

# PHARMACIST EVALUATING EXAMINATION

## SYLLABUS

The Pharmacy Examining Board of Canada



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## EVALUATING EXAMINATION SYLLABUS - INTRODUCTION

This brief syllabus is intended to provide candidates preparing to write the PEBC Pharmacist Evaluating Examination with information on the subject areas of the Canadian pharmacy curriculum that form the exam blueprint. The material in this syllabus is NOT a comprehensive guide to the curriculum content and is only intended to provide an overview of topics that are included in the various subject areas.

The syllabus is organized into three sections that correspond to the three major subject areas represented on the Evaluating Examination. These include:

- Pharmaceutical Sciences
- Pharmacy Practice
- Behavioural, Social, and Administrative Pharmacy Sciences

In addition to didactic learning, the Canadian pharmacy curriculum is designed so that practice skills are developed through laboratory, simulation, and practice-based experiences to enable students to care for patients and their medication-related needs and to continually develop as a professional. (see Professional Practice Experience)

## PHARMACEUTICAL SCIENCES

### Pharmaceutics and Drug Delivery Systems:

- physical and chemical behavior of drug products, the rationale underlying their formulation, and compounding techniques of pharmaceutical preparations
- pre-formulation factors (melting point, solubility, viscosity, dissolution, particle, and solid state properties)
- biopharmaceutical considerations and physiochemical foundation of various dosage forms (solutions, powders, colloids, dispersions, emulsions, semisolids, suppositories, tablets, capsules, injectables, topicals, patches, and various inhalation devices)
- principles of formulation and good pharmaceutical manufacturing practice, including aspects of product development and assessment, stability testing, and quality control
- concepts and application of various drug delivery and administration routes for specific clinical situations to improve therapeutic outcomes
- bioequivalence testing of generic drugs and special considerations for biopharmaceutical products

### Pharmacokinetics and Biopharmaceutics:

- biopharmaceutical and pharmacokinetic principles to predict how drugs are absorbed, distributed, metabolized, and eliminated from the body
- biopharmaceutical and pharmacokinetic principles used in the selection, dosing, and monitoring of drug therapy to maximize efficacy and minimize toxicity
- pharmacokinetic and pharmacodynamic mechanisms of drug interactions
- pharmacokinetic formulae and models that account for factors such as patient demographics, organ function, and disease states

### Pharmacology:

- mechanisms of drug action, dose-response relationships, structure-activity relationships, drug-receptor interactions, rational drug design, and drug metabolism.
- pharmacological basis of the action of drugs leading to therapeutic effects, as well as adverse effects
- effects of structural changes within a drug class on drug potency, formulation, and pharmacokinetics
- focus on drugs used in the management of autoimmune, cardiovascular, dermatological, endocrine, gastrointestinal, genitourinary, hematological, infectious, mental health, musculoskeletal, neurological, oncological, ophthalmic, renal, and respiratory conditions, as well as analgesics and drugs of abuse

### Toxicology:

- toxicology of prescription and nonprescription medications, as well as drugs of abuse
- clinical relevance of toxicology, including pharmacogenomic concepts
- approaches to managing poisoning and overdose

**Biotechnology and Pharmacogenetics:**

- concepts and technologies used in production of biologic products
- pharmaceutical considerations of biotechnology-derived products
- personalized drug therapy, based on the genetic profile of individuals, to optimize drug therapy outcomes

## **PHARMACY PRACTICE**

### **Pathophysiology:**

- nature of disease, causes and effects, and alterations in structure and function of cells
- underlying pathophysiological mechanisms associated with various types of human disease, with a focus on autoimmune, cardiovascular, dermatological, endocrine, gastrointestinal, genitourinary, hematological, infectious, mental health, musculoskeletal, neurological, oncological, ophthalmic, renal, and respiratory conditions

### **Clinical Biochemistry/Laboratory and Diagnostic Testing:**

- interpretation of the results of laboratory and diagnostic tests
- point-of-care tests that support diagnosis and the approach to patient care

### **Pharmacotherapeutics/Medication Management:**

- patient assessment and management of common diseases including autoimmune, cardiovascular, dermatological, endocrine, gastrointestinal, genitourinary, hematological, infectious, mental health, musculoskeletal, neurological, oncological, ophthalmic, renal, and respiratory conditions as well as women's/men's health, addictions, and pain (see Appendix 1 for more detail)
- effective management of patients' drug therapy by identifying drug therapy problems, establishing therapeutic goals and outcomes, recommending pharmacological and nonpharmacological therapeutic alternatives, developing individualized therapeutic regimens, and developing a monitoring plan to evaluate adherence, efficacy, and safety
- critical thinking skills for incorporating principles of evidence-based therapeutic decision making into the patient care process framework for optimizing pharmacotherapy in a variety of disease states
- complementary and alternative medicine as well as utilization of natural health products
- application of nutrition and supplements in the management of disease or enhancement of health
- management of minor, self-limiting, and self-diagnosed ailments with a focus on the pharmacist's role, particularly communicating with patients, accurately assessing and triaging patients, developing care plans, and monitoring therapy

### **Patient Care Process:**

- systematic, patient-centred approach to define and achieve the goals of safe, effective pharmacotherapy
- completion of a comprehensive patient assessment (including relevant physical assessments) to identify, resolve, and prevent drug therapy problems
- educate patients on the appropriate use of medications
- integrate relevant information to recommend appropriate therapy, determine efficacy and safety endpoints for monitoring therapy, document a care plan, and follow-up parameters to evaluate response to therapy

### **Special populations:**

- Geriatrics:
  - physiological changes in aging and how drug response may be affected
  - concepts relevant to the care of elderly patients including fitness, frailty, functional ability, social vulnerability, elder abuse, and therapeutic decision making
  - assessment and management of common conditions such as cognitive disorders, incontinence and falls
  - assessment and optimization of drug therapy in older adults with multiple medications and medical issues
- Pregnancy, lactation, pediatrics:
  - physiological changes and drug use principles during pregnancy, lactation, and growth and development in children
  - common conditions and complications in pregnancy
  - special nutritional needs and use of vitamins and supplements for these populations
  - assessment and management of common symptoms, conditions, and infections in children
  - current childhood immunization schedules and vaccine administration issues in children

### **Prescription Processing, Product Preparation, and Medication Administration:**

- interpretation and verification of prescriptions, prescription processing and checking skills, and application of appropriate laws/standards of practice
- use of pharmacy information technology for clinical assessment and documentation
- extemporaneous compounding of pharmaceutical products
- skills required for expanded scope of practice including renewing, modifying, and initiating pharmacotherapy, as well as deprescribing
- medication reconciliation
- skills required for safe and effective administration of vaccines and medications by injection in selected populations
- home medical devices

### **Prescription Calculations:**

- calculations related to the preparation of medications including those related to expression of concentration, quantity, dosing, rates of administration, and alligation methods

### **Communication (Patient/Caregiver Education) and Collaborative Care (Intra- and Interprofessional):**

- fundamental skills necessary for effective communication in pharmacy practice, including best possible medication histories, comprehensive medication reviews, and nonprescription medication consultations
- verbal and non-verbal communication, listening, and empathy
- motivational interviewing
- shared decision-making
- evidence-based communication to patients and their caregivers regarding risks and benefits of medication
- culturally respectful communication

- intra- and interprofessional collaboration with a focus on: communication; patient/client/family/community-centred care; role clarification; team functioning; collaborative leadership; and conflict resolution



## **BEHAVIOURAL, SOCIAL, AND ADMINISTRATIVE PHARMACY SCIENCES**

### **Health Promotion/Disease Prevention:**

- health and wellness strategies for individuals and groups
- preventative health services (e.g., immunizations, smoking cessation, screening for cancer and other diseases)

### **Literature Evaluation/Research Methods:**

- application of the principles of scientific inquiry and critical appraisal to identify and evaluate the quality and validity of resources and information used in pharmacy practice
- application of an evidence-based approach for answering health- and medication-related questions
- incorporating best available evidence into supporting clinical decisions
- principles of biostatistics and their applications to research studies
- health care economics and pharmacoeconomics including supply and demand factors, third party prescription insurance plans and payment policies, drug use management strategies, and pharmacoeconomic concepts and analyses

### **Medication/Patient Safety Practices:**

- management of a safe and effective medication distribution system
- strategies to prevent medication incidents
- management and documentation of medication incidents
- adverse drug reaction reporting

### **Professionalism/Ethics:**

- ethical frameworks and professional standards that govern the profession of pharmacy and how they apply to practice
- value systems in Canada and ethical dilemmas in pharmacy practice
- contribution of cultural competence and professionalism to the delivery of quality patient care
- how to sensitively and effectively work with a variety of patients with unique needs
- personal self-management and leadership skills
- skill development in preceptorship, self-directed learning, and managing sensitive topics

### **Pharmacy Management:**

- application of clinical, pharmaceutical, management, and leadership skills to provide high quality services that are patient-focused and demonstrate value for money
- management principles including human resources management, financial management, operations management, inventory management, marketing/promotion, risk management, continuous quality improvement, and strategic planning
- planning, development, implementation, and evaluation of patient care services
- the change process and the leader's role in change
- professional, ethical, and legal implications of using information and communication technologies for delivering patient care and fostering collaboration between healthcare providers

### **Canadian Healthcare System:**

- Canadian healthcare system, its development, history, structure, and financing
- federal and provincial governments' involvement in the healthcare system and health policy
- scope of practice for members of the pharmacy team (e.g., pharmacists, pharmacy technicians, pharmacy students, etc)
- roles and responsibilities of key health care providers in a variety of health care settings
- structure, governance, and delivery of services within health systems such as primary care, family health teams, acute care, home care, and long-term care facilities
- evolution of the healthcare system, especially with respect to the roles that pharmacists and other professionals play within the system
- interconnectedness of health equity with global contexts such as social class, ethnicity, gender, ability, and mental health
- social determinants affecting the health of individuals, communities, and populations and how these affect the delivery of pharmacy and other health services
- contribution of cultural competence to the delivery of quality patient care to diverse populations with unique needs (e.g., ethnicity, gender, sexual orientation, physical or mental ability)
- Indigenous health in Canada and the role of pharmacists in collaborating with Indigenous communities to provide culturally safe care and healing

## **PROFESSIONAL PRACTICE EXPERIENCE**

- serve as an active member of the healthcare team incorporating professional, legal, and ethical principles under the supervision of a pharmacist
- develop practical knowledge necessary for the professional role of pharmacists as care providers, communicators, scholars, educators, advocates, practice managers, leaders, and collaborators

### **Community Pharmacy:**

- cultivate patient care skills and gain personal clinical experiences working with a variety of patients and other members of the healthcare team encountered in a community pharmacy
- gain experience in prescription processing, gathering and assessing patient information, patient education, drug information, patient/medication safety, and health promotion
- develop patient care skills to appropriately identify, prevent, and resolve drug therapy problems
- provide safe and effective care to a variety of patients presenting with chronic and acute conditions across the lifespan
- participate in health promotion activities

### **Hospital Pharmacy:**

- cultivate patient care skills and gain personal clinical experiences working with a variety of patients and other members of the healthcare team within a hospital setting
- gain experience in understanding the patient chart; documentation of patient care; ordering and interpreting lab values as required for the management of drug therapy; providing evidence-based drug information; and patient/medication safety
- gain clinical experience in providing safe and effective, patient-focused, and evidence-informed care to a variety of patients with acute and chronic conditions across the lifespan and across all levels of care offered within the institution, as well as for patients in the transitions between levels of care

### **Non-Direct Patient Care Setting**

- explore both traditional and non-traditional roles of pharmacists within either a Canadian or global health care context

## Appendix 1: Organ Systems and Disease State Topics

The following is a list of disease states and related content topics (organized by organ system) that are generally responsive to drug therapy. Disease frequency, socioeconomic burden to society, and impact of pharmacist involvement in medication therapy are considered when developing content for the Pharmacist Evaluating Examination.

### Cardiovascular Disorders

- Acute coronary syndromes (STEMI, NSTEMI, unstable angina)
- Atherosclerotic cardiovascular disease, primary and secondary prevention
- Arrhythmias, atrial (e.g., atrial fibrillation) and ventricular
- Dyslipidemia
- Heart failure
- Hypertension
- Ischemic heart disease
- Peripheral arterial disease
- Stroke (ischemic, hemorrhagic, and transient ischemic attack)
- Venous thromboembolism

### Dermatologic Disorders

- Alopecia
- Acne vulgaris
- Burn injuries, minor (e.g., sunburn, self-treated burns)
- Dermatitis (e.g., atopic, contact, diaper)
- Drug-induced dermatologic disorders
- Psoriasis
- Rosacea
- Wounds, minor (e.g., lacerations, bites, abrasions)

### Ear, Nose, and Throat Disorders

- Allergic rhinitis
- Cerumen impaction
- Cough
- Ménière disease
- Otitis externa
- Rhinorrhea
- Sore throat

### Endocrine Disorders

- Adrenal gland disorders (e.g., adrenal insufficiency, hypercortisolism)
- Diabetes, type 1 and 2
- Drug-induced endocrine disorders
- Hypothyroidism
- Hyperglycemic crises (e.g., diabetic ketoacidosis)
- Hyperthyroidism
- Male hypogonadism
- Transgender health

### **Gastrointestinal Disorders**

- Celiac disease
- Cirrhosis, end-stage liver disease, and complications (e.g., portal hypertension, ascites, varices, hepatic encephalopathy, hepatorenal syndrome)
- Constipation
- Diarrhea (including traveler's diarrhea)
- Drug-induced hepatic disorders
- Gastroesophageal reflux disease
- Inflammatory bowel disease (Crohn disease, ulcerative colitis)
- Irritable bowel syndrome
- Nausea & vomiting, complex (e.g., postoperative, chemotherapy-induced)
- Nausea & vomiting, simple (e.g., acute viral gastroenteritis, motion sickness)
- Pancreatitis (acute, chronic, and drug-induced)
- Peptic ulcer disease (including stress-related mucosal injury, gastrointestinal bleeding)

### **Gynecologic and Obstetrical Disorders**

- Contraception
- Diabetes mellitus, gestational
- Endometriosis and uterine fibroids
- Female sexual dysfunction
- Infertility
- Labor and delivery (e.g., labor induction, preterm labor)
- Lactation (e.g., drugs and breastfeeding)
- Menopausal symptoms (e.g., hot flashes, vaginal dryness, vulvovaginal atrophy)
- Menstrual cycle disorders (e.g., dysmenorrhea, menorrhagia)
- Polycystic ovary syndrome
- Pregnancy (e.g., nutrition & supplementation, drug dosing, teratogenicity, nausea/vomiting)
- Pregnancy termination
- Pregnancy-induced hypertension, preeclampsia, eclampsia

### **Hematologic Disorders**

- Anemias (e.g., iron deficiency, vitamin B12 deficiency, folic acid deficiency, chronic disease/inflammation)
- Drug-induced hematologic disorders

### **Immunologic Disorders**

- Allergies/drug hypersensitivities (e.g., anaphylaxis, desensitization)
- Immunodeficiency
- Solid organ transplantation (e.g., heart, liver, lung, kidney; including immunosuppressive therapy)
- Systemic lupus erythematosus

## Infectious Diseases

- Antimicrobial prophylaxis in surgery and other procedures
- Antimicrobial stewardship
- Bloodstream and catheter infections
- Bone and joint infections (e.g., osteomyelitis, prosthetic joint infections)
- Central nervous system (CNS) infections (e.g., meningitis, encephalitis, brain abscess)
- *Clostridioides difficile* infection
- Fungal infections, invasive (e.g., histoplasmosis, coccidioidomycosis, cryptococcosis, blastomycosis, hematogenous candidiasis, aspergillosis)
- Fungal infections, superficial (e.g., vulvovaginal and esophageal candidiasis, dermatophytoses)
- Gastrointestinal infections (e.g., infectious diarrhea, enterotoxigenic poisonings)
- Health care–acquired infections: preventive measures
- Hepatitis, viral
- Human immunodeficiency virus (HIV) infection
- Immunization (including vaccines, toxoids, and other immunobiologics)
- Infections in immunocompromised patients (e.g., febrile neutropenia, opportunistic infections in AIDS)
- Infective endocarditis
- Influenza virus infection
- Intra-abdominal infections (e.g., peritonitis, abscess)
- Lower respiratory tract infections
- Parasitic diseases (e.g., protozoans [giardiasis, amebiasis, malaria], helminths [pinworms], ectoparasites [head and body lice, scabies])
- Prostatitis
- Sepsis and septic shock
- Sexually transmitted infections (e.g., syphilis, gonorrhea, chlamydia, trichomoniasis, human papilloma virus, pelvic inflammatory disease)
- Skin and soft tissue infections
- Tickborne illnesses (e.g., Lyme disease)
- Travel medicine
- Tuberculosis
- Upper respiratory tract infections (e.g., otitis media, sinusitis, pharyngitis, bronchitis)
- Urinary tract infections
- Viral infections (e.g., varicella, cytomegalovirus, herpes simplex, measles [rubeola], mumps, rabies)

### **Musculoskeletal and Connective Tissue Disorders**

- Gout and hyperuricemia
- Osteoarthritis
- Osteoporosis
- Rhabdomyolysis
- Rheumatoid arthritis
- Soft tissue injuries (e.g., strains, sprains, tendinitis, bursitis, acute low back pain)

### **Neurologic Disorders**

- Epilepsy
- Fibromyalgia
- Headache (e.g., tension-type, migraine, cluster)
- Multiple sclerosis
- Neurocognitive disorders (e.g., Alzheimer disease, vascular and frontotemporal dementia)
- Pain, neuropathic (e.g., diabetic, postherpetic)
- Pain, nociceptive (acute and chronic)
- Parkinson disease

### **Nutritional Disorders**

- Essential nutrients (including vitamin and trace mineral deficiency and excess)
- Malabsorptive syndrome
- Overweight and obesity

### **Oncologic Disorders**

- Oncologic emergencies (e.g., tumor lysis syndrome, hypercalcemia, coagulopathy)
- Supportive care (e.g., myelosuppression, nausea/vomiting, pain, mucositis)

### **Ophthalmic Disorders**

- Conjunctivitis (e.g., bacterial, viral, allergic)
- Drug-induced ophthalmic disorders
- Glaucoma
- Macular degeneration
- Xerosis (dry eye)

### **Psychiatric and Behavioral Disorders**

- Alcohol use disorder
- Anxiety disorders (e.g., generalized anxiety, panic, social anxiety disorder)
- Attention-deficit/hyperactivity disorder
- Bipolar disorder (e.g., mania, bipolar depression, maintenance therapy)
- Delirium/acute agitation
- Depressive disorders (e.g., major depressive disorder)
- Eating disorders (e.g., anorexia nervosa, bulimia nervosa, binge eating disorder)
- Insomnia
- Obsessive-compulsive disorder
- Opioid use disorder
- Schizophrenia
- Substance use disorders (e.g., hallucinogens, stimulants, depressants, opioids, performance-enhancing drugs)
- Tobacco/nicotine use disorder (including smoking cessation)
- Trauma- and stressor-related disorders (e.g., posttraumatic stress disorder)

### **Renal, Fluid, and Electrolyte Disorders**

- Acid-base disturbances
- Acute kidney injury (prerenal, intrinsic, and postrenal)
- Chronic kidney disease and complications (anemia, bone & mineral disorders)
- Diabetes insipidus
- Dialysis and renal replacement therapies
- Drug dosing in renal dysfunction
- Drug-induced renal disorders
- Electrolyte disorders (sodium, potassium, calcium, phosphorus, magnesium)
- Evaluation of renal function
- Fluid balance
- Glomerulonephritis
- Nephrolithiasis
- Nephrotic syndrome
- Polycystic kidney disease
- Syndrome of inappropriate antidiuretic hormone secretion (SIADH)

### **Respiratory Disorders**

- Asthma
- Chronic obstructive pulmonary disease (COPD)
- Cystic fibrosis

### **Urologic Disorders**

- Erectile dysfunction
- Interstitial cystitis
- Lower urinary tract symptoms (LUTS), including benign prostatic hyperplasia (BPH)
- Urinary incontinence