitioners a solid context of the role and expertise of OEM physicians.

PART 1: INTRODUCTION AND 10 CORE COMPETENCIES

The American College of Occupational and Environmental Medicine (ACOEM) recognizes the need for defining competencies essential to occupational and environmental medicine (OEM) physicians. The first set of OEM competencies was published in 1998,¹ later updated in 2008,² and again in 2014.³ Increasing globalization and modernization of the workplace, along with published research on OEM practice,⁴⁻⁹ and

the evolution of the curricula in US OEM residency programs required an update to these OEM competencies to stay current with the overall field and practice of OEM.¹⁰⁻¹⁷

OEM focuses on the interaction between work, the environment, and health. This includes the arrangements of work; the physical, chemical, and organizational environments in the workplace; and the health outcomes of environmental exposures and social determinants. Physicians practicing OEM are expected to understand how to recognize, prevent, evaluate, diagnose, treat, and manage adverse health effects from workplace and environmental hazards, as well as, how to create and promote a culture of wellness in the workplace. Moving from the traditional view of OEM as “industrial medicine,” OEM physicians have become the leading experts on mitigating the impact of health conditions on work and conversely the impact of work conditions on health. In practice, this may include direct patient care, managing employee absences, evaluating work capacity, preventing work disability, and assessing fitness-for-work duties based on knowledge of the workplace environments, occupations, and job tasks; advising on appropriate work restrictions, disaster preparedness, surveillance; and designing and implementing programs focused on employee health and human performance. In essence, OEM focuses on the National Institute for Occupational Safety and Health’s (NIOSH) Total Worker Health[®] Program.¹⁸ The preventive medicine foundation of occupational medicine serves as the basis for the various practice areas in OEM, ranging from preventing or limiting the impact of illness or injury related to a hazardous exposure or work injury to ensuring that neither the individual or others will be harmed if a medical condition may impact a worker’s ability to perform a task safely.

OEM physicians are also required to effectively utilize a multidisciplinary approach, which involves collaboration with a wide range of other professionals. This may include among others, other medical specialists and health care providers, employers, safety and industrial hygiene professionals, human resource managers, attorneys, labor unions, and other public health professionals.

In these interactions, OEM physicians should follow a strict code of ethics related to matters such as confidentiality and potential conflicts of interest. The *ACOEM Code of Ethics* provides detailed guidance.¹⁹ Effective communication is expected of the OEM physician operating in a largely collaborative context executing tasks such as risk communication, patient education, workforce education, development of policy and guidance documents, and medical/legal document preparation.

In general, OEM physicians possess a much more diverse background than physicians practicing in most other areas of medicine in that their role frequently extends beyond solely clinical medicine. An eye to population medicine is essential.^{19,20} Research on OEM careers and practice indicate that OEM physicians typically practice in three broad areas^{4-6,16}: (1) clinical care such as workers’ compensation injury or illness care management and work-related placement examinations; (2) clinical subspecialty care such as toxicology and environmental hazard evaluation, causation analysis and medical/legal work, work fitness, and disability management; and (3) management/population health to include corporate employee health program management, pandemic preparedness and exposure management, OEM research, and benefit management.²⁰⁻²⁴ There tends to be a great deal of overlap among these areas and while many OEM physicians’ practice includes all three practice environments, those who are board certified in occupational medicine should be able to competently work in all three areas. However, like other specialties, not all physicians practicing OEM need equivalent competency in each of these diverse areas.

Pathways toward board certification in occupational medicine (OM) are through the American Board of Preventive Medicine (ABPM) or American Osteopathic Board of Preventive Medicine (AOBPM). Residency programs in OM provide training consistent with the American Council for Graduate Medical Education (ACGME) requirements, OEM milestones, ABPM core content areas, and the ACOEM core competencies as described in this document. Both ABPM and AOBPM maintain

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a list of certified physicians through their organization.

However, most physicians engaged in the practice of OEM are not board certified in occupational medicine (OM) but are often board certified in other medical fields. According to its membership data, approximately 42% to 47% of ACOEM physician members are board certified in OM and 65% to 71% are board certified in another specialty. (These numbers do not add up to 100% as some members are double certified and captured in both categories.)

In 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 which adequately accomplishes a desired outcome. Delineation of core competencies for the profession provides employers, government agencies, health care organizations, and other health practitioners a solid context of our role.

This document organizes key topics relevant to OEM theory and practice into 10 core competency areas, relevant for all OEM physicians. It then describes the knowledge areas and skill sets for each of those 10 areas, further describing how each of the three practice areas may be addressed within some of the competencies.

The term “OEM physician” is used generically, without specification of board certification. These OEM Core Competencies define knowledge and skills that one who considers oneself an OEM physician should possess. Those with more advanced training such as through residency programs should be expected to demonstrate increased knowledge and skills beyond what is presented in this document. In essence, this document denotes the minimum competencies required of a practicing OEM physician. Physicians without OM board certification can avail themselves of training courses available through ACOEM and other organizations designed to teach the basics of OEM. These courses also provide specialized content on topics such as medical review officers (MRO), commercial driver medical examiners (CDME), or performance of an independent medical examination (IME), necessary for the effective delivery of highly specific OEM-related clinical services. Other courses may focus on toxicology, ergonomics, or health and human performance.

ACGME denotes six core competencies required of the physician seeking OM board certification.¹⁴ This document indicates which of these six competencies are primarily addressed through the 10 OEM Core Competencies outlined in this document. The six ACGME core competency areas are: (1) Patient Care; (2) Medical Knowledge; (3) Practice-Based Learning

and Improvement; (4) Interpersonal and Communication Skills; (5) Professionalism; and (6) Systems-Based Practice.¹⁵ ACGME has also published milestones which OM resident trainees are required to achieve prior to graduation. Achievement of these milestones also are required prior to the resident being able to sit for the OM certifying examination.

Appendix A describes the ACGME competencies and Appendix B the ACGME milestones. Appendix C presents the content outline of the ABPM and AOBPM OM certification examinations. These should be considered reference documents, relevant to the current training of new OEM physicians seeking board certification. Appendix D is related to competency in techniques and methodologies of research and education.

OEM CORE COMPETENCIES

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

1. **Clinical Occupational and Environmental Medicine:** OEM physicians should have the knowledge and skills to provide evidence-based clinical evaluation and treatment of injuries and illnesses that are occupationally or environmentally related. OEM physicians' expertise is also applied to evaluating the impact of personal medical conditions or work-related conditions on the ability to perform work tasks. Throughout the course of care, physicians should seek to maximize the patients' functional abilities.^{25,26} Knowledge and skill are essential in a broad range of specialties including dermatology, internal medicine, neurology, pulmonary, infectious diseases, orthopedics, psychiatry, pain management, sleep medicine, and others. Individuals with underlying risk factors or disease may encounter special concerns in certain positions. OEM physicians utilize their knowledge and skill to identify those conditions which may present a safety concern or may be exacerbated by certain exposures. Working with other professionals which may include safety, human resources, labor relations, industrial hygiene and/or the employee's health care provider, OEM physicians evaluate and coordinate appropriate cautions and job task in individuals with high consequence disease or risk factors.

Their perspective is crucial in evaluating workers in certain positions such as emergency response, hazardous waste, commercial driving, forklift operation, or those requiring respirator use. These positions have the potential for a high consequence outcome for the population served if there is a sudden or emergent medical event during work. Clinical expertise may be applied in face-to-face care of patients or caring for populations, as well as activities such as case management and peer-to-peer discussions. OEM services may also be provided through telehealth. OEM physicians have responsibility for employee health or population health management as part of their clinical OEM practice. (ACGME: *Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism.*)

2. **OEM Related Law and Regulations:** OEM physicians should have the knowledge and skills necessary to understand and apply regulations applicable to occupational and environmental health as well as the range of laws and regulations related to interactions between work and health. They should also be aware of voluntary standards, guidance, or recommendations regarding work practices, exposures, and other factors which may impact the health and safety of workers from organizations such as NIOSH, Department of Transportation (DOT), American Congress of Governmental Industrial Hygienists (ACGIH), and ACOEM. OEM physicians need to interact knowledgeably with non-medical professionals in various roles including human resources operations, industrial hygiene, safety, labor relations, government affairs, and legal, and should understand the laws, regulations, standards, and practices that guide these professionals. (ACGME: *Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)
3. **Environmental Health:** OEM physicians should have the knowledge and skills necessary to recognize potential chemical, physical, and biological environmental causes of health concern to individuals as well as to community health. Environmental issues most often include air, water, or soil contamination by natural or artificial pollutants. OEM physicians should be competent in taking an exposure history that includes environmental as well as occupational sources and must understand how to identify environmental hazards. They can also characterize risk, based on an assessment of exposure that includes

potential routes of exposure and risk assessment. They understand dose–response relationships and how to compare environmental and biomonitoring data to published standards. OEM physicians should be aware of common clinically significant environmental agents and diseases relevant to the geographic area where they practice, such as lead, asbestos, arsenic, and radon. (ACGME: *Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

4. **Work Fitness and Disability Management:** OEM physicians should have the knowledge and skills to determine whether workers can safely be at work and perform required job tasks. They should be able to evaluate the individual, coordinate care with other specialists and utilize evidence-based guidelines to develop a treatment or management plan. OEM physicians should be able to utilize information from employers, other providers, and professionals such as case managers, ergonomists, therapists, vocational rehabilitation specialists, safety professionals, attorneys, and human resources to facilitate an outcome that aligns an individual's abilities with the job requirements and essential functions. OEM physicians should have the knowledge and skills necessary to communicate and provide guidance to the employee and employer when there is a need for integration of an employee with a disability or impairment/functional limitations into the workplace, or when there is a need to pursue other avenues such as vocational rehabilitation or disability benefits. This would include whether such disability is due to musculoskeletal or cognitive function, the prognosis and progression of the medical condition including substance abuse or the effect of treatment such as medications or other therapy. Some OEM providers may perform disability evaluations or IMEs utilizing current disability or impairment rating resources. Others may be responsible for developing and managing transitional or alternate work placement programs or evaluating the effectiveness of OEM medical care delivered by other physicians, and monitor adherence to evidence-based practice guidelines as well as clinical outcomes. (ACGME: *Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)
5. **Toxicology:** OEM physicians should have the knowledge and skills to recognize, evaluate, and manage health

effects of exposures to toxic agents at work or in the general environment. They should be familiar with and able to use existing resources and databases (eg, safety data sheets [SDS], PubChem, threshold limit values [TLV], etc.) to characterize the potential risk from occupational and environmental chemical exposures. OEM physicians can interpret industrial hygiene reports and other data describing specific exposure conditions to determine potential routes of exposure and possible overexposure. They should be familiar with the adverse effects of such overexposures on exposed individuals, as well as the standard clinical and biological tests used to confirm such adverse effects. OEM physicians can 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 surveillance and monitoring procedures for those chemicals. (ACGME: *Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Professionalism and Systems-Based Practice.*)

6. **Hazard Recognition, Evaluation, and Control:** OEM physicians should have the knowledge and skills to assess if there is risk of an adverse event from exposure to physical, chemical, biological, or psychosocial hazards in the workplace or environment. They should be prepared to collaborate with industrial hygienists or other qualified safety and health professionals and interpret measurements and reports from such professionals in context. If there is a risk with exposure, that risk can be characterized with recommendations for control measures or medical surveillance. OEM physicians should demonstrate an understanding of the core principles of industrial hygiene, ergonomics, occupational safety and risk assessment and communication, and apply Hierarchy of Controls principles to protect the health of individual workers, patients, and the public from known physical, chemical, biological, or psychosocial hazards. (ACGME: *Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills and Systems-Based Practice.*)
7. **Disaster Preparedness and Emergency Management:** OEM physicians may have a critical role in emergency preparedness, emergency management, and pandemic preparation and mitigation. This includes playing a key role in protecting employees and

families, health systems, companies, and government agencies, as well as contributing to the health of the national and global workforce by anticipating and preventing the economic consequences of disasters. OEM physicians may be called upon to treat those impacted by the emergency or disaster or to evaluate emergency responders. OEM physicians should be able to describe specific threats, including a broad range of physical, chemical, biological, or psychosocial hazards. Depending on their practice setting, OEM physicians may need the knowledge and skills to collaborate with the employer management team to plan for workplace response to natural or manmade disasters. Emergency management planning includes resource mobilization, worker population tracking, communication, procurement of medical products, financing, leadership and governance, and contingency planning. Collaboration with local, state, or federal agencies is essential. (ACGME: *Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills and Systems-Based Practice.*)

8. **Health and Human Performance:** OEM physicians should be able to identify and address individual and organizational factors in the workplace toward optimizing worker health and enhancing human performance. They should be able to assess the degree of impact of those factors (ie, smoking, depression, burnout, and other medical conditions) and be able to advise on or create programs relevant to that workplace to address the concern (ie, smoking cessation, physical activity, depression or blood pressure screening, weight management, mindfulness, or resiliency training) that will improve worker wellness. OEM physicians should be able to understand data management and reporting systems and assess aggregate data from health risk assessments, health insurance claim data and the effect of implemented wellness related programs. They should be knowledgeable of the organizational structure and be able to communicate data to senior management of an organization. Overall, OEM physicians should have the ability to provide guidance to an organization on optimal health and human performance programs to consider for the workforce and may participate in decisions about the optimal method to deliver those services. They provide

advice to support the organization promoting a culture of health and ensuring that any program aligns with business goals in accordance with best practice in supporting workplace health and safety. OEM physicians should have a strategy to demonstrate their value to the system and the return on investment (ROI) of suggested or implemented initiatives. The goal being creating and sustaining a healthy, safe, and high-performance workforce. (*ACGME: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills and Systems-Based Practice.*)

9. **Public Health, Surveillance, and Disease Prevention:** OEM physicians should be able to assess, prepare and respond to individual and population risks for common occupational and environmental disorders as well as emerging and catastrophic events such as pandemics, bioterrorism, climate/weather occurrences. They should have the knowledge and skill to develop, evaluate, and manage medical surveillance programs for the workplace as well as the public to identify trends and sentinel events. They should be knowledgeable and able to apply appropriate screening guidelines, as well as immunization and chemo-prophylaxis recommendations for workers. This includes those from the US Preventive Services Task Force (USPSTF), Hospital Infection Control Advisory Committee on Immunizations, Centers for Disease Control and Prevention (CDC), and applicable OSHA guidelines (eg, bloodborne pathogen exposure). OEM physicians should be able 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. Deploying information technology to address current and emerging occupational hazards and utilizing available information, they should have the ability to appropriately communicate risk to workers, organizations, and the public. OEM physicians should also possess data management skills as well as know how to access and advise expert epidemiology and biostatistics support in acquiring, managing, and interpreting data relevant to the populations they serve in order to make evidence-based interventions. They should be able to measure, organize and improve public health service or

a surveillance system. (*ACGME: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

10. **OEM Related Management and Administration:** OEM physicians should have administrative and management knowledge and skills to plan, design, implement, manage, and evaluate comprehensive occupational and environmental health programs and projects and work with leadership and governance to ensure the health and safety of employees. OEM physicians need an understanding of health care benefits, workers' compensation systems, electronic health records, and knowledge of the laws and regulations applicable to their jurisdiction, industry, and population of interest. They should understand and be able to articulate the differences in assessment between the concepts of medical causation and those related to workers' compensation and other legal and regulatory standards. 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 these needs in their practices. OEM physicians should be able to collaborate as part of a larger OEM team which may include physician colleagues, other health care providers, industrial hygienists, safety professionals, ergonomists, physical therapists, athletic trainers, employers, legal experts, human resources professionals, insurance carriers, case managers, adjusters, etc., and may play a leadership role in those teams. They may be 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. OEM physicians should be able to manage many of the programs essential to the success of the above nine core competencies. (*ACGME: Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

PART 2: KNOWLEDGE AND SKILL SETS

1. **Clinical Occupational and Environmental Medicine:** OEM physicians should have the knowledge and skills to provide evidence-based clinical evaluation and treatment of injuries and illnesses that

are occupationally or environmentally related. Their expertise is also applied to evaluating the impact of personal medical conditions or work-related conditions on the ability to perform work tasks. Throughout the course of care, the physician should seek to maximize the patient's functional abilities.^{25,26} Knowledge and skill are essential in a broad range of specialties including dermatology, internal medicine, neurology, pulmonary, infectious diseases, orthopedics, psychiatry, pain management, sleep medicine, and others. Individuals with underlying risk factors or disease may encounter special concerns in certain positions. OEM physicians utilize their knowledge and skill to identify those conditions which may present a safety concern or may be exacerbated by certain exposures. Working with other professionals which may include safety, human resources, labor relations, industrial hygiene and/or the employee's health care provider, OEM physicians will evaluate and coordinate appropriate cautions and job task in an individual with a high consequence disease or risk factors. Their perspective is crucial in evaluating workers in certain positions such as emergency response, hazardous waste, commercial driving, forklift operation or those requiring respirator use. These positions have the potential for a high consequence outcome for the population served if there is a sudden and emergent medical event during the course of work. Clinical expertise may be applied in face-to-face care of patients or caring for populations, as well as activities such as case management and peer-to-peer discussions. OEM services may also be provided through telehealth. OEM physicians have responsibility for employee health or population health management as part of their clinical OEM practice. (*ACGME: Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism.*)

Clinical: General

OEM physicians should provide clinical care with an understanding of the workplace, work exposures, and relevant statutes and regulations, such as federal or state medical standards and workers' compensation. They should understand and identify interactions between personal and occupational health conditions and risk factors and understand the process for the evaluation of causation of occupational illnesses and injuries. Some may be able to prepare detailed root cause analysis reports.

Core Knowledge and Skills

1. Obtain appropriately detailed patient histories, with an emphasis on occupation and exposure.

2. Identify the potential relationship between patient medical complaints and physical findings with occupational/environmental exposures.
3. Interpret applicable and relevant clinical laboratory tests and imaging studies in the context of diagnosing, treating, mitigating, and preventing occupational and environmental injury and illness/disease.
4. Evaluate the potential relationship regarding work relatedness and effectively communicate and support that opinion.
5. Identify non-occupational/environmental factors that may contribute to work-related disease or injury.
6. Diagnose and treat or refer and manage occupational/environmental illnesses and injuries with the use of consultants in related disciplines when indicated.
7. Manage a workers' compensation case treatment plan from first visit to closure, including provision of required medical documentation, following the relevant jurisdictional rules.
8. Elicit patients' concerns about exposures and establish a therapeutic alliance incorporating risk communication.
9. 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.
10. Identify and refer the injured or ill employee for definitive treatment and diagnosis for non-occupational illness and injury.
11. 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 human performance.
12. Apply evidence-based clinical practice guidelines in one's practice of medicine.
13. Utilize clinical knowledge to assess the impact of medical conditions on the ability to perform work tasks and if necessary, consider modifications which would be needed for performance of job tasks.
14. Recognize the importance of early and safe return to work for injured workers and focus on functional improvement.

Additional Knowledge and Skills

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

1. Assist programs or companies in developing, implementing, or evaluating

their occupational or environmental health programs and injury management procedures.

2. Perform utilization review and complex case management.
3. Perform IMEs.
4. Perform impairment rating examinations using specific sets of guidelines.
5. Perform functional capacity evaluations.
6. Perform CDMEs (National Registry of Certified Medical Examiners [NRMCE] certification required).
7. Perform airman medical examinations (aviation medical examiner [AME] certification required).
8. Review drug tests (MRO certification required in some settings, recommended in others).
9. Apply principles of population management which include understanding health risks, epidemiological principles, clinical practice guidelines for chronic disease management and current practices in disease detection, prevention, and treatment, as well as disability management principles.

Clinical: Cardiology

OEM physicians should be aware of the cardiac conditions that can present as work-related conditions, complicate work-related conditions or interfere with fitness for work.

Core Knowledge and Skills

1. Recognize, evaluate, manage, and refer if appropriate, the cardiac effects of chemical asphyxiants such as carbon monoxide, methylene chloride, and cyanide.
2. Evaluate a person's ability to perform strenuous or safety-sensitive work after a cardiac event (such as myocardial infarction, stent/angioplasty, arrhythmia, placement of pacemaker or implantable cardioverter defibrillator, coronary artery bypass graft surgery) and the risk of sudden or gradual impairment or incapacitation due to that cardiac condition.
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 and refer if appropriate.

Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians, referring to cardiologists as appropriate: Perform cardiovascular evaluations such as stress testing, echocardiography, or diagnostic ultrasound to assess fitness for duty.

Clinical: Dermatology

Occupational dermatoses, among the leading causes of occupational disease in the United States, may also result from exposure to hazardous compounds in the home or other environments. Dermatology issues may impact performance of some job tasks. OEM physicians should provide early recognition, diagnosis, and management of relevant dermatologic disorders and make necessary recommendations for prevention, treatment, or fitness for duty.

Core Knowledge and Skills

1. Differentiate occupational skin disorders by history, examination, and diagnostic evaluation.
2. Identify and refer if appropriate, work-aggravated dermatoses.
3. Identify and refer if appropriate, the cause of allergic contact dermatitis and allergic contact urticaria (and other related IgE-mediated allergic responses), particularly those caused by common antigens such as latex, epoxy monomer, nickel, and rhus.
4. Identify and refer if appropriate, primary irritant-induced dermatoses.
5. Identify and refer if appropriate, potentially contagious skin conditions such as those caused by varicella/zoster, herpes, methicillin-resistant *Staphylococcus Aureus* (MRSA), or other skin infection causing pathogens.
6. Identify and refer if appropriate other occupational dermatoses such as occupational acne, occupational cutaneous infections, occupational skin neoplasia, occupational pigmentary disorders.
7. Manage occupational and environmental skin injuries and dermatoses such as lacerations, contact or allergic dermatitis, chemical and other types of burns.
8. Evaluate the impact of dermatologic conditions on the performance of job tasks.

Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians, referring to dermatologists as clinically indicated:

1. Perform repair of skin lacerations.
2. Perform testing for diagnosis of allergic contact dermatitis and other atopic conditions.
3. Perform skin biopsy.

Clinical: Emergency Medicine

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.

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. Perform basic wound repair techniques.
4. Evaluate ophthalmic injuries and refer as appropriate.
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.

Additional Knowledge and Skills

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

1. Utilize diagnostic testing such as radiographs, ultrasound, or pulmonary testing as part of emergency evaluations.
2. Perform therapeutic and diagnostic injections.
3. Treat and manage simple fractures including splinting and casting.
4. Manage ophthalmic injuries including removal of foreign body.

Clinical: Endocrinology

OEM physicians should be aware of the endocrine conditions that can present as, or complicate work-related conditions or interfere with fitness for work.

Core Knowledge and Skills

1. Select appropriate initial diagnostic tests to evaluate workplace issues related to common endocrine conditions.
2. Assess the impact of poorly controlled endocrine conditions, such as diabetes mellitus on the worker's health and ability to work.
3. Evaluate the role that endocrine conditions (eg, hypothyroidism, diabetes) might cause or exacerbate work-related conditions (eg, carpal tunnel syndrome).
4. Treat and refer as appropriate, endocrine emergencies in the workplace such as hypoglycemia.

Clinical: Gastroenterology

OEM physicians should be aware of the gastroenteric conditions that can present as, or complicate work-related conditions or interfere with fitness for work.

Core Knowledge and Skills

1. Evaluate abnormal liver function enzymes in the context of evidence of exposure to workplace or environmental toxicants.
2. Evaluate personal risk of exposure to hepatotoxic agents.
3. Evaluate gastroenteric conditions and their impact on the worker's health and ability to work.

Clinical: Hematology/Oncology

OEM physicians should have the knowledge and skills to evaluate, diagnose, and minimize the hematologic and carcinogenic effects of occupational and environmental exposures.

Core Knowledge and Skills

1. Interpret hematologic laboratory studies in the context of medical surveillance and post-exposure examinations.
2. Perform clinical evaluations to detect the health effects of exposure to hematologic toxicants such as benzene, lead, and arsine.
3. Evaluate hematologic/oncologic medical conditions or their treatment on impact on the worker's health and ability to work.

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

Bloodborne, waterborne, foodborne, and airborne pathogens pose unique challenges for travelers and in occupational and/or environmental settings. OEM physicians should have the knowledge and skill to provide early recognition and preventive action of infectious disease resulting from workplace exposures or having an impact on performance, including, when appropriate, contact investigations, screening, prophylaxis, and health risk communication, to minimize their spread, health effects, and recurrences.

Core Knowledge and Skills

1. Identify, manage, treat, or refer for treatment, and implement steps to prevent or mitigate:

- a. Bloodborne, airborne, waterborne, and food borne pathogen exposure and associated illnesses.
 - b. Infestations and zoonotic conditions.
 - c. Transmission of infection by those in certain occupations such as food service workers.
2. Understand and apply recommendations from public health authorities, such as CDC, and World Health Organization (WHO), and other relevant organizations for immunization of the working populations.
 3. Apply CDC, OSHA, or other requirements or recommendations for infectious disease prevention, surveillance, exposure evaluation and treatment.
 4. Understand the role of the OEM physician as it relates to endemics, epidemics, and pandemics.
 5. Manage incidents of potential bloodborne pathogen, tuberculosis, or other occupational infectious disease exposure according to applicable government guidelines.

Additional Knowledge and Skills

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

1. Evaluate travel medicine issues and provide appropriate advice and treatment as indicated.
2. Participate in research and education on infectious agents and unusual zoonoses.
3. Manage specific occupational infectious diseases found in various venues such as biosafety labs, animal care or medical centers.
4. Manage/advise on employee's health and safety in response to epidemic/pandemic situation including on mitigation activities such as physical distancing, use of personal protective equipment (PPE), hygiene, testing, contact tracing, treatment, and vaccination.
5. Design and manage preventive programs such as for needlestick or immunizations.

Clinical: Musculoskeletal

Musculoskeletal injuries comprise a majority of the acute occupational injuries seen by the OEM physician and may cause major human performance, 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 are 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. Utilize knowledge of the pathophysiology, evaluation, and management of work-related musculoskeletal injury.
3. Interpret common diagnostic studies used to evaluate musculoskeletal conditions in occupational medicine.
4. Understand options and controversies in the treatment of musculoskeletal conditions.
5. Identify, manage, and prevent acute and chronic musculoskeletal disorders and their associated disabilities, and determine when such conditions are work-related.
6. Some conditions of particular interest include spine disorders; cumulative trauma disorders; joint and extremity injuries and disorders; degenerative diseases of bones, joints, and connective tissue.
7. Identify appropriate rehabilitation services for an injured worker.
8. Identify delayed recovery and manage chronic musculoskeletal pain syndromes with referral as appropriate.
9. Evaluate the impact of musculoskeletal conditions on fitness for duty.

Additional Knowledge and Skills

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

1. Utilize diagnostic tools such as radiographs or ultrasound for evaluation of musculoskeletal injuries and pain syndromes.
2. Perform diagnostic or therapeutic injections for musculoskeletal injuries and pain syndromes including but not limited to the following: joint and soft tissue injections including bursal, tendon sheath, nerve sheath, barbotage, tenotomy, and aspiration, using imaging techniques as appropriate.
3. Perform casting and splinting for musculoskeletal disorders and fractures.
4. Utilize knowledge of biomechanics of injury and apply to preventive strategies (ergonomics, prevention programs, pre/post shift biomechanical training, etc.).

Clinical: Neurology

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

Core Knowledge and Skills

1. Perform focused neurological and mental status examinations in the evaluation of occupational/ 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 neurologic conditions that may be impacting the ability to perform work tasks. Such studies may include imaging, electrodiagnostic or electrophysiologic studies or neuropsychological/neurocognitive testing.
3. Recognize neurologic emergencies and treat or refer as appropriate.
4. Collaborate with specialists and, primary care providers to appropriately treat and determine if workers can safely continue to work or return to work.
5. Understand and interpret diagnostic testing (eg, nerve conduction studies or electromyography).
6. Evaluate the impact of neurologic conditions on fitness for duty, especially in safety-sensitive occupations.

Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians: Perform diagnostic testing or treatment utilizing ultrasound, nerve conduction studies, electromyography, or nerve blocks.

Clinical: Ophthalmology

OEM physicians 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. Perform ophthalmic examinations, including visual acuity and color/depth tests, assessment for foreign bodies or other abnormalities.
2. Recognize and treat, or refer to specialist as appropriate, occupational ophthalmic diseases and injuries. These may include infectious and irritant conjunctivitis,

ultraviolet photokeratitis, ocular chemical exposures and burns (including alkali, acid, and hydrofluoric acid).

3. Identify the need for specialized ophthalmologic evaluation.
4. Evaluate the impact of ophthalmic abnormalities in fitness for duty determinations.

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 slit lamp examination.
2. Measure intraocular pressure.
3. Utilize diagnostic tools such as ultrasound to evaluate ophthalmic injuries.
4. Removal of ophthalmic superficial foreign bodies.

Clinical: Otolaryngology

OEM physicians 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 treat or refer as appropriate, an individual with hearing loss or other occupationally related otologic conditions such as external otitis related to, or complicated by, the use of hearing protection.
3. Identify noise-induced hearing loss and counsel on means to prevent further damage.
4. Interpret an audiogram, identify a standard threshold shift, and implement appropriate treatment and preventive interventions.
5. Support safety and industrial hygiene professionals in the mitigation and/or abatement of occupational noise sources, the design and implementation of hearing conservation programs, and in the selection of appropriate hearing protection options for employees.
6. Develop, implement, and manage an occupational hearing conservation program.
7. Evaluate the impact of hearing abnormalities in fitness for duty.

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 audiometric testing.
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

OEM physicians should be familiar with the diagnosis, treatment associated with various types and presentations of pain.

Core Knowledge and Skills

1. Understand the difference between acute and chronic pain, including the neurologic pathways mediating each.
2. Utilize treatment approaches that will help patients with pain maintain optimal function consistent with current best practice and evidence-based medicine.
3. Follow evidence-based treatment guidelines related to acute opioid prescription and chronic opioid management.
4. Refer to pain management specialists as appropriate and collaborate on a treatment plan that includes functional restoration and return-to-work planning.
5. Evaluate the impact of pain and any treatment on fitness for duty, especially in safety sensitive positions.
6. Utilize state's prescription drug monitoring program.

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 long-term opioid therapy.
2. Manage outpatient opioid detoxification.
3. Perform diagnostic testing or treatment utilizing ultrasound, nerve conduction studies, electromyography, or nerve blocks

Clinical: Psychiatry

OEM physicians should have the knowledge and skill to recognize, evaluate, and assist in the management or triage of workers with psychological or substance related disorders presenting in the workplace.

Core Knowledge and Skills

1. Identify the impaired employees with mental health or drug abuse issues and refer as appropriate including to employee assistance programs.
2. Identify and interpret warning signs of the violent, homicidal, or suicidal employee and refer as appropriate.

3. Identify and evaluate with referral as appropriate workers who may be under the influence of psychoactive chemicals at work (eg, industrial exposure, medications, recreational drugs, 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 catastrophizing, disability beliefs and fear/avoidance behavior.
5. Perform a mental health and psychosocial history.
6. Evaluate the impact of psychological conditions and their treatment on fitness for duty.
7. Determine the need for and recommend appropriate limitations or accommodations for workers with mental health conditions.
8. Utilize evidence-based guidelines to provide appropriate treatment and assess return to work for individuals with mental health conditions.
9. Ability to recognize and advise on workplace interventions to prevent burnout in colleagues and employees.
10. Understand the impact of social determinants of health on employee health and wellness.

Additional Knowledge and Skills

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

1. Identify and assist in the management of psychological stressors in the workplace.
2. Participate in the implementation of workplace mental health programs which can impact employee human performance, morale, and disability.
3. Participate in the design of violence prevention and response programs.
4. Counsel employees on resiliency practice.

Clinical: Pulmonary

OEM physicians 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 but not limited to work-related asthma, pneumoconiosis, irritant inhalations, chronic obstructive pulmonary disease, hypersensitivity pneumonitis, inhalation fever, bronchiolitis obliterans, lung cancer, mesothelioma, and obstructive sleep apnea.

2. Identify and recommend appropriate work restrictions and accommodations for both occupational and non-occupational lung diseases.
3. Perform and interpret a spirogram appropriate standards.
4. 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.
5. 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).
6. Evaluate the impact of pulmonary conditions and their treatment on the worker's health and ability to work.
7. Apply the hierarchy of controls to reduce exposure and minimize risk for pulmonary disease and impairment.

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 and interpret or refer as appropriate for diagnostic testing for pulmonary disease including pulmonary function testing, methacholine and other challenge testing, pulmonary imaging studies and allergy testing.
2. Perform International Labor Organization (ILO) B reading of radiographic abnormalities of pneumoconiosis.
3. Utilize diagnostic ultrasound to evaluate lung function and pathology related to occupational injury and exposures.

Clinical: Reproductive Medicine

OEM physicians have 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

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians: Advise on policies and procedures relating to the protection of fertility for both men and women and for placement of pregnant or lactating workers.

Clinical: Sleep Medicine

OEM physicians 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 disorder such as obstructive sleep apnea, circadian rhythm sleep disorders or fatigue.
2. Refer for evaluation and diagnostic testing as appropriate, individuals where sleep disorders may impact work performance.
3. Evaluate the impact of sleep disorders on fitness for duty, especially in safety-sensitive positions.

Additional Knowledge and Skills

Some OEM physicians have additional knowledge and skills in the following areas, not considered core for all OEM physicians: Advise on and implement a fatigue risk management program.

2. OEM Related Law and Regulations: OEM physicians should have the knowledge and skills necessary to understand and apply the regulations applicable to occupational and environmental health, as well as the wide range of laws and regulations related to the interactions between work and health. They should also be aware of voluntary standards, guidance or recommendations regarding work practices, exposures and other factors which may impact the health and safety of workers from organizations such as NIOSH, DOT, ACGIH, and ACOEM. OEM physicians need to interact knowledgeably with non-medical professionals in various roles including human resources operations, industrial hygiene, safety, labor relations, government affairs and legal, and should understand the laws, regulations, standards, and practices that guide these professionals. (*ACGME: Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

Core Knowledge and Skills

The OEM physician should have the knowledge and skills to:

1. Understand and apply applicable regulations, related to occupational health

practice, to employers, employees, and patients, including:

- a. OSHA standards and regulations, including the General Duty Clause.
 - b. The privacy provisions of the Health Insurance Portability and Accountability Act (HIPAA), including exceptions related to workers' compensation and public safety.
 - c. DOT and other federal regulations regarding fitness for duty in safety-sensitive positions.
 - d. Federal and state drug testing regulations.
 - e. Drug-free workplace programs.
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 record-keeping.
 4. Maintain complete, timely, and legible records.
 5. Recognize and address ethical dilemmas in the practice of OEM, using relevant guidelines.
 6. If providing workers' compensation related care, comply with requirements of relevant statutes, 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. Appropriately implement and explain consensus standards applicable to specific groups of employees.

Additional Knowledge and Skills

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

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:
 - a. Legislation and regulations protecting the employment rights of persons with disabilities (eg, the Americans

with Disabilities Act [ADA], ADA Amendment Act [ADAAA], Rehabilitation Act of 1973).

- b. Genetic Information Nondiscrimination Act (GINA).
 - c. Family Medical Leave Act (FMLA).
 - d. Short- and long-term disability management and outcomes related to impairment and disability.
 - e. Environmental health and safety regulations.
 - f. 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.
 3. Provide medical-legal reports and expert opinions and testimony on OEM issues.
 4. 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.

3. Environmental Health: OEM physicians 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 soil contamination by natural or artificial pollutants. OEM physicians should be competent in taking an exposure history that includes environmental as well as occupational sources. The physician must understand how to identify environmental hazards. OEM physicians can also characterize risk based on an assessment of exposure that includes potential routes of exposures and risk assessment. They understand dose–response relationships and how to compare environmental and biomonitoring data to published standards. OEM physicians should be aware of common clinically significant environmental agents and diseases relevant to the geographic area where they practice, such as lead, asbestos, arsenic, and radon. (*ACGME: Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

Core Knowledge and Skills

OEM physicians should have the knowledge and skills to:

1. Identify sources and routes of environmental exposure and recommend methods of reducing environmental health risks.

2. Recognize and manage common illnesses that may be impacted by environmental exposures.
3. Characterize health risks based on hazard identification, exposure assessment, and effectively communicate risk from a variety of exposures.
4. Understand basic principles of environmental mitigation and exposure control and be aware of governmental agencies or private resources that can perform environmental monitoring and mitigation.

Additional Knowledge and Skills

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

1. Identify common environmental contaminants indoors and outdoors and understand how to assess exposure to these contaminants.
2. Understand when to obtain environmental monitoring.
3. Interpret and explain the results of environmental monitoring and compare to established guidelines or recommendations.
4. Identify and treat individual health effects associated with environmental exposures.
5. Identify and manage population exposure to environmental toxins.
6. Interpret published quantitative risk assessments and the principles of comparative, cumulative and integrated risk assessment and understand their limitations.
7. Employ 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.

4. Work Fitness and Disability Management: OEM physicians should have the knowledge and skills to determine whether a worker can safely be at work and perform required job tasks. OEM physicians should be able to evaluate the individual, coordinate care with other specialists, and utilize evidence-based guidelines to develop a treatment or management plan. They should be able to utilize information from the employer, other providers, and other professionals such as case managers, ergonomists, therapists and vocational rehabilitation specialists, safety professionals, attorneys, and human resources to facilitate an outcome that aligns the individual's abilities with the job requirements and essential functions. OEM physicians should have the knowledge and skills

necessary to communicate and provide guidance to the employee and employer when there is a need for integration of an employee with a disability or impairment/functional limitations into the workplace, or when there is a need to pursue other avenues such as vocational rehabilitation or disability benefits. This would include whether such disability is due to musculoskeletal or cognitive function, the prognosis and progression of the medical condition including substance abuse or the effect of treatment such as medications or other therapy. Some OEM providers may perform disability evaluations or IMEs utilizing current disability or impairment rating resources. Others may be responsible for developing and managing transitional or alternate work placement programs or evaluating the effectiveness of OEM medical care delivered by other physicians, monitor adherence to evidence-based practice guidelines as well as clinical outcomes. (*ACGME: Patient Care, Medical Knowledge, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

Core Knowledge and Skills

1. Integrate work disability prevention and management principles into delivery of clinical care.
2. Establish clinical treatment protocols that are consistent with current best practice and evidence-based medicine.
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 guidance documents relevant to this topic.

Additional Knowledge and Skills

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

1. Design and implement integrated systems of work disability prevention and management including the impact

psychological, personal medical, and work injury conditions on the natural history of illness and injury.

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 ADAAA, and consistent with the regulations and standards of the applicable system of evaluation.
3. Assess and express impairment in terms required by the relevant legal or benefit systems.
4. Perform IMEs.

5. Toxicology: OEM physicians should have the knowledge and skills to recognize, evaluate, and manage health effects of exposures to toxic agents at work or in the general environment. They should be familiar with and able to use existing resources and databases (eg, SDS, PubChem, TLVs, etc.) to characterize the potential risk from occupational and environmental chemical exposures. OEM physicians can interpret industrial hygiene reports and other data describing specific exposure conditions to determine potential routes of exposure 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. OEM physicians can 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. (*ACGME: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Professionalism and Systems-Based Practice.*)

Core Knowledge and Skills

OEM physicians should have the knowledge and skills to:

1. Evaluate, manage and/or properly refer persons with health effects from toxic exposures.
2. Understand the potential toxicity, including medical surveillance requirements and protection standards related to materials used by working populations routinely served clinically (eg, pre-placement or surveillance examinations).
3. Obtain information about hazardous materials implicated or suspected in toxic exposure evaluations (eg, from SDS and other sources).
4. Use available information from patient, employer, and other sources, incorporating information about protective

- equipment used, to characterize risk of exposure, absorption, and toxic effects.
- Order clinically appropriate laboratory studies to determine acute organ or metabolic effects.
 - Determine need for referral for specialty evaluation or further exposure evaluation.
 - 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

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

- Evaluate, manage, and treat persons whose health may be affected by toxic exposures.
- Determine the nature and extent of toxic exposures, considering routes of exposure and routes of absorption.
- Interpret exposure data in the context of the scientific literature (human and animal), published guidelines or regulations and the patient's presentation.
- 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.
- Interpret and apply information from medical, toxicological, and environmental health literature.
- Perform complex causation analysis and provide a rationalized and well-supported written report.
- Effectively communicate risk, necessary actions, and reassurance to patients.

6. Hazard Recognition, Evaluation, and Control: OEM physicians should have the knowledge and skills necessary to assess if there is risk of an adverse event from exposure to physical, chemical, biological, or psychosocial hazards in the workplace or environment. They should be prepared to collaborate with industrial hygienists or other qualified safety and health 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. OEM physicians should demonstrate an understanding of the core principles of industrial hygiene, ergonomics, occupational safety and risk assessment 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 physical, chemical, biological, or psychosocial hazards. (*ACGME: Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills and Systems-Based Practice.*)

Core Knowledge and Skills

- Recognize common occupational hazards and most appropriate exposure control measures based on the hierarchy of controls which may include PPE.
- Understand protective measures appropriate for the hazards of interest in the working populations served.
- Communicate concerns related to health hazards to appropriate employer health and safety professionals; participate in mitigation efforts.

Additional Knowledge and Skills

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

- Characterize existing and potential occupational and environmental hazards within defined populations.
- Evaluate and interpret the results of industrial hygiene surveys or risk assessments.
- Interpret and apply published exposure limits such as OSHA permissible exposure limits (PELs), ACGIH's TLVs and biologic exposure indices (BEIs), Environmental Protection Agency standards, and other criteria in the assessment of chemical and physical hazard exposures.
- 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.
- Advise employers and employees regarding industrial hygiene and safety 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.
- Design and manage a hearing conservation program for workers exposed to loud noise.
- Perform a risk assessment and identify exposure-related health hazards, evaluate level of exposure, and characterize risk.
- Communicate to target groups including health professionals, patients, the public, and the media, in a clear and effective manner the levels of risk from real or potential hazards and the rationale for selected interventions.

- Assess the workplace and environment for potential hazards and address the need for PPE and other exposure control methods.

7. Disaster Preparedness and Emergency Management:

OEM physicians may have a critical role in emergency preparedness, emergency management and pandemic preparation and mitigation. This includes playing a key role in protecting employees and families, health systems, companies, and government agencies, as well as contributing to the health of the national and global workforce, anticipating, and preventing the economic consequences of disasters. OEM physicians may be called upon to treat those impacted by the emergency or disaster or to evaluate emergency responders. OEM physicians should be able to describe specific threats, including a broad range of physical, chemical, biological, or psychosocial hazards. Depending on their practice setting, OEM physicians may need the knowledge and skills to collaborate with the employer management team to plan for workplace response to natural or manmade disasters. Emergency management planning includes resource mobilization, worker population tracking, communication, procurement of medical products, financing, leadership and governance, and contingency planning. Collaboration with local, state, or federal agencies is essential. (*ACGME: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills and Systems-Based Practice.*)

Core Knowledge and Skills

- Knowledge of local threats, for example, nuclear plants, chemical production facilities.
- Participate in local emergency response exercises.
- Understand how to activate/notify others in the emergency response system.
- Recognize sentinel events that may represent a potential disaster or epidemic.
- Understand local clinical role in the community emergency/disaster response plan.

Additional Knowledge and Skills

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

- Describe specific threats, including a broad range of chemical, biological, radiological, and physical hazards.
- Apply knowledge of personal protection and other approaches to health protection to evaluate the adequacy of protection at the individual level.

3. Participate in the development of emergency or disaster plans for the workplace and/or the community.
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 Incident Command Structure.

8. Health and Human Performance: OEM physicians should be able to identify and address individual and organizational factors in the workplace towards optimizing worker health and enhancing human performance. They should be able to assess the degree of impact of those factors (ie, smoking, depression, burnout, and other medical conditions) and be able to advise on or create programs relevant to that workplace to address the concern (ie, smoking cessation, physical activity, depression or blood pressure screening, weight management, mindfulness, or resiliency training) that will improve worker wellness. OEM physicians should be able to understand data management and reporting systems and assess aggregate data from health risk assessments, health insurance claim data and the effect of implemented well-being related programs. OEM physicians should be knowledgeable of the organizational structure and be able to communicate data to senior management of an organization. Overall, OEM physicians should have the ability to provide guidance to an organization about optimal health and human performance programs to consider for the workforce and may participate in decisions about the optimal method to deliver those services. They should provide advice to support the organization promoting a culture of health, and ensuring that any program aligns with business goals, in accordance with best practice in supporting workplace health and safety. OEM physicians should also have a strategy to demonstrate their value to the system and the return on investment of suggested or implemented initiatives. The ultimate goal is creating and sustaining a healthy, safe and high-performance workforce. (*ACGME: Patient Care,*

Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills and Systems-Based Practice.)

Core Knowledge and Skills

1. Recognize burnout in employees.
2. Perform health risk assessments, biometric screenings, or other appropriate interventions to modify health risk behaviors in the clinical setting.
3. Counsel employees about health risks and lifestyle.
4. Use tools and best practices to identify, measure, and modify individual and population health risk behaviors.
5. 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

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

1. Design, implement and evaluate worksite health-promotion and disease-prevention programs, incorporating Department of Health and Human Services (DHHS) and other authoritative guidelines as appropriate.
2. Understand and apply the concepts of the NIOSH Total Worker Health[®] approach.
3. Describe the appropriate use and limitations of health risk assessment and screening for well populations and the applications of screening, assessment, and early intervention for targeted high-risk groups.
4. Advise on methods for prevention of psychosocial risks at a collective level.
5. Communicate current medical, environmental, and/or other scientific knowledge effectively to target groups, including patients, employees, employers, unions, community groups, and the media.
6. Recognize the effects of cultural, ethnic, and social factors, including health beliefs and practices, on the health and safety of workers.
7. Execute cost/benefit analysis, ROI, value of investment.
8. Critically review the OEM and medical literature.

9. Public Health, Surveillance, and Disease Prevention: OEM physicians should be able to assess, prepare and respond to individual and population risks for common occupational and environmental disorders as well as emerging and

catastrophic events such as pandemics, bioterrorism, climate/weather occurrences. OEM physicians should have the knowledge and skill to develop, evaluate, and manage medical surveillance programs for the workplace as well as the public in order to identify trends and sentinel events. They should be knowledgeable and able to apply appropriate screening guidelines, as well as immunization and chemoprophylaxis recommendations for workers. This includes those from USPSTF, Hospital Infection Control Advisory Committee on Immunizations, CDC, and applicable OSHA guidelines (eg, bloodborne pathogen exposure) and standards. OEM physicians should be able 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. Deploy information technology to address current and emerging occupational hazards. Utilizing available information, they should have the ability to appropriately communicate risk to workers, organizations, and the public. OEM physicians should also possess data management skills as well as know how to access and advise expert epidemiology and biostatistics support in acquiring, managing, and interpreting data relevant to the populations they serve in order to make evidence-based interventions. They should be able to measure, organize and improve public health service or a surveillance system. (*ACGME: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

Core Knowledge and Skills

1. Design and execute a medical surveillance program to protect workers, ensuring compliance with applicable regulations when appropriate as well as monitor, interpret, and act on results.
2. Advise employers concerning trends in occupational injury and illness.
3. Implement prevention programs such as the National CDC Diabetes Prevention Program.
4. Evaluate and manage situations of suspected chemical impairment, including collection of specimens ensuring appropriate chain of custody, in compliance with applicable rules and regulations.
5. Manage incidents of potential bloodborne pathogen, tuberculosis, or other occupational infectious disease exposure according to applicable government guidelines.
6. Identify appropriate exposure controls which may include appropriate PPE,

- with industrial hygiene and safety, to mitigate hazards faced in the workplace.
- Intervene in response to positive findings when indicated to measurably improve health outcomes.
 - Interpret abnormal laboratory findings in asymptomatic workers and recommend further evaluation and/or treatment as indicated.
 - Recognize and report or investigate potential sentinel events.

Additional Knowledge and Skills

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

- 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.
- 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.
- Design and conduct surveillance programs in workplace and/or community settings.
- Review, interpret, and explain the public health and clinical implications of epidemiological studies that address occupational hazards.
- Apply validated epidemiologic and biostatistical principles and techniques to analyze injury/illness data in a defined worker and community populations.
- Apply primary, secondary, and tertiary prevention approaches to disease prevention and health promotion to individuals and communities.
- Recommend and implement policies and control measures to address emerging infectious diseases of concern.

10. OEM Related Management and Administration: OEM physicians should have the administrative and management knowledge and skills to plan, design, implement, manage, and evaluate comprehensive occupational and environmental health programs and projects and work with leadership and governance to ensure the health and safety of employees. OEM physicians need an understanding of health care benefits, workers' compensation systems, electronic health records and knowledge of the laws and regulations applicable to their jurisdiction, industry, and population of interest. OEM physicians should understand and be able to articulate the differences in assessment between the concepts of medical causation and those

related to workers' compensation and other legal and regulatory standards. 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. OEM physicians should be able to collaborate as part of a larger OEM team which may include physician colleagues, other health care providers, industrial hygienists, safety professionals, ergonomists, physical therapists, athletic trainers, employers, legal experts, human resources professionals, insurance carriers, case managers, adjusters, etc., and may play a leadership role in those teams. OEM physicians may be 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. OEM physicians should be able to manage many of the programs essential to the success of the above nine core competencies. (*ACGME: Practice-Based Learning and Improvement, Interpersonal and Communication Skills, Professionalism and Systems-Based Practice.*)

Core Knowledge and Skills

- Establish protocols to manage patient records and protect confidentiality.
- Work effectively as a team member with administrators, occupational health nurses, nurse practitioners, physician assistants, and others, demonstrating an understanding of their roles in an occupational health service.
- Identify potential customers and develop an education and marketing plan for an occupational environmental health program.
- Use information technology (eg, e-mail, local and wide area networks, internet, video conferencing technologies) to communicate with colleagues, clients, and others.
- 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.

Additional Knowledge and Skills

Board-certified OM specialists and other physicians practicing as OEM clinical specialists and OEM population managers may need the following additional knowledge and skills:

- 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.

- 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.
- Recognize potential sources of system or program failure and use root cause analysis to plan solutions.
- Evaluate health 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.
- 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.
- Expanding the footprint of OEM to employees' families and communities.
- Evaluate the effectiveness and cost-effectiveness of occupational health services and risk reduction methods.
- Work effectively with both labor and management to make system-based changes to maximize workplace health, safety, and human performance.
- 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.
- Manage and set up international work-sites, evacuation of injured workers overseas, and manage expatriates.
- Evaluate, analyze, and utilize data systems to use information management tools to identify, acquire, process, use, and share information.

Additional Resources

- American Board of Preventive Medicine—<https://www.theabpm.org/>
- Accreditation Council for Graduate Medical Education Program Requirements—<https://www.acgme.org/Specialties/Program-Requirements-and-FAQs-and-Applications/pfcatid/20/Preventive%20Medicine>
- Journal of Occupational and Environmental Medicine—<https://journals.lww.com/joem/pages/default.aspx>
- National Institute of Occupational Safety and Health (NIOSH)—<https://www.cdc.gov/niosh/>
- Centers for Disease Control and Prevention—<https://www.cdc.gov>

- Agency for Toxic Substance and Disease Registry (ATSDR)—<https://www.atsdr.cdc.gov>
- American College of Occupational and Environmental Medicine (ACOEM)—<https://www.acoem.org>
- Association of Occupational and Environmental Clinics (AOEC)—<http://www.aoec.org>
- Department of Transportation—<https://www.transportation.gov>
- Occupational Safety and Health Administration—<https://www.osha.gov>
- World Health Organization—<https://www.who.int>
- Environmental Protection Agency—<https://www.epa.gov>
- CDC – NCEH: National Center for Environmental Health—<https://www.cdc.gov/nceh/>
- Food and Drug Administration—<https://www.fda.gov>
- Department of Labor—<https://www.dol.gov>
- LaDou J, ed. *Current Occupational and Environmental Medicine*. 5th ed. New York, NY: McGraw Hill; 2014.
- ACOEM Occupational Medicine Practice Guidelines—<https://acoem.org/Practice-Resources/Practice-Guidelines-Center/MDGuidelines>
- Rom WN, Markowitz SB. *Environmental and Occupational Medicine*, 4th ed. 2007. Wolter Kluwer.
- Levy BS, Wegman DH, Baron SL, Sokas RK. *Occupational and Environmental Health*, 7th ed. 2017. Oxford University Press.

REFERENCES

1. American College of Occupational and Environmental Medicine. 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. American College of Occupational and Environmental Medicine. Occupational and environmental medicine competencies: *J Occup Environ Med*. 2014; 56:e21–40. Available at: https://acoem.org/acoem/media/PDF-Library/Publications/OEM_Competencies/ACOEM-OEM-COMPETENCIES.pdf. Accessed July 22, 2020.
4. 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.
5. 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.
6. Harber P, Rose S, Bontemps J, et al. Occupational medicine practice: one specialty or three? *J Occup Environ Med*. 2010;52:672–679.
7. 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.
8. 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.
9. 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.
10. Emmett EA, Green-McKenzie J. External practicum-year residency training in occupational and environmental medicine: University of Pennsylvania Medical Center Program. *J Occup Environ Med*. 2001;43:501–511.
11. 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.
12. Dinman BD. Education for the practice of occupational medicine: knowledge, competence, and professionalism. *J Occup Environ Med*. 2000;42:115–120.
13. Michas MG, Iacono CU. Overview of occupational medicine training among US family medicine residency programs. *Fam Med*. 2008; 40:102–106.
14. Guidotti T. Learning objectives for training and continuing education in occupational medicine. *Am J Prev Med*. 1992;8:249–256.
15. Accreditation Council for Graduate Medical Education. ACGME Program Requirements for Graduate Medical Education in Preventive Medicine. 2020. Available at: <https://www.acgme.org/Specialties/Overview/pfcatid/20>. Accessed June 1, 2021.
16. Ducatman AM, Vanderploeg JM, Johnson M, et al. Residency training in preventive medicine: challenges and opportunities. *Am J Prev Med*. 2005;28:403–412.
17. 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.
18. CDC NIOSH. NIOSH Total Worker Health. Available at: <https://www.cdc.gov/niosh/twh/default.html>. Accessed July 19, 2020.
19. 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, 2020.
20. Green McKenzie J, Emmett E. Characteristics and outcomes of an innovative train-in-place residency program. *J Graduate Medical Educ*. 2017;9:634–639.
21. Baker BA, Greaves IA, Rice HR. Occupational medicine residency graduate survey: assessment of training programs and core competencies. *J Occup Environ Med*. 2007;49: 1325–1388.
22. Baker B, Kesler D, Guidotti T. Occupational and environmental medicine: public health and medicine in the workplace. *Am J Public Health*. 2020;110:636–637. Available at: <https://ajph.aphapublications.org/doi/pdfplus/10.2105/AJPH.2020.305625>. Accessed June 1, 2021.
23. Green-McKenzie J, Savanoor U, Duran H, et al. Outcomes of a survey-based approach to determine factors contributing to the shortage of occupational medicine physicians in the United States. *J Public Health Manag Pract*. 2021; 27(Suppl 3):S200–S205.
24. Miller LA, HRSA-Funded Preventive Medicine Residency Program Directors Workgroup. The SARS-CoV-2 pandemic: real-time training and service for preventive medicine residents. *J Public Health Manag Pract*. 2021;27(Suppl 3):S123–S128.
25. Mueller K, Konicki D, Larson P, Hudson TW, Yarborough C. ACOEM Expert Panel on Functional Outcomes. Advancing value-based medicine: why integrating functional outcomes with clinical measures is critical to our health care future. *J Occup Environ Med*. 2017;59:e57–e62.
26. Mueller KL, Hudson III TW, Bruns D, et al. Recommendations from the 2019 symposium on including functional status measurement in standard patient care. *J Occup Environ Med*. 2020;62:e457–e466.

PART 3: APPENDICES

Appendix A – ACGME Six Competencies and ACGME Program Requirements for Graduate Medical Education in Preventive Medicine/Specific Competencies for Occupational Medicine Residencies

The Accreditation Council for Graduate Medical Education (ACGME) is a private, nonprofit council that evaluates and accredits medical residency programs in the US. Established in 1981, its mission is to improve health care by assessing and advancing the quality of resident physicians' education through exemplary accreditation. ACGME intermittently updates its common program and residency specific program requirements. The most current, detailed requirements can be found on the ACGME web site at <https://www.acgme.org>. ACGME recommended all residency programs evaluate their trainees under six core competencies that are included in the updated ACGME Common Program Requirements (Residency) in 2020. All residency programs must integrate the following core competencies into their curriculum:

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

The ACGME Residency Review Committee (RC) for Preventive Medicine (PM) last revised its required Competencies for Preventive Medicine Residencies in general and Occupational Medicine Residencies on July 1, 2020. RC requirements for PM include requirements for all preventive medicine residency programs which encompass occupational medicine, aerospace medicine, and public health/general preventive medicine. ACGME now allows preventive medicine residencies to include the PGY1 or internship year. Previously, all PM residents had to complete their internship prior to being accepted into a PM residency program. Currently, they may enter prior to or after internship. Preventive medicine RC requirements for occupational medicine residencies in which residents are to demonstrate competence include:

- a. Conducting research for innovative solutions to health problems.
- b. Diagnosing and investigating medical problems and medical hazards in the community.

- c. Applying primary, secondary, and tertiary preventive approaches to individual and population-based disease prevention and health promotion.
- d. Evaluating the effectiveness of clinical preventive services for both individuals and populations.
- e. Developing policies and plans to support individual and community health efforts.
- f. Applying the principles of ergonomics in a real or simulated workplace setting to reduce or prevent worker injury.
- g. Applying the principles of toxicology in a real or simulated workplace setting to reduce or prevent worker injury.
- h. Conducting a real or simulated workplace walk-through to identify and mitigate hazards and relay this information to worksite administration.
- i. Applying toxicologic and risk assessment principles in the evaluation of hazards.
- j. Developing plans in response to sentinel events using primary, secondary, and tertiary prevention methods; participating in emergency preparedness programs in at least one workplace setting.
- k. Demonstrating competence in their knowledge of factors that impact the health of individuals and populations.
 1. Lifestyle management.
- m. Social determinants of health.
- n. Knowledge of the use of available technology, such as telemedicine, to reduce health disparities.
- o. Industrial hygiene, safety, and ergonomics.
- p. Occupational epidemiology.
- q. Risk/hazard control and communication; and toxicology.

For complete 2020 ACGME requirements, visit:

ACGME Common Program Requirements

<https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/CPRResidency2020.pdf>

ACGME RC for Preventive Medicine Competencies for Occupational Medicine

https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/380_PreventiveMedicine_2020.pdf?ver=2020-06-30-144631-400

Appendix B – The Preventive Medicine Milestone Project: Occupational Medicine

The current Preventive Medicine Milestone Project is online at <http://www.acgme.org/Portals/0/PDFs/Milestones/PreventiveMedicineMilestones-OccupationalMedicine.pdf>. The Occupational Medicine Milestones 2.0 is a joint

initiative of the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Preventive Medicine to be published in 2020.

As a product of the Next Accreditation System of the ACGME, the milestones represent a “trajectory of professional development in essential elements of competency” and offer a framework for measuring resident progress and outcomes in the relevant specialty.* Five levels were included within the milestones in keeping with the Dreyfus Model of expertise development, such that Level 4 was construed as a graduation benchmark and Level 5 aspirational.**

The initial attempt culminated in a set of Milestones 1.0 with considerable variability between specialties in both content and developmental progression across milestone levels.* Responsive to a wide range of stakeholders, feedback, and data, the revision process is underway to reduce complexity and offer additional resources to programs in the form of a Supplemental Guide, with examples of how the milestones are to be implemented. Noteworthy among the several changes made for Milestones 2.0 is the greater harmonization across the non-patient care and medical knowledge milestones.**

The Milestones are designed only for use in evaluation of residents in the context of their participation in ACGME-accredited residency programs. The Milestones provide a framework for the assessment of the development of the resident in key dimensions of the elements of physician competence 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.

*Edgar L, Roberts S, Holmboe E. Milestones 2.0: a step forward. *J Graduate Medical Education*. 2018;10:367–369.

**Edgar L, McLean S, Hogan SO, Hamstra S, Holmboe ES. *The Milestones Guidebook*, 2nd ed. ACGME: Chicago, 2020. Available at: <https://www.acgme.org/Portals/0/MilestonesGuidebook.pdf?ver=2020-06-11-100958-330>.

Appendix C: Content Outline of the ABPM OM Examination

American Board of Preventive Medicine Occupational Medicine Examination Content

I. Prevention, Exposure Assessment, Hazard Recognition and Control

A. Hazard Characterization

1. Walk through assessment
2. Industrial hygiene surveys

B. Toxicological Principles

1. Toxicokinetics
2. Carcinogenesis
3. Hydrocarbons and solvents
4. Metals
5. Gases
6. Dusts
7. Pesticides
8. Nitrogen compounds
9. Chemical warfare agents

C. Ergonomics

1. Evaluation
2. Control

D. Physical Hazards

1. Ionizing radiation
2. Non-ionizing radiation
3. Noise
4. Dysbarism
5. Temperature
6. Mechanical and electromagnetic
7. Vibration
8. Lasers

E. Chronobiology

1. Fatigue
2. Shift work
3. Travel

F. Occupational Safety and Controls

G. Industrial Hygiene

1. Engineering controls
2. Personal protective equipment
3. Administrative controls

H. Environmental Health

I. Risk Assessment

II. Clinical Patient Care

A. General Patient Evaluation and Testing

1. Exposure and occupational history
2. Causation and work-relatedness
3. Contributing factors

B. Eyes

1. Screening
2. Injury

C. Ear, Nose and Throat

1. Noise and solvent induced hearing loss
2. Acute acoustic trauma
3. Assessment: Audiometry
4. Barotrauma

D. Pulmonary

1. Occupational disease
 - a. Pneumoconiosis
 - b. Asthma
 - c. Allergic and immunologic disease
 - d. Inhalation disorders
 - e. Cancer
2. Pulmonary function testing
3. Respirator certification
4. Prevention

E. Heart and Vascular System

1. Effects of physical and chemical agents
2. Physically and psychologically stressful duties
3. Fitness for duty

F. Hepatic and Gastrointestinal

1. Liver and biliary tract disorders
2. Cancer
3. Liver function testing

G. Genitourinary

1. Renal disorders
2. Renal and bladder cancer

H. Hematology/Oncology

1. Hematologic disorders
2. Hematologic cancers
3. Clinical and laboratory studies
 - a. Medical surveillance
 - b. Post-exposure

I. Infectious Diseases and Biohazards

1. Blood borne pathogens
2. Tuberculosis
3. Diseases of travelers and workers
4. Zoonotic disease
5. Building-related illnesses
6. Biologic warfare

J. Musculoskeletal

1. Spine disorders and back pain
 - a. Diagnosis and management
 - b. Treatment and Prevention
2. Upper extremity disorders
 - a. Entrapment neuropathies
 - b. Overuse syndromes
3. Joint and extremity injuries and disorders

K. Neurologic Disorders

1. Neurological and mental status exams
2. Neurotoxic exposures
3. Central nervous system disorders
4. Peripheral neuropathy
5. Interpretation of neurologic testing
6. Sleep disorders

L. Mental Disorders

1. Effects on work capacity
2. Identify, manage, and refer impaired employee
3. Workplace stress

M. Reproductive Disorders

1. Common reproductive toxins and their effects
2. Risk and exposure
3. Protection of fertility

N. Dermatology

1. Allergic and irritant dermatitis
2. Urticaria
3. Infections
4. Neoplasia
5. Pigmentation disorders
6. Work-aggravated dermatoses

O. Clinical Toxicology: Evaluate and treat exposure to toxins

P. Pain Management: Acute and chronic management

III. OEHS Administration and Systems-Based Practice

A. Surveillance

1. Principles of surveillance
2. Occupational disease surveillance
3. Medical surveillance programs in the workplace

B. Medical ethics and confidentiality

C. Regulations

1. OSHA
2. EPA
3. ADA and ADAAA
4. GINA
5. FMLA

D. Workers' Compensation

1. Payment principles
2. Disability assessment
3. Health care delivery systems
4. OEHS program management

E. Health and Human performance

1. Health risk assessments
2. Nutrition
3. Physical activity
4. Lifestyle medicine

F. Emergency and Disaster Management

1. Programmatic planning
2. Chemical
3. Biological
4. Nuclear

G. Transportation Medicine

1. Commercial driver medical examinations

H. Disability Administration

1. Disability prevention and management
2. Americans with Disabilities Act
3. Fitness for duty and return to work

I. Substance Use and Abuse

1. Employee assistance programs

J. Workplace Violence

American Osteopathic Board of Preventive Medicine – Occupational Medical Examination Content

Treatment
 Rules and Regulations
 Epi/Biostat
 Health Management/Impairment
 Toxicology
 Hearing
 Dermatology
 Respiratory/Industrial Hygiene
 Reproductive
 Decompressions
 Vibrations
 Radiation

There is also an oral portion of the American Osteopathic Board of Preventive

Medicine examination which covers administration, environment, and clinical topics.

Appendix D – 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 are required. These competencies are also essential to effective population health management in that the ability to collect or access data as well as manipulate the data is essential to effective population management to ensure a healthy workforce. The OEM physician can use these skills to help identify trends, sentinel events, and hazards. Data may include surveillance data, and injury and infectious disease data, among others.

1. Design and conduct a scientific investigation.
 - a. Formulate a hypothesis.
 - b. Perform a literature review.
 - c. Select and apply research design methods

d. Apply knowledge of biostatistics and epidemiology or secure such expertise as necessary

e. Seek and secure human or animal subjects review panel approval when indicated.

f. Identify and secure other necessary resources.

g. Collect and prepare data for analysis.

h. Analyze data and present results in tabular, graphical, and verbal formats.

i. Draw conclusions discuss implications and identify limitations of the research findings.

2. Write a report suitable for informing policy in the workplace locally, globally or nationally, to support an intervention to improve outcomes, or for publication.

3. Interpret and present technical and clinical data for a variety of audiences.

a. Apply principles of adult learning.

b. Handle oral presentations in a professional manner.

c. Prepare effective written reports for a variety of audiences.

d. Defend conclusions and recommendations, using appropriate data and logical reasoning.

e. Evaluate learning outcomes.