

OCCUPATIONAL MEDICINE

CORE COMPETENCIES

**A Curriculum Framework for
Undergraduate Medical Education**

Occupational Medicine Specialists of Canada

April 2018

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Introduction

The purpose of this document is to define the Occupational Medicine core competencies to provide guidance for Undergraduate Medical Education and facilitate harmonisation of curricula amongst Canadian Faculties of Medicine. They are meant to provide a foundation upon which each Faculty can develop specific items as needed.

Based on the *Competency-Based Medical Education Curriculum Framework*¹ and *CanMEDS Competency Framework*², this document first describes the relevant competencies, capacities and manifestations of the capacities as applicable to Occupational Medicine. The medical expertise competency is further described, specifying the corresponding *Objectives for the Qualifying Examination of the Medical Council of Canada*³. The description of the Entrustable Professional Activities for the Transition from Medical School to Residency (EPA)⁴ specifically relevant to Occupational Medicine are also described.

This framework document was developed by a working group comprised of occupational medicine physicians involved in occupational medicine training at the undergraduate level and of the three (3) program directors of specialty training. Other physicians involved in occupational medicine teaching were also consulted and their comments integrated in the final version.

Issue and Rationale

Employment and working conditions are key determinants of health and have a powerful effect on health equity^{5,6}. Meaningful and good employment positively influences income and social status, social contacts and a person's sense of identity and purpose, conversely being workless has an adverse effect on health.

However, conditions at work can also contribute to many different health problems, acute or chronic⁶. Health risks, such as exposure to hazardous chemicals, dusts and fumes, biologic and carcinogenic agents, noise, vibration, radiation, heat, awkward postures, repeated motions, sustained forces and psychological stress can cause occupational diseases and aggravate other health problems. The World Health Organisation (WHO) estimates that these occupational risks account for a substantial part of the burden of chronic diseases: 37% of back pain, 16% of hearing loss, 13% of chronic obstructive pulmonary disease, 11% of asthma, 8% of injuries, 9% of lung cancer, 2% of leukemia and 8% of depression⁶. These diseases can be prevented.

Physicians play an essential role in recognizing, assessing, preventing, and managing work-related injury, illnesses, and disability. As work-related health problems do not have a specific clinical presentation, early detection of occupational and work-related diseases demands that an accurate and complete occupational and environmental history should be done. Physicians should also be competent in identifying the contribution of occupational risks in the exacerbation of illnesses, in supporting return to work, and preserving work capacity, and of their own role in the regulatory framework.

Assessing the link between illness or injury and work is essential, not only for accuracy in medical diagnosis and treatment plan, but also to notify relevant authorities to protect other workers in the same workplace or in workplaces with similar exposures. The identification of the hazards can also serve to protect the environment as waste from the workplace (e.g. chemicals, dusts or fumes) can contaminate air, soil and water.

Physicians also have an important role in returning individuals to work after non-work related injuries and illnesses. Appropriate return to work plans have many benefits for injured workers. Matching the abilities of the worker to the demands of regular or modified work is an important step in limiting time individuals are off work and improving their overall wellbeing.

To undertake these important roles, the WHO recommends that training in work-health issues be part of all health care professional training, facilitating the inclusion of occupational health into undergraduate and post-graduate training and increasing skills of primary care providers in this area. This is paramount to help ensure that workers exposed to health risks or presenting with work-related injury, illnesses, or disability are offered appropriate services and receive adequate care ^{6,7}.

Overarching principles

The aims of occupational health have been defined by the International Labour Organisation (ILO) and WHO in 1950, and updated in 1995 ⁸:

“Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the workers in an occupational environment adapted to his physiological and psychological capabilities; and to summarise, the adaptation of work to man and of each man to his job.”

Occupational Medicine is that branch of medicine that emphasizes prevention, and deals clinically and administratively with the health needs of both individuals and groups with respect to their working environments and includes the recognition, evaluation, control, management and rehabilitation of occupationally related diseases and injuries, and other conditions affecting ability to work ⁹.

The essential ethical principles that should guide all professionals involved in occupational health activities have been developed by the International Commission on Occupational Health (ICOH) ⁸. Among others, it is understood that physicians involved in worker’s care should aim to:

- protect and promote workers’ health;
- sustain and improve their working capacity and ability;
- contribute to the establishment and maintenance of a safe and healthy working environment for all;
- promote the adaptation of work to the capabilities of workers, taking into account their state of health.

Occupational Medicine Core Competencies ^{1,2}

The Competencies described below represent the core that undergraduate medically trained physicians should know in Occupational Medicine when treating workers. Only those considered to apply specifically to Occupational Medicine, or be of importance, are described. For easier referral to the original document, the numbers listed are those of the document *Towards a Competency-Based Medical Education Curriculum: A training framework* ¹.

Competency	Description of the role	Capacities and manifestations of the capacities
Medical expertise	As a medical expert, physicians will use their knowledge to gather and interpret information, make appropriate decisions and perform preventive, diagnostic and therapeutic clinical interventions at both the individual and population level with respect to occupational health.	<p>1.- Assesses a situation and establishes a diagnosis, including being able to perform an occupational history, assess the contribution of occupational exposures in the development of common diseases, assess the impact of the condition on the ability to work and inform appropriate authorities of any reportable diseases, or the unusual frequency of events of diseases. (1.1, 1.2, 1.7, 1.8, 1.10, 1.13)</p> <p>2. - Recommends appropriate interventions at the individual level, among others explaining the importance of maintaining work attendance and early return to work and liaises with appropriate authorities for issues at the population level. (2.1, 2.3, 2.4, 2.5)</p>
Collaborator	Physicians act in partnership with the patient as well as with all stakeholders in a range of situations that require leadership sharing.	3.- Consults with other professionals in a cooperative manner (e.g. physiotherapists, occupational therapists, occupational hygienists). When concerned about the occupational causation of a condition, consults and/or liaises with appropriate authorities to ensure that the condition is investigated. (3.1)
Communicator	Communication is defined as an exchange between the physician and the patient, other health professionals, or other stakeholders. Communication takes into account cognitive, emotional and social aspects, including literacy and cultural background.	1.- Exchanges information with the patient, members of the care team, public health authorities, managers in the workplace, or worker's compensation, appropriately, respecting confidentiality. (1.1, 1.2)

<p>Health advocacy</p>	<p>As health advocates, physicians take into account all factors that affect health, including professional and environmental conditions, personal behavior and lifestyle. They gather information, use education and empowerment, and advocate for the health and well-being of individuals and other workers.</p>	<p>1.- Carries out basic health-promotion and disease-prevention interventions with the patient, or a group of workers, including identifying workplace factors that may affect health, helping workers achieve awareness of workplace factors affecting their health, and assisting patients in their application for disability or workers' compensation benefits, orienting them towards appropriate resources and services. (1.1, 1.2, 1.3, 1.4)</p> <p>2.- Promotes initiatives related to occupational health to minimize the adverse effects of a variety of workplace conditions. Recognizes that certain groups may require additional advocacy and support (e.g. immigrant workers). (2.1, 2.2)</p>
<p>Management</p>	<p>As managers, physicians are actively involved in assuming the medical administrative obligations related to their professional practice.</p>	<p>1.-Contributes to efficient healthcare and services by demonstrating leadership in the appropriate management of occupational conditions and by properly completing the relevant forms for employers, compensation boards and insurance carriers. (1.3)</p> <p>2.- Meets medico-legal, ethical and administrative obligations towards their patients and other workers exposed to a risk (e.g. notification, compensation claims). (2.2)</p>
<p>Professionalism</p>	<p>As professionals, physicians are committed to enhancing the well-being of patients and communities.</p>	<p>1. - Acts in the patient's best interest taking into account collective needs, including respecting the patient as a person in every way, basing their actions on sound, ethical practice and acting with fairness and impartiality in the delivery of care and services. (1.1, 1.2, 1.4)</p>
<p>Scholar</p>	<p>As workplace settings evolve, new work processes and exposures arise and previously unsuspected health effects are described, physicians recognize that they need continuous learning and nurturing of their scientific curiosity.</p>	<p>1.- Ensures continuing professional development through reflective thinking for all the competencies required to perform their roles, including assessing the impact of their learning on their practice and adjusting their continuing professional development strategy as needed.</p>

Medical Expertise ^{3, 10, 11}

To assume their responsibilities in management of workers and work-related injuries and illnesses, physicians should have basic knowledge on a number of issues. This section, based on the Objectives for the Qualifying Examination of the Medical Council of Canada ³, gives a more detailed description of subjects specific to occupational medicine topics or issues. The textbooks used for reference are those recommended by the Medical Council of Canada for Undergraduate Medical Education in Occupational Medicine ^{10, 11}.

1. Health, work and wellbeing

Subject	Issues to be addressed
Work as a determinant of health	Significance of work both at the individual and societal level Negative impacts of unemployment
General characteristics of vulnerable populations of the workforce	e.g. older workers, younger workers, pregnant workers, migrant workers, newly arrived immigrant workers, disabled workers, knowledge of language, level of literacy
Effects of work on health	Work-related health conditions and occupational diseases (e.g. WHO definition and ILO list of diseases)
Effects of health on work	Workers with acute or chronic health conditions, limitations or disabilities Factors influencing absenteeism and presenteeism

2. Occupational medicine practice (organisational, legal and ethical aspects)

Subject	Issues to be addressed
Context and organisation of occupational health	Awareness of the different stakeholders in occupational health (e.g. employers, labor unions, public health, Workers' Compensation Boards) Overview of Canadian Workers' Compensation (e.g. Meredith principles) Basic knowledge of the organisation of occupational health and of relevant legislation in their respective province
Ethics and confidentiality	Duties to multiple parties and conflicts of interest (e.g. objectivity, evidence-based judgement, medical sick note justification) Right to work and discrimination (e.g. evaluation of worker's capability and employment) Confidentiality (e.g. notes to third party, reports to management)

3. Occupational hazards (identification, risk assessment and prevention)

Subject	Issues to be addressed
Basics of risk assessment	Hazard and risk Introduction to methods of exposure assessment (static monitoring, personal monitoring, biological monitoring) Understanding exposure limits Awareness of Safety Data Sheets (MSDSs) (e.g. understanding the toxicology section and required PPE)
Awareness of the hierarchy of control of hazardous exposures (primary prevention)	Source reduction or elimination Engineering controls Administrative controls Personal protective equipment (PPE)
Basic classification of hazardous exposures	Chemical, physical, biologic, ergonomic, psychological
Chemical hazards*	Fumes (e.g. metal fumes from soldering, fumes from fires) Gases (e.g. CO) Dusts (e.g. wood, mineral dusts (asbestos, silica)) Vapors (e.g. organic solvents) Metals (e.g. lead, mercury, cadmium, arsenic, nickel, manganese, beryllium) Pesticides (e.g. insecticides)
Physical hazards	Noise Vibration Ionizing and non-ionizing radiation Thermal
Biologic hazards*	Blood borne pathogens (e.g. HIV, HBV, HVC in health care workers) Airborne pathogens (e.g. tuberculosis in health care workers, molds and building-associated illness) Zoonosis (e.g. rabies, cryptosporidiosis, anthrax, Q fever, Lyme disease in outdoor workers, farm workers, animal carers)
Ergonomic hazards*	Biomechanical factors (force, repetition, awkward postures)
Psychological hazards and Organizational factors	Stressful job conditions (e.g. job/task demands, organizational factors, violence) Shift work

* With overview of most important health effects

4. Basic toxicology and work-related diseases

Subject	Issues to be addressed
Basics in toxicology	Definitions Routes of entry, transport, metabolism, storage and elimination Biologic monitoring and basics in interpretation (e.g. half-life and timing of testing) Exposure, dose and health effects (e.g. acute exposure, chronic exposure, low dose exposure) Dose-response relationships including inter-individual differences in response (susceptibility) Types of effects <ul style="list-style-type: none"> - by time to presentation (e.g. acute and chronic, long latency) - by mechanisms of action (e.g. irritants, sensitizers, carcinogens) - by organ specificity (e.g. lung, nervous system, liver, blood, renal)
Most common work related diseases, their characteristics (if any) and basic investigation (if not covered elsewhere in the curriculum). Link with most frequent occupational and/or environmental exposures.	
Respiratory disorders	Pneumoconiosis, occupational asthma, allergic rhinitis hypersensitivity pneumonitis, inhalational injury, COPD, lung cancer, mesothelioma
Musculoskeletal	Back pain; shoulder, elbow, hand tendinopathies; hand-arm vibration syndrome
Skin disorders	Irritant and allergic contact dermatitis; contact urticaria (e.g. latex); skin cancer
Neurologic disorders	Central nervous symptoms of toxicants (e.g. encephalopathy, Parkinson's disease), peripheral nervous system (e.g. carpal tunnel syndrome)
Mental health disorders	Burn-out, post-traumatic stress disorder, substance use disorder
Hearing disorder	Noise-induced hearing loss, acute acoustic trauma
Reproductive disorders	Female (e.g. menstrual disorders, infertility, spontaneous abortion, low birth weight, birth defects) Male (e.g. infertility, abnormal spermatogenesis)
Occupational cancer	Most frequent organs affected and most frequent related carcinogens (e.g. lung and pleura, skin, blood, liver, bladder)
Other systems disorders	e.g. liver, renal, blood

5. Basic management principles

Subject	Issues to be addressed
Clinical evaluation of work-relatedness	<p>Causation and work-relatedness (basic principles on how to assess for work-relatedness e.g. presence of relevant exposures, use of preventive measures, plausibility of outcome based on exposure, temporality, exclusion of other causes/exposures)</p> <p>Epidemiological data in occupational medicine: use and limits in individual appraisal of work-relatedness</p>
Management of workers exposed to occupational risks	<p>Principles of evaluation of fitness for work (e.g. pre-placement evaluation, return to work)</p> <p>Describe restrictions or propose medical removal from exposure / from work (when appropriate)</p> <p>Vulnerable groups (e.g. young workers, older workers, migrant workers, pregnant and lactating workers)</p>
Disability management and prevention	<p>Returning to work (early return to work, modified assignment, work restrictions, etc.)</p> <p>Employers' obligations (eg. Duty to accommodate (Human Rights Commission) whether disability is due to work or not)</p> <p>Factors affecting return to work</p>
Regulatory and Workers' Compensation issues	<p>Basic knowledge of the provincial health and safety legislation (e.g. general duty clauses)</p> <p>Awareness of physician's role and responsibilities</p> <p>Understanding of Workers' Compensation Board principles</p>

6. Prevention of disease and health surveillance

Subject	Issues to be addressed
Levels of prevention	Primary, secondary and tertiary prevention
Hazard surveillance	<p>Principles of hazard surveillance</p> <p>Biological monitoring</p>
Occupational Health surveillance (secondary prevention)	<p>Basic principles of occupational health surveillance and screening</p> <p>Basics in biological / physiological monitoring</p> <p>Basics in pregnant or lactating worker protection</p>
Sentinel health event	Notification to appropriate regulatory and/or compensation authority (e.g. Public Health)

Entrustable professional activities (EPA) ⁶

Transition from Medical School to Residency

Entrustable professional activities are “tasks or responsibilities to be entrusted to the unsupervised execution by a learner once he or she has attained sufficient specific competence”.¹ A document published by the Association of Faculties of Medicine of Canada (AFMC) describes 12 EPAs for the transition from medical school to residency.⁶ These define expectations for graduates entering a residency program in Canada.

Following are the EPAs from the AFMC document considered most specific to the assessment and management of workers (occupational medicine). All EPAs are important when evaluating a worker but it is understood that students will learn the other competencies for patient assessment and management in other disciplines. Only the general description of the corresponding EPA and the most relevant CanMEDS roles are elaborated. Readers are invited to refer to the *AFMC Entrustable Professional Activities for the Transition from Medical School to Residency* document⁶ for further details on entrustable behaviors and assessment suggestions.

This table represents a mapping of the roles that the working group considers most likely be assessed with the EPA.

	Medical Expert	Collaborator	Communicator	Health Advocate	Leader	Professional	Scholar
EPA 1 History	X		X			X	X
EPA 3 Investigation plan	X			X	X	X	
EPA 4 Dx & screening tests	X	X	X		X		
EPA 5 Management plans and health advocacy	X	X	X				X
EPA 12 Educate patients	X	X	X	X			

EPA 1 – Obtain an occupational history adapted to the patient’s clinical situation

1. Short description	The graduate performs an appropriate occupational history in an organized manner tailored to the clinical situation and specific patient encounter. This includes, but is not limited to, gathering data on work/environment exposures, means of exposure prevention in the workplace, history of symptoms in relation to work, perception of work demands, etc. The encounter is conducted with respect, in a manner sensitive to the patient’s particular concerns.
2. Most relevant CanMEDS roles	Medical Expert Communicator Scholar Professional

EPA 3 – Formulate an initial plan of investigation based on the diagnostic hypotheses

1. Short description	The graduate selects appropriate investigations to help refine the differential diagnosis for a clinical presentation, to contribute to the evaluation of work-relatedness, and to enable him/her to make appropriate management decisions.
2. Most relevant CanMEDS roles	Medical Expert Leader Professional Health Advocate

EPA 4 – Interpret and communicate results of common diagnostic and screening tests

1. Short description	The graduate recognizes normal and abnormal diagnostic and screening test results, explains the significance of test results including biological monitoring (e.g. blood lead level, urinary arsenic level), measures of organ system function (e.g. liver, renal, hematologic) and physiological monitoring (e.g. pulmonary function tests, audiograms), responds appropriately to these test results and communicates them to the worker and others as appropriate and with consent.
2. Most relevant CanMEDS roles	Medical Expert Collaborator Communicator Leader

EPA 5 – Formulate, communicate and implement management plans, including health advocacy

<p>1. Short description</p>	<p>The graduate proposes an initial management plan for commonly encountered presentations and diagnosis, including medical removal from work exposure (e.g. stopping work, modified work), exposure reduction (e.g. personal protective equipment), assessing impact on the ability to perform work (e.g. work limitations or restrictions), and planning for a return to work. He/she discusses common preventive measures.</p> <p>He/she can discuss compensation claims with the worker and complete relevant reporting forms (e.g. sick leave, workers' compensation documents).</p> <p>The graduate can formulate a communication plan to the employer (if necessary e.g. work restrictions) with the workers' consent.</p> <p>The graduate also discusses confidentiality and consent for employer disclosure, and distinguishes between disclosure to an occupational health professional to disclosure to management.</p> <p>The graduate takes into consideration in his/her management plan other workers/population that may be exposed to the risk (e.g. notification to relevant authorities).</p>
<p>2. Most relevant CanMEDS roles</p>	<p>Medical Expert Communicator Collaborator Scholar</p>

EPA 12 – Educate patients on disease management, health promotion and preventive medicine

<p>1. Short description</p>	<p>The graduate counsels patients on disease management, importance of using protective measures put in place by the employer, risk factor modification, and health promotion adapted to meet the clinical context using evidence-based information. He/she does so independently where appropriate, or in collaboration with other members of the health care team.</p> <p>Examples of the types of information to be provided by the graduate may include lifestyle modifications which could have a combined impact on health because of the occupational exposure (e.g. smoking and exposure to pulmonary irritants or carcinogens, physical activity and non-specific back pain, music listening with headphones and noise exposure at work, marijuana consumption and other psychotropic medications (e.g. opioids) and safety-sensitive work)</p>
<p>2. Most relevant CanMEDS roles</p>	<p>Medical Expert Communicator Health advocate Collaborator</p>

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