



MEDICAL TOXICOLOGY

2026



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

___ In The Name of Allah ___

PREFACE

- The primary goal of this document is to enrich postgraduate trainees' training experience by outlining the learning objectives that will help them become independent and competent future practitioners.
- This curriculum may contain sections outlining some training regulations; however, up-to-date information on such regulations should be obtained from the "General Bylaws" and "Executive Policies" published by the Saudi Commission for Health Specialties (SCFHS) and accessible online under the "Training" section of the official SCFHS website. In the event of discrepancies between the regulation statements, the provisions contained in the most recently updated bylaws and executive policies will apply.
- As this curriculum is subject to periodic refinement, please refer to the electronic version for the most updated edition, which is posted online at www.scfhs.org.sa.

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We also acknowledge that the CanMEDS framework is copyrighted by the Royal College of Physicians and Surgeons of Canada and that many of the competencies described have been adapted from their resources. Please refer to: Frank, J. R., Snell, L., Sherbino, J., & Boucher, A. (2015). CanMEDS 2015 Physician Competency Framework Series I. Ottawa: Royal College of Physicians and Surgeons of Canada.

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III. FORWARD

Medical toxicology provides medical expertise for individual patients and patient populations ranging in age from infancy to older adulthood, including antenatal care. This expertise includes (1) principles of toxicology, (2) toxins and toxicants, (3) clinical assessment, (4) therapeutics, (5) assessment and population health, (6) analytical and forensic toxicology, (7) environmental toxicology, (8) occupational and industrial toxicology, and (9) addiction toxicology and substance use.

Medical toxicologists apply their knowledge of toxicology to clinical patient care, research, and public health. For individual patients, medical toxicologists provide consultation and recommendations regarding specialized testing, treatment, and care, including for patients with complex comorbidities, adverse drug reactions, and intentional or accidental poisoning. At the population level, medical toxicologists provide expertise in the prevention of poisonings, allocation of antidotes, and management of occupational and poisoning-related disasters. Medical toxicologists work in many settings, including hospitals, research institutes, poison centers, government agencies, and the pharmaceutical industry. They collaborate broadly within multidisciplinary teams in clinical and nonclinical settings.

The toxicology fellowship curriculum development team acknowledges the valuable contributions and feedback provided by the scientific committee members during the development of this program. We extend our special appreciation and gratitude to all members who have been pivotal in completing this booklet, especially the Curriculum Group, Curriculum Specialists, and Scientific Council. We would also like to acknowledge that the CanMEDS framework is copyrighted by the Royal College of Physicians and Surgeons of

Canada and the Accreditation Council for Graduate Medical Education (ACGME); the latter is the body responsible for accrediting graduate medical education programs for physicians in the United States. Many of the competency descriptions have been adapted from their resources (1, 2).



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V. INTRODUCTION

1. Context of Practice

Medical toxicology is a field of medicine dedicated to the evaluation and treatment of poisoned and envenomated patients. This field also includes the management of adverse health effects caused by medications, occupational and environmental toxins, and biological agents.

Medical toxicologists are involved in the care of individuals who come into contact with drugs, substances, or other agents that may cause adverse health effects. This requires expertise in many areas, including unintentional and intentional pharmaceutical overdoses, exposure to industrial chemical products and environmental hazards, drug abuse management, analytical toxicology, and forensic toxicology principles.

In the 2018 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS), there were 2,099,751 human exposures and 2,621,242 follow-up calls, with 3,111 human exposures resulting in death. These data support the need for specialized medical toxicology services to manage more serious exposures (3). In Saudi Arabia, prior to November 12, 2020, medical toxicology services received calls via two hotlines: the 937 hotline for public calls and the 1937 hotline for healthcare facility calls. More than 20,513 public calls were reported in 2020 (4). Since November 12, 2020, all toxicology consultation calls have been handled by a single toxicology service located at the Ministry of Health Lifeline, which is part of the Medical Referrals Center in Riyadh City. Specialists in poison information are trained to receive calls from both healthcare facilities and the public. They collect all necessary data and provide appropriate recommendations when consultation

calls are within their scope of practice. If consultation calls require advanced care or further expert opinion, the medical toxicologist on call is consulted as necessary. All data are recorded in a single database, allowing for early identification of toxicological outbreaks, future planning, and risk mitigation. Four medical toxicologists are on call every day, covering two 12-hour shifts. Sixteen medical toxicologists take calls at the poison control center, and more than 20 medical toxicologists practice in Saudi Arabia. Between September 2020 and September 2021, the center received 37,644 calls, of which 23,212 were from the public, and 14,432 were from healthcare facilities. Analysis of the registered consultation data led to the identification of areas that may benefit from appropriate preventive measures; for instance, a significant number of calls were related to pesticides (particularly organophosphates) and accidental ingestions among children aged 1–5 years. A public educational campaign was conducted, and future campaigns are planned. These data will be published soon.

We already have certified toxicology consultants who are well trained in managing adult and pediatric cases, along with available facilities for conducting such a program. Additionally, we have a specialized referral toxicology center that provides consultation and advice to the public and physicians throughout the Kingdom.

For these reasons, we propose developing a fellowship training program that addresses all these aspects.

A medical toxicology fellowship provides fellows with the experience needed to practice medical toxicology and prepares physicians to become practitioners, educators, researchers, and administrators capable of practicing medical toxicology in academic and clinical settings.

The fellowship program is a two-year curriculum that combines competency-based learning with conference-based teaching, course activities, bedside teaching (ED, ICU, inpatient settings), adult and pediatric clinics, poison center phone consultations, and research.

After completion of this training, graduates will be able to assess and manage acute and chronic health effects resulting from exposures to chemicals, toxins, pharmaceuticals, illicit drugs, biological agents, and radiation. These exposures may be occupational, environmental, intentional, unintentional, or due to malicious intent.

2. Goals and Responsibilities of Curriculum Implementation

The goals of the fellowship are as follows:

1. To develop expertise in the diagnosis and treatment of acutely and chronically poisoned patients. This encompasses intentional and accidental poisoning from pharmaceutical agents, plants, venomous animals, household products, and industrial exposures.
2. To become familiar with industrial hygiene procedures for environmental monitoring, Occupational Safety and Health Administration (OSHA) regulations, National Institute for Occupational Safety and Health (NIOSH) criteria documents, NIOSH proposed standards, and general industrial toxicology.
3. To become familiar with the medical effects of hazardous materials and become competent in managing the medical complications observed after hazardous material incidents.
4. To actively engage in both animal and human research that produces relevant information that can be used in the treatment of poisoned patients.

5. To actively share information gathered through research by publishing results in medical journals and making presentations at national and international medical meetings.
6. To participate in the training of medical personnel ranging from paramedics to physicians.
7. To become knowledgeable in basic pharmacology, drug interactions, and pharmacokinetics, and provide these services to physicians in the clinical setting.
8. To spend time in the toxicology laboratory and become familiar with analytical methodologies.
9. To develop expertise in operating a regional poison center and delivering public services provided by such a center.
10. To become competent in the prevention of poisonings in the home and workplace through public education programs and direct involvement with industry.
11. To become knowledgeable in the practice of hyperbaric medicine as it pertains to toxicology.
12. To train and certify physicians who graduated from primary boards of Emergency Medicine, Pediatrics, and Internal Medicine in medical toxicology.



FELLOWS RESPONSIBILITIES

CALL

1. The fellow is on call for 24 hours approximately every third day. Faculty members provide full-time medical backup for fellows.
2. The responsibilities of taking calls under the supervision of faculty include:
 - a. Handling phone and patient consultations from physicians.
 - b. Rounding with the attending physician daily on poisoned patients at all facilities where inpatient consultation is provided.
 - c. Acting as medical backup for the staff of the Poison Center and providing bedside consultations for poisoned patients within the catchment area of the training center.
 - d. Participating in medical toxicology outpatient care, including seeing new outpatients and following up with discharged patients.
 - e. Acting as a medical expert during hazardous material incidents.
 - f. Consulting on and providing care for patients requiring hyperbaric oxygen therapy for poisoning-related conditions.
 - g. Providing phone consultations for inpatients with poisoning-related illnesses at community hospitals.

OUTPATIENT CLINICS

A medical toxicology clinic, if available, is held on an “as scheduled” basis through outpatient clinic appointments. Patients are scheduled through referrals from community hospitals, primary healthcare services, or inpatient services after discharge for follow-up with a medical toxicologist. The fellow will participate in staffing this clinic, which will provide care for patients with long-standing toxicology-related complications.

TOXICOLOGY JOURNAL CLUB

Every month, fellows are expected to review the tables of contents of all published articles related to toxicology (medical, industrial, forensic, and analytical), adverse drug reactions, and pharmacology. In addition, fellows will review selected bibliographies to search for similar articles. During the Medical Toxicology conference held every Monday, two hours are devoted to the journal club, and it is the fellow’s responsibility to organize and distribute articles to all conference attendees.

CONFERENCES

Every Monday, the Division of Medical Toxicology in an accredited center should hold a teaching conference for toxicologists, fellows, pharmacists, house staff, and rotating students involved in toxicology or pharmacology services. The fellow will present a 30–60-minute presentation on a major topic related to toxicology every week, in addition to participating in case reviews and the journal club.

Toxicology fellows will be responsible for presenting and discussing toxicology-related topics or interesting cases during Morbidity and Mortality conferences held every month in the Emergency Medicine Department of an accredited center in conjunction with the poison center.



Toxicology fellows will also be responsible for presenting and discussing toxicology-related cases presented during grand rounds of the Emergency Medicine, Pediatrics, and Internal Medicine Departments.

In the case of accreditation of more than one center for toxicology training, toxicology fellows will be responsible for facilitating, organizing, and presenting interesting cases in collaboration with other centers.

Toxicology fellows are expected to attend a minimum of one of the following conferences: the annual scientific meeting of the American College of Medical Toxicology, the Middle East & North Africa Toxicology Conference, and/or the American Academy of Clinical Toxicology Conference. Toxicology fellows are also expected to present their research projects (posters and/or oral presentations) during these conferences.

POISON CENTER

The fellow will spend daytime during the fellowship in the Poison Center, working with specialists in poison information (SPIs) and other staff members. Fellows can listen to phone calls and collaborate with SPIs.

Activities will include answering phone consultations from SPIs, using poison center resources, making follow-up telephone calls, developing guidelines, and participating in quality assurance projects. These activities will allow fellows to become integrated into the system and facilitate communication among staff members.

RESEARCH

Fellows are required to participate in at least one animal research project or one clinical research project during the medical toxicology fellowship. The fellow will be responsible for designing the project and moving it through various committees, including the Institutional Review Board, with assistance from the toxicology consultant. In conducting research projects, fellows are expected to gain experience in biostatistics, medical epidemiology, and manuscript preparation for publication. The Division of Medical Toxicology of the accredited centers should provide computer support, office space, and supplies.

Formal didactic courses in medical epidemiology and biostatistics are mandatory for conducting research. Time will be provided for fellows to attend at least one of these courses during the program.

Fellows are expected to submit at least two manuscripts for publication in medical journals or as book chapters. At least one of these manuscripts should report results obtained from the research projects mentioned above, whereas others may include reviews, clinical series, or case reports.

Program Director

1. There must be one faculty member appointed as the program director with authority and accountability for the overall program, including compliance with all applicable program requirements.
2. The election of the program director will be conducted through a review committee (to be specified later).

Qualifications of the program director:

1. Must be a consultant in emergency medicine, pediatric emergency medicine, or internal medicine with valid training or fellowship in the medical toxicology subspecialty.
2. Must have at least three years of experience as a medical toxicology faculty member after certification.
3. Should demonstrate participation in academic societies and educational programs designed to enhance his or her educational and administrative skills.

Program Director Responsibilities:

1. The program director must have responsibility, authority, and accountability for administration and operations; teaching and scholarly activity; fellow recruitment and selection, evaluation and promotion of fellows, disciplinary actions; supervision of fellows; and fellow education in the context of patient care.
2. Administer and maintain a learning environment conducive to educating fellows in each of the SCFHS competency domains.

VI. ABBREVIATIONS USED IN THIS DOCUMENT

Try to limit the use of abbreviations to recognized ones, for example:

Abbreviation	Description
SCFHS	Saudi Commission for Health Specialties
F(1)	(First) year of Fellowship
F(2)	(Second) year of Fellowship
PT	Progress test
OSCE	Objective Structured Clinical Examination
SOE	Structured oral examination
OSPE	Objective Structured Practical Examination
Mini-CEX	Mini-Clinical Experience report
DOPS	Direct Observation of Procedural Skills report
CBD	Case-Based Discussion report



Abbreviation	Description
CBE	Competency-Based Education
ITER	In-Training Evaluation Report
COT	Consultation Observation Tool
FTC	Fellow Training Committee
MT	Medical Toxicology
CA	Clinical area
SPI	Specialist poison information

VII. PROGRAM ENTRY REQUIREMENTS

Please refer to the executive policy of the SCFHS on admission and registration and ensure that there is a statement advising candidates to refer to the SCFHS website.



VIII. LEARNING AND COMPETENCIES

Introduction to Competency-Based Education

Training in Medical Toxicology should be guided by clearly defined competencies that reflect real work in real settings. In competency-based education (CBE), we do not treat time in rotation as a proxy for mastery. Instead, we judge progress using multiple observations and assessments aligned with staged milestones. Because Medical Toxicology is relatively new as a formal fellowship in our context, we also articulate learning outcomes—clear statements of what trainees will be able to do—alongside competency roles. In short, learning outcomes describe the program's results; competencies describe the graduate.

CBE recognizes that professional practice blends knowledge (K), skills (S), and attitudes/professional behavior (A) and expects trainees to apply these in the workplace under appropriate supervision, progressing from novice to independent practice. Several established CBE frameworks inform this curriculum (e.g., CanMEDS from the Royal College of Physicians and Surgeons of Canada, ACGME Milestones in the U.S., and others). The SCFHS endorses CanMEDS for professional roles, and this curriculum applies CBME principles accordingly (Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015).

Core definitions

Competency

An observable ability that integrates K/S/A and values, expressed in real clinical contexts according to professional standards (e.g., Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar, Professional).

Milestones

Developmental signposts along the continuum from supervised beginner to unsupervised practice; used to guide learning, feedback, and decisions about readiness for greater responsibility.

Learning Domains

The dimensions of learning used throughout this curriculum: K = Knowledge, S = Skills, A = Attitudes/Professional behavior.

Principles of CBME used in this curriculum

Focused outcomes:

Start from societal and patient needs; define clear outcomes and measure them.

Competency framework:

Map the curriculum to CanMEDS roles and sub-competencies (Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015).

Learner-centered pacing:

Trainees progress as they demonstrate competence—not simply with time.

Integrated assessment:

Multiple low-stakes observations and workplace assessments are conducted over time.

Flexible pathways:

Tailored experiences while maintaining common standards.

Real-world application:

Emphasis on practice-based learning and impact on patient care.

Supervision and feedback:

Deliberate practice with frequent, actionable feedback.

Lifelong learning:

Graduates are prepared for self-directed improvement.

Accountability:

Training aligns with SCFHS, healthcare system needs, and patient safety.

Frameworks referenced:

CanMEDS 2015 Physician Competency Framework (Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015).

2. Program Outcomes and Staging

We organize training across four stages—Transition to Discipline (TTD), Foundations (F), Core of Discipline (C), and Transition to Practice (TTP)—with outcomes that describe what trainees should reliably do by the end of each stage. Each stage lists required experiences (must do). Programs may also designate recommended and optional experiences locally to fit available resources.

Note on Service Settings: “Medical Toxicology in any setting” includes inpatient consults/wards, ambulatory clinics (e.g., substance use, medication safety, adverse drug reactions), poison control/IPC call rooms, and liaison work with ED, ICU, anesthesia, pediatrics, obstetrics, psychiatry, and internal medicine subspecialties.

2.1 Induction Phase

Purpose

Orient the trainee to the fellowship, confirm fundamental clinical assessment skills in a toxicology context, and introduce toxicology-specific investigations and workflows.

Required clinical experiences

- Medical Toxicology exposure in any of the following:
- Anesthesiology; Critical Care (ICU); Emergency Medicine; Poison Control; Internal Medicine and subspecialties; Pediatrics and subspecialties; Maternal–Fetal Medicine; Psychiatry.

Required formal/orientation activities

- Program, institution, and university orientation



- Focused instruction in:
 1. History and examination for pharmaceutical/toxin exposure (S).
 2. Recognition of life-threatening toxicologic presentations (K/S).
 3. Intensive toxicology orientation course (K).
 4. Role of the Medical Toxicologist within interprofessional teams (A).
 5. Core consultant skills: triage, timely response, clear scope/boundaries (S/A).
 6. Intro to pharmacology/toxicology laboratory methods available locally (K/S).
 7. Critical appraisal/journal club fundamentals (K/S).

Milestone emphasis:

Safe initial assessments, escalation, and consultation etiquette; early professionalism.

2.2 Junior Phase

Purpose:

Build a strong knowledge base in clinical pharmacology/toxicology and develop core skills in critical appraisal and research methods.

Required clinical experiences

Medical Toxicology in at least one of the following additional areas (beyond TTD exposure), with progressive responsibility:

Anesthesiology; Critical Care; Emergency Medicine; Poison Control; Internal Medicine and subspecialties; Pediatrics and subspecialties; Maternal–Fetal Medicine; Psychiatry.

Required formal instruction

1. Pharmacokinetics/Pharmacodynamics/Toxicokinetics (K)
2. Molecular mechanisms of toxicity (K)
3. Cytotoxic mechanisms (e.g., apoptosis, microtubular dysfunction) (K)
4. Principles of radiation (decay, units) (K)
5. Mutagenesis and carcinogenesis (K)
6. Reproductive and developmental toxicity (K)
7. Laboratory methodologies (K/S)
8. Drug analyses (K/S)
9. Therapeutic drug monitoring (TDM) (K/S)

Milestone emphasis:

Applies PK/PD/TK to cases; interprets laboratory tests; contributes to journal clubs with basic methods literacy.

2.3 Senior Phase I

Purpose:

Achieve breadth across toxicology practice; apply knowledge and skills in patient care and scholarship.

Required clinical experiences

- Longitudinal Medical Toxicology service (inpatient/clinic/consult/poison control), with rotations through at least one of the following:

Anesthesiology; Critical Care; Emergency Medicine; Poison Control; Internal Medicine and subspecialties; Pediatrics and subspecialties; Maternal–Fetal Medicine; Psychiatry.



Required formal instruction

A) Toxins and Toxicants

1. Pharmaceutical agents
2. Drugs of abuse
3. Industrial/household/environmental toxicants
4. Natural products
5. Warfare/terrorism agents
6. Radiological exposures

B) Clinical Assessment

7. Toxicologic syndromes (e.g., cholinergic, opioid)
8. Vital-sign–based syndromes
9. Differential diagnosis by key clinical findings
10. Pediatric and reproductive syndromes
11. Radiation syndromes
12. Environmental exposure syndromes (not elsewhere specified)
13. Toxic outbreaks of historical significance (learning from past events)

C) Therapeutics

1. ABCs and resuscitation in poisoned patients
2. Initial stabilization and decontamination
3. Pharmacologic basis and indications for antidotes
4. Supportive and organ-specific care
5. Withdrawal syndrome management
6. Radiation exposure management (triage and medical countermeasures)

D) Population Health & Systems

1. Causal inference criteria (plausibility, consistency, dose–response, strength, temporality)
2. Public health monitoring and surveillance
3. Occupational assessment and prevention
4. Epidemiology and study design basics
5. Risk assessment and risk management
6. Poison centers: structure, metrics, and integration
7. HAZMAT and CBRN incident response
8. Roles of national/international agencies in toxicology
9. Injury prevention strategies
10. Medical publishing and dissemination ethics
11. Consultation resources (e.g., NLM databases)



E) Analytical & Forensic Toxicology

1. Assay methods and interpretation
2. Detection and interpretation of performance-enhancing substances
3. Laboratory and diagnostic test selection/interpretation
4. Forensic principles relevant to clinical practice
5. Legal drugs of abuse
6. Medico-legal issues
7. Workplace drug testing: indications and interpretation

Required scholarly/leadership activities

- Active participation in hospital, university, and national committees relevant to Medical Toxicology.
- Teaching for multiple audiences (junior learners, peers, and the public).
- Ongoing critical appraisal/journal club participation.
- Participation in medical and opioid use disorder clinics (where available).
- Attendance at one national or international scientific meeting in toxicology.
- Contribute to and progressively lead research at the national/international level (protocol development, IRB submission, execution, analysis, and dissemination).

Milestone emphasis:

Manages complex consultations; teaches effectively; contributes to research; understands systems and population-level toxicology.

2.4 Senior Phase II

Purpose:

Consolidate and integrate expertise; prepare for independent practice, including administrative and professional responsibilities.

Required experiences

- Junior consultant role in Medical Toxicology with supervised autonomy (triage, time-to-response, documentation quality, interprofessional leadership).
- Medico-legal case exposure and report writing.
- Practice management (clinic flow, consult service organization, safety/quality metrics, KPI dashboards).
- Physician wellness and resilience strategies for on-call and high-acuity work.
- Continuing professional development planning (lifelong learning plan).
- Expert testimony fundamentals and ethics (where applicable).
- Forensic matters relevant to Medical Toxicology practice.

Milestone emphasis:

Ready for unsupervised practice; demonstrates professionalism, sound judgment, and systems impact.

3. Mapping to Competency Roles (CanMEDS)

Across all stages, learning outcomes map to competency roles as follows (examples):

- Medical Expert: Recognize/treat life-threatening toxic syndromes; apply PK/PD; select and interpret toxicology laboratories; initiate antidotes.
- Communicator: Deliver clear, concise consults; provide safety-net counseling for patients/families.
- Collaborator: Work effectively with ED, ICU, anesthesia, pediatrics, OB, psychiatry, and poison centers.
- Leader/Manager: Organize consult services; manage time-to-response; contribute to QI; understand antivenom/antidote logistics.
- Health Advocate: Provide preventive counseling; promote harm reduction; mitigate occupational/environmental risks.
- Scholar: Appraise literature; conduct/lead research; teach; contribute to guideline development.
- Professional: Practice ethically; respect scope/limits; attend to wellness and patient safety.

4. Learning Outcomes (summary)

By graduation, fellows will:

- Safely assess and manage acute and complex toxicologic presentations across age groups and settings.
- Integrate PK/PD/TK and laboratory interpretation to personalize care and antidote use.
- Lead interprofessional teams and contribute to toxicology systems (poison centers, HAZMAT/CBRN readiness, risk management).
- Teach and advocate effectively for patients and communities (prevention, harm reduction, occupational/environmental health).
- Contribute to scholarship, from critical appraisal to leading research and guideline development.
- Practice professionally and sustainably, with attention to wellness, ethics, medico-legal standards, and lifelong learning.

2. Program Duration

The educational program in Medical Toxicology must be 2 years (24 months) in length.



3. Program Rotations

Training	Mandatory core rotations*		Setting
	Rotation name	Duration	
F1	*MT1 (Fundamental Medical Toxicology and Intensive Course)	2 blocks	Poison control, #CA
	*MT2 (Core Medical Toxicology 1) — Toxins and Toxicants, Clinical Assessment	9 blocks	#CA, Poison control
	Elective rotation	1 block	#CA, lab, or poison control
F1	Annual leave	1 block	
F2	*MT3 (Core Medical Toxicology 3) — Therapeutics, Assessment, and Population Health	8 blocks	#CA, Poison control
	*MT4 (Core Medical Toxicology 4) Analytical and Forensic Toxicology	2 blocks	#CA and laboratory
	MT5 Epidemiology and research in medical toxicology	1 block	Epidemiology in action course or similar courses
	Elective rotation	1 block	#CA, lab, or poison control
F2	Annual leave	1 block	

#Clinical areas (CA): Anesthesiology, critical care areas, Emergency Medicine, Poison control, Internal Medicine and subdivisions, Pediatrics and subdivisions, Maternal–Fetal Medicine, Psychiatry

4. Mapping of Competencies, Roles, Assessment, and Educational Activities to Program Rotations

MT: medical toxicology

Rotation: MT1 (Fundamental Medical Toxicology and Intensive Course)

Rotation setting	Training stage	Training years	Rotation duration (Months/weeks/block)	Rotation-specific outcomes	Competency roles**
Poison control, CA	Junior	1	2 blocks	• Complete orientation to the program, the institution, and the affiliated hospitals. • Perform focused history-taking and physical assessment specific to pharmacological and toxin exposure. • Recognize life-threatening clinical scenarios relevant to clinical pharmacology and toxicology. • Participate in an intensive toxicology orientation course. • Demonstrate the role of the medical toxicologist within the healthcare team.	ME, COM, COL, P



Rotation setting	Training stage	Training years	Rotation duration (Months/weeks/block)	Rotation-specific outcomes	Competency roles**
				• Apply basic consultant skills, including triage, timely response and assessment, and appropriate boundaries of the consultant role. • Describe and utilize medical pharmacology and toxicology laboratory methods relevant to the training environment. • Engage in critical appraisal activities, including journal club. • Look for index A for more details	

***ME medical expert, L leader, COL collaborator, COM communicator, HA health advocate, P professional, S scholar.*

*MT: medical toxicology

Rotation: MT2 (Core Medical Toxicology 2) — Toxins and Toxicants, Clinical Assessment

Rotation setting	Training stage	Training years	Rotation duration (Months/weeks/block)	Rotation-specific outcomes	Competency roles**
Poison control, CA	Junior	1	9 blocks	Toxins and Toxicants 1. Evaluate pharmaceutical drugs and their toxicologic effects. 2. Assess drugs of abuse and associated acute and chronic toxicities. 3. Identify and manage industrial, household, and environmental toxicants. 4. Recognize toxic exposures related to natural products. 5. Describe and respond to warfare- and terrorism-related toxic agents. 6. Assess radiological exposures and associated health effects. Clinical Assessment 1. Identify toxicologic syndromes (e.g., cholinergic, opioid). 2. Interpret vital-sign abnormalities and related toxicologic syndromes. 3. Formulate differential diagnoses based on key clinical findings.	ME, COM, COL, P



Rotation setting	Training stage	Training years	Rotation duration (Months/weeks/block)	Rotation-specific outcomes	Competency roles**
				4. Assess pediatric and reproductive toxicology syndromes. 5. Recognize and evaluate radiation syndromes. 6. Identify environmentally attributed syndromes not specified elsewhere. 7. Analyze toxic outbreaks of historical significance and their clinical implications. Look for index B for more details	

***ME medical expert, L leader, COL collaborator, COM communicator, HA health advocate, P professional, S scholar.*

Rotation: MT3 (Core Medical Toxicology 3) — Therapeutics, Assessment, and Population Health

Rotation setting	Training stage	Training years	Rotation duration (Months/weeks/block)	Rotation-specific outcomes	Competency roles**
Poison control, CA	Senior	2	8 blocks	• Apply criteria for causal inference (e.g., biological plausibility, consistency, dose–response relationship, strength of association, and temporality). • Conduct monitoring and surveillance relevant to toxicologic exposures. • Perform occupational exposure assessment and implement prevention strategies. • Evaluate and manage toxicologic risk at individual and population levels. • Describe and utilize poison centers, including their structure, functions, and metrics. • Respond to and coordinate hazardous materials (HAZMAT) incidents, including those related to terrorism.	ME, COM, COL, P, HA, L, S



Rotation setting	Training stage	Training years	Rotation duration (Months/weeks/block)	Rotation-specific outcomes	Competency roles**
				• Explain the role of government agencies in toxicology and public health responses. • Implement injury prevention strategies related to toxic exposures. • Demonstrate principles of ethical medical publishing and dissemination. • Access and apply consultation resources (e.g., databases, National Library of Medicine). Look for index C for more details	

***ME medical expert, L leader, COL collaborator, COM communicator, HA health advocate, P professional, S scholar. *MT: medical toxicology*

Rotation: MT4 (Core Medical Toxicology 4) Analytical and Forensic Toxicology

Rotation setting	Training stage	Training years	Rotation duration (Months/weeks/block)	Rotation-specific outcomes	Competency roles**
CA and laboratory	Senior	2	2 blocks	Analytical, Forensic, Scholarly, and Leadership Competencies 1.1 Interpret toxicology assay methods and results. 1.2 Detect and interpret performance-enhancing substances. 1.3 Select and interpret laboratory and other diagnostic assessments relevant to toxicology. 1.4 Apply forensic toxicology principles relevant to clinical practice. 1.5 Recognize and evaluate legal drugs of abuse and their toxicologic implications. 1.6 Address medico-legal issues related to medical toxicology practice. 1.7 Interpret workplace drug testing results and their limitations. 1.8 Participate in and contribute to committee work relevant to medical toxicology at the hospital, university, and/or national levels.	ME, COM, COL, P



Rotation setting	Training stage	Training years	Rotation duration (Months/weeks/block)	Rotation-specific outcomes	Competency roles**
				1.9 Plan and deliver teaching activities for diverse audiences, including junior learners, peers, and the public. 1.10 Engage in critical appraisal activities, including journal club. Clinical Exposure, Scholarship, and Professional Development 1. Provide care in medical and opioid use disorder clinics. 2. Attend national and/or international scientific meetings relevant to medical toxicology. 3. Contribute to and lead medical toxicology research at the national and international levels. Look for index D for more details	

***ME medical expert, L leader, COL collaborator, COM communicator, HA health advocate, P professional, S scholar*

***MT: medical toxicology**

Rotation: MT5 Epidemiology and Research in Medical Toxicology

***ME medical expert, L leader, COL collaborator, COM communicator, HA health advocate, P professional, S scholar*

IX. CONTINUUM OF LEARNING

Training in Medical Toxicology follows a progressive competency-based model, with knowledge, clinical skills, and consultation expertise developing throughout each stage of the fellowship. Medical Toxicology is a rapidly evolving specialty, with continuous advances in the understanding of toxins, antidotes, extracorporeal therapies, environmental and occupational exposures, and emerging toxicologic threats. Fellows are expected to engage in lifelong continuous professional development (CPD) to maintain current knowledge and provide safe, evidence-based consultation services. The following table outlines the expected progression of competencies across the junior and senior levels of training.



Domain	F1 (Junior Level)	F2 (Senior Level)
Level of Practice	Dependent/supervised practice	Increasing independent practice under supervision
Medical Knowledge	Acquire foundational knowledge in clinical toxicology, toxicokinetics, toxidromes, antidotes, and the management of common poisoning cases.	Apply advanced toxicology knowledge to manage complex poisoning cases and provide evidence-based consultation.
Clinical Skills	Perform toxicology assessments, recognize toxidromes, and initiate management under supervision.	Independently assess and manage common and complex toxicologic emergencies with indirect supervision.
Consultation Skills	Participate in bedside and telephone toxicology consultations under direct supervision.	Provide toxicology consultation with increasing independence and effectively communicate recommendations to multidisciplinary teams.
Teaching & Professional Development	Participate in teaching, journal clubs, and simulation activities.	Contribute to teaching, research, quality improvement, and simulation as a facilitator under faculty supervision.

X. EDUCATIONAL ACTIVITIES (TEACHING AND LEARNING STRATEGIES AND METHODS)

The teaching and learning method sections have been updated to Educational Activities and accompanied by an educational guide developed and reviewed by the Training Standards Department and also reviewed by the Central Training Committee (CTC). This section will be updated when necessary for improvement. All sections should comply with SCFHS bylaws, standards, and related documents and decisions.

Any addition not listed in the Educational Activities document of the curriculum should be requested for inclusion following SCFHS standards and policies to avoid creating unnecessary tools. Please refer to the Educational Activity document.

Teaching & Learning

The teaching methods used in postgraduate fellowship training programs are primarily based on adult learning theory principles. Trainees understand the importance of learning and, thus, play active roles in their learning process. All training program activities are based on adult learning theory principles, where residents are responsible for meeting their learning requirements. Formal training time includes three formal teaching activities: specific learning activities, universal topics, and general learning opportunities.



Program Specific Learning Activities

Program-specific activities are educational activities specifically designed and intended for teaching trainees. **Trainees** must attend these activities, and **noncompliance** can subject them to disciplinary actions. **Attendance** and participation **in these activities** are part of the continuous assessment tools (see the formative assessment section below). Program administration must support these activities by providing protected time for trainees to attend and participate. These activities include academic half-days, practical clinical teaching, reusable learning objects, and practice-based learning.

Program Academic Half-day

The academic half-day covers core specialty topics aligned with specialty-defined competencies and teaching methods. These core specialty topics ensure that the crucial problems of the specialty are taught effectively. It is recommended that lectures be conducted in an interactive, case-based discussion format. The learning objectives of each core topic need to be clearly defined, and it is preferable to distribute learning materials in advance to ensure maximum benefit for learners during the session. Whenever applicable, core specialty topics should include workshops, team-based learning (TBL), and simulations to develop skills in core procedures. Regional supervisory committees, in coordination with academic and training affairs, program directors, and chief fellows, should work together to ensure the planning and implementation of academic activities, as indicated in the curriculum. Trainees should be actively involved in developing and delivering topics under faculty supervision; their involvement might include delivery, content development, and research. The supervisor's educator should ensure that each topic is stratified into three learning domain categories: knowledge, skill, and attitude. The recommended number of half-day activities to be conducted annually is 40 sessions per training academic year, with reserved time for other forms of

teaching methods, such as journal clubs and clinical/practical teaching. The fellowship training committee, program directors, and chief fellows should work together with academic and training affairs and regional supervisory committees to ensure the planning and implementation of academic activities, as indicated in the curriculum. They should aim to utilize available resources efficiently and optimize the exchange of expertise. A complete map of academic half-days is presented in Appendix E. A list of clinical skills expected to be mastered by graduates is presented in Appendix F. A sample one-month schedule is presented in Appendix G.

Clinical/Practical Teaching

As fellows may enter the program from internal medicine, emergency medicine, or pediatric emergency medicine backgrounds, they are strongly encouraged to participate in relevant conferences, workshops, simulation-based training courses, and other educational activities to promote standardized competency development in medical toxicology.

- Epidemiology course (Epi in Action)
- AHLS
- Chemical agents of opportunity for terrorism
- Medication-assisted treatment (MAT) course
- Annual scientific meeting
- MENATOX conference
- Hyperbaric oxygen course
- CBRN course
- CITI Program course
- AACT conference
- Total Tox course (intensive tox course)

Reusable Learning Objects (RLOs)

Reusable learning objects are educational opportunities available online for learners. Learners in this fellowship are advised to enroll in these RLOs for two main purposes: gaining knowledge and identifying high-quality educational resources that they can use for teaching later in their careers. Learners must complete the following RLOs:

- ACMT National Journal Club (belonging to the American College of Medical Toxicology) (online meeting, once per month)
https://www.acmt.net/cgi/page.cgi/_evtcal.html?evt=775
- ACMT National Case Conference (online meeting, once per month)
https://www.acmt.net/cgi/page.cgi/_evtcal.html?evt=776
- Addiction Toxicology Case Conference (online meeting, once per month)
<https://www.acmt.net/ATCC.html>
- ACMT Grand Round
(https://www.acmt.net/cgi/page.cgi/_evtcal.html?evt=778)
- FIT Visiting Professor Lecture (*to be arranged*)

Universal Topics

Universal topics, such as e-learning modules accessed through personalized accounts for each trainee, have been developed by SCFHS and are available to trainees. Each universal topic includes a self-assessment at the end of the module. As indicated in the “Executive Policies of Continuous Assessment and Annual Promotion,” universal topics are a mandatory component of the criteria for trainees’ annual promotion from their current level to the subsequent level.

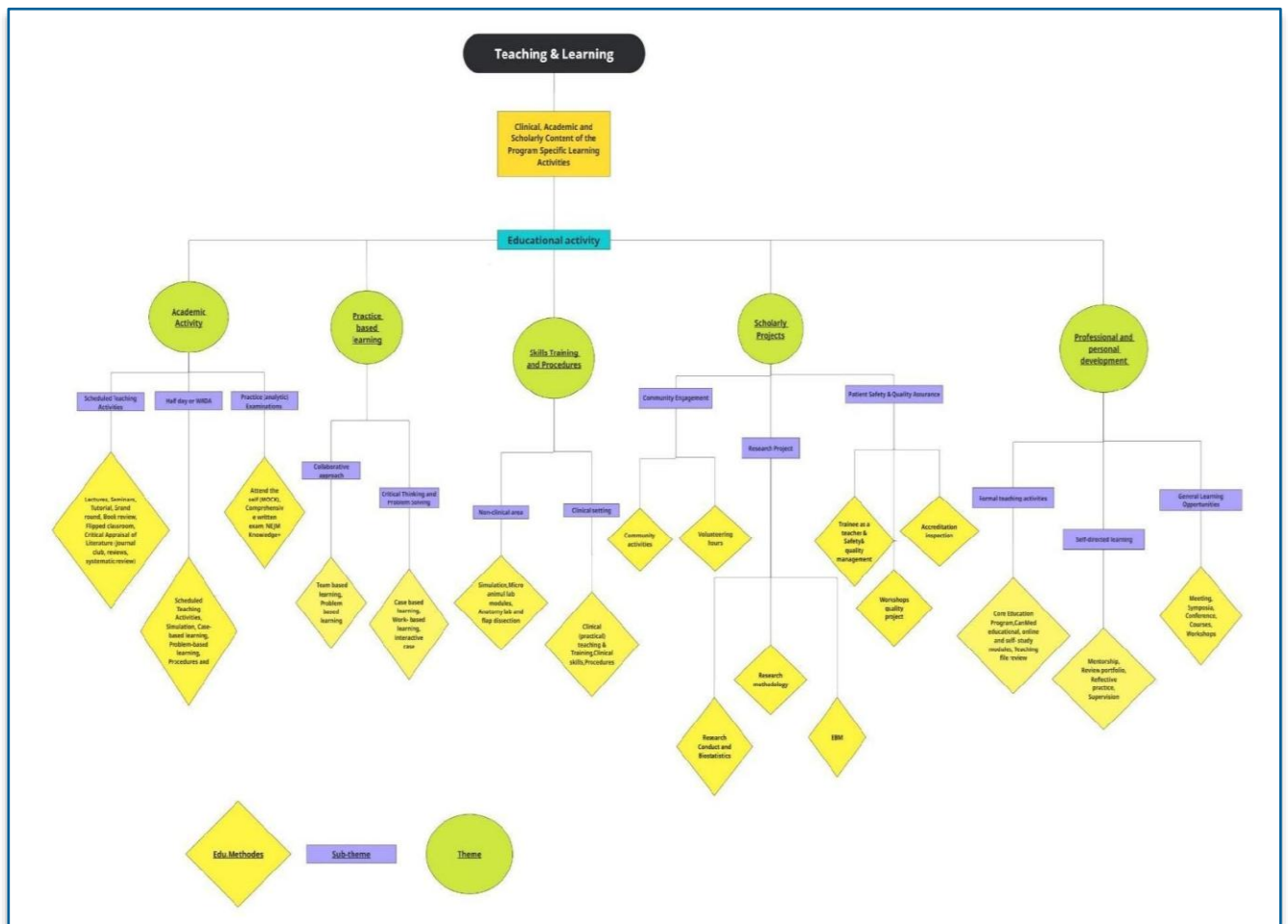
Training Year	UT Module	Subjects	Objectives
F1	Module 6: Frail Elderly	27. Assessment of frail elderly 30. Care of the elderly	As per the universal topics' curriculum
	Module 7: Ethics and Healthcare	31. Occupational hazards of HCW 32. Evidence-based approach to smoking cessation	
F2	Module 7: Ethics and Healthcare	33. Patient advocacy 34. Ethical issues: transplantation/organ harvesting; withdrawal of care 35. Ethical issues: treatment refusal; patient autonomy 36. Role of doctors in death and dying	As per the universal topics' curriculum

General Learning Opportunities

Formal training time will be supplemented by other practice-based learning (PBL) activities, such as:

- Journal Club: regular discussion and appraisal of current toxicology and pharmacology literature to enhance evidence-based decision-making.
- Involvement in quality improvement committees and meetings: contributing to patient safety, clinical governance, and service development initiatives.
- Continuous professional development activities (CPD) relevant to the specialty: attending workshops, CME events, and specialized courses relevant to toxicology and emergency care.

The following educational activity map outlines the main themes, subthemes, and educational methods.



Simulation is recommended.

Simulation-based training is an optional component of the Medical Toxicology Fellowship that complements core clinical training. As fellows may enter the program from internal medicine, emergency medicine, or pediatric emergency medicine backgrounds, simulation provides a standardized approach to managing rare, high-acuity toxicologic emergencies while strengthening procedural, communication, and teamwork skills in a safe learning environment. Fellows are encouraged to participate in simulation-based workshops, including CBRNE training, and may also contribute as simulation facilitators or educators under faculty supervision.

The primary aim of the fellowship is to prepare physicians for independent practice as consultant medical toxicologists. Simulation is intended to support—not replace—clinical training by reinforcing key competencies, promoting patient safety, and enhancing the quality of care.

A detailed simulation session developed by a simulation specialist is attached in the appendix.

Simulation Type	Scenario Example	Competencies Developed	Learning Focus
High-Fidelity Mannequin Simulation	Acute organophosphate poisoning with respiratory failure	Medical Expert, Communicator, Teamwork	Airway management, antidote administration, crisis communication
Tabletop / Command Simulation	Hospital response to a chemical spill or mass poisoning	Leader, Collaborator, Health Advocate	Incident coordination, resource allocation, interdepartmental communication
Task Trainer / Procedure Lab	Intravenous lipid emulsion therapy or gastric lavage	Medical Expert, Professional	Technical skill accuracy, patient safety
Standardized Patient Simulation	Delirium after recreational drug use	Communicator, Scholar	Clinical reasoning, patient counseling, substance-use assessment
Interdisciplinary Simulation	Radiation exposure and contamination event	Collaborator, Leader, Health Advocate	Risk communication, protective measures, system coordination

XI. ASSESSMENT AND EVALUATION

1. Purpose of Assessment

Assessment plays a vital role in the success of postgraduate training and guides trainees and trainers in achieving the defined standards, learning outcomes, and competencies. Furthermore, assessment provides feedback to learners and faculty regarding curriculum development, teaching methods, and the quality of the learning environment. A reliable and valid assessment is an excellent tool for evaluating curriculum alignment among objectives, learning methods, and assessment methods. Finally, assessment assures patients and the public that health professionals are safe and competent to practice. This assessment can serve the following purposes:

- A. **Assessment for learning:** Educators are expected to conduct assessment activities to evaluate trainees' learning needs. Such assessments might involve triangulation techniques to identify consensus regarding learning needs and gaps. Educators will evaluate learning needs through input from employers, patients, and learners themselves.
- B. **Assessment while learning:** Formative assessment activities are designed to help trainees learn through the evaluation process. Educators are expected to conduct "mock" exams and other assessment activities to identify learners' knowledge gaps. Learners are expected to participate in such activities to further enhance their self-assessment abilities.



- C. **Assessment of learning** is used to demonstrate the achievement of learning outcomes. This is a graded assessment and usually counts toward the trainee's end-of-training degree.
- D. **Feedback and evaluation:** Assessment outcomes represent quality metrics that improve the learning experience.

For organizational purposes, assessment will be further classified into two main categories: formative and summative.

Assessment and Progression (overview)

- Workplace-based assessments (WBAs): mini-CEX, case-based discussions, direct observation of consults, call review.
- Portfolio: procedures/logbook, teaching, committee work, research outputs, reflection.
- Milestone reviews: stage-gate decisions for progression (induction, junior, then senior).
- Scholarly assessment: journal club leadership, protocol submission, abstract/manuscript, or equivalent scholarly product.
- Summative elements: end-of-stage review; final readiness-for-practice judgment

2. Formative Assessment

2.1 General Principles

Trainees, as adult learners, should seek feedback throughout their competency journey, from “novice” to “mastery” levels. Formative assessment (also referred to as continuous assessment) is the component of assessment that is distributed throughout the academic year, primarily to provide trainees with effective feedback. Every four weeks, at least 1 hour will be allocated for trainees to meet with their mentors and review their performance reports (e.g., ITER, e-portfolio, mini-CEX). Input from the overall formative assessment tools will be utilized at the end of the year to determine whether each trainee will be promoted from F1 to F2. Formative assessment will be defined based on scientific council/committee recommendations (usually updated and announced at the beginning of the academic year). According to the executive policy on continuous assessment (available online at www.scfhs.org.sa), formative assessment will have the following features, which will be used based on Miller’s pyramid:

- I. **Multisource:** minimum of four assessment tools.
- II. **Comprehensive:** covering all learning domains (knowledge, skills, and attitude).
- III. **Relevant:** focusing on workplace-based observations.
- IV. **Outcome-oriented:** reflecting the trainee's expected learning outcomes that match the trainee’s skill level.

Trainees should play an active role in seeking feedback during training. However, trainers are expected to provide timely formative assessments. The SCFHS will provide an e-portfolio system to enhance communication and analysis of data arising from formative assessments.



Trainers and trainees are directed to follow the scientific council's recommendations regarding updated forms, frequency, distribution, and deadlines related to the implementation of evaluation forms.

To achieve unconditional promotion, the candidate must receive a minimum of “borderline” in all five components. However, even if the aforementioned criterion is not met, the program director can still recommend candidates' promotion in the following situations:

- If the candidate received “below expectation” in a maximum of one or two components, these scores should not belong to the same area of assessment (for example, both below-expectation scores should not belong to the same skill domain).
- The candidate must have passed all other components and received a minimum of “meets expectation” in at least two components.

2.2 Formative Assessment Tools

2.2.1 Work-based Assessment:

Work-based assessment (WBA) is occasionally used interchangeably with workplace-based assessment (WPBA), which refers to the direct observational assessment of a trainee in a real work environment. Recently, it has also been referred to as a supervised learning event (SLE).

WBA is among the most recognized and widely utilized approaches for enhancing learning through formative assessment and feedback.

Numerous WBA tools assess a range of competencies, including communication and consultation skills, clinical decision-making and reasoning, and patient management in contexts where diagnostic uncertainty, resource constraints, and public health considerations may exist. Moreover, WBA tools facilitate the assessment of more complex domains, including professionalism, procedural skills, and ethical and legal aspects inherent to clinical practice, which may not be adequately evaluated using traditional assessment methods.

2.2.2 Educational Activity (Non-WBA Assessment)

EAs are part of the trainees' training program and involve teaching and learning activities to acquire specialty competencies. Examples of contributions to EAs can include, but are not limited to, presentations in journal clubs, lectures, morbidity and mortality rounds, grand rounds, and research and scholarly activities.

All formative assessment tools used for formative assessment purposes **MUST** abide by the **Scoring Categories and Scaling Definitions** in SCFHS policies.

Doesn't Meet Expectation	Borderline	Meets Expectation	Exceeds Expectation
(<50%)	(50–69.99%)	(>70–89.99%)	(>90%)

To attain the optimal training-level outcome, the candidate must complete the compulsory requirements of all selected formative assessment tools.

The following are examples of a summary table of tools and their descriptions for one of the specialties, provided for illustrative purposes and do not necessarily fulfill all quality standards. (Additional details on formative assessment and WBA are provided in the formative assessment documents included in the accompanying materials.)

Medical Toxicology Fellowship

Formative Assessment (2025)

Gen./Sub	Level	Knowledge					Skills							Attitude
		SOE	EYPT-Int'l	Academic Activities	Capstone project	EYPT-Local	OSCE/OSPE	Research	DOPS	Logbook	Volunteering	Other	Mini-CEX	ITERS
Medical Toxicology Fellowship	F1			√	√	√		√		√			√	√
	F2			√	√			√		√			√	√

SOE: Structured Oral Exam; EYPT-Int'l: International Exam; EYPT-Local: Progress Test

DOPS: Direct Observation of Procedural Skills; OSCE: Objective Structured Clinical Examination; CBD: Case-Based Discussion

OSPE: Objective Structured Practical Examination; Mini-CEX: Mini-Clinical Evaluation Exercise; ITER: In-Training Evaluation Report

Description Table of Formative Assessment Tools

Learning Domains	Assessment/Educational Activity Tool	Requirements (Important details, description, and total frequency of the tool/academic year)
Knowledge	Academic Activities	F1–F2: Trainees are required to attend the weekly academic half-day (40 academic half-day activities) during the academic activity sessions as per the curriculum. Trainees must attend academic activities as scheduled. Any excused absence must be approved by the program director. (Detailed topics can be found in Appendix XXX.)
	EYPT-Local	Trainees are required to take a written progress test twice per academic year, comprising a minimum of 100 MCQs.
	Capstone Project	Trainees are expected to write and complete a capstone project annually, reflecting what they have learned during that year. The capstone project can be an emergency operation plan, offline medical control protocol, or other planning document and should be submitted before they take their final exam.
Skills	Research	(F1–F2): Trainees are required to conduct one research project during their training. The research project is conducted over the two years of training as follows: First year (F1): - Planning: Engage in critical thinking around clinical questions and review the literature and available resources.



Learning Domains	Assessment/Educational Activity Tool	Requirements (Important details, description, and total frequency of the tool/academic year)
		- Finalize the hypothesis for the research project and the research methodology. - Write the proposal and obtain approval. Second year (F2): - Start working on the research project; collect data and present it at meetings. - Complete the study. - Analyze the data. - Complete writing and provide evidence of submission to a journal at least three months before the exams. - Presentations/publications.
	Logbook	(F1–F2): Trainees are required to complete a logbook during the training program. Trainees are required to maintain a logbook of the skills they learn during rotations, which should be submitted before they take their final exam. In addition to the numerical requirement, logbooks will be evaluated for overall case diversity, complexity of case experience, and distribution of diagnoses within each category. The logbook should be discussed with the program director every six months.

Learning Domains	Assessment/Educational Activity Tool	Requirements (Important details, description, and total frequency of the tool/academic year)
		Trainees are required to complete all logbook requirements in the electronic systems. (Additional details for log cases are provided in Appendix B.)
	Mini-CEX	(F1–F2): Trainees are required to complete a minimum of 22 Mini-CEX per academic year (minimum of twice/month) with at least six satisfactory assessments.
Attitude	ITER	(F1–F2): All ITERs must be completed. ITERs are used as the end-of-rotation evaluation following SCFHS policies and criteria for ITERs.

EA:

- Case presentation (F1–F2): Trainees are required to give at least four (4) presentations per academic year. *Results from the case presentations are for formative feedback purposes.*
- Topic Special Assignments/Journal Club (F1 and F2):
- Trainees are required to present four (4) topic assignments/journal clubs (topics related to the specialty modules in the curriculum, e.g., articles and topic presentations) as assigned by the program director/trainer.
- Results from the topic assignments are intended for formative feedback.*
- Feedback should be provided on trainees' performance in case presentations and topic assignments.

Important Notes:

All formative and work-based assessments should be performed following the SCFHS definitions and methodologies. Noncompliance with these parameters will result in trainees facing disciplinary actions per SCFHS bylaws.

Appendix A provides information on assessment mapping.

Evaluation:

Trainees should actively seek feedback throughout their training, while trainers are expected to provide timely formative assessments. The SCFHS will provide an electronic system to facilitate communication and analysis of data from formative assessments. Both trainers and trainees are expected to adhere to the requirements related to the use of assessments and EAs, including specified forms, frequencies, distributions, and deadlines for implementing evaluation processes. To attain the optimal training-level outcome, trainees must complete all training requirements.

Trainees will be evaluated based on their program-specific requirements, which include EAs and assessment tools such as formative assessments and WBAs. Each assessment will be documented using standardized forms and reflected in evaluation reports that capture feedback, track improvements, and demonstrate progression. Trainees are expected to fully comply with their program's requirements and activities; failure to do so may result in disciplinary action.

2.3. Promotion of the Trainee:

Trainee promotion from one level to the next will be determined in accordance with SCFHS regulations and applicable bylaws. This is generally based on the successful completion of the curriculum's required assessments, EAs,

evaluation forms, and specialty-specific requirements, as well as satisfactory overall performance and fulfillment of any remediation or action plans, if applicable. Furthermore, noncompliance with these requirements may result in disciplinary actions under SCFHS regulations, which may include repeating the entire academic year or a portion thereof.

2.4. Final In-Training Evaluation Report (FITER)

FITER is a comprehensive final evaluation required at the end of training to determine a trainee's readiness for independent practice. Its format and content are governed by SCFHS regulations and may evolve over time. Submission of the FITER is part of the process for certification eligibility, in accordance with SCFHS requirements.

Summative Assessment

3.1 General Principles

Summative assessment is the component of assessment that primarily aims to make informed decisions regarding trainee competency. Compared with formative assessment, summative assessment does not aim to provide constructive feedback. For further details on this section, please refer to the general bylaws and executive policy regarding assessment (available online: www.scfhs.org). To be eligible to participate in the final exams, a trainee should be granted "Certification of Training Completion."

3.2 End-of-Fellowship Exam

3.3 Certification of Training Completion

To be eligible to participate in the final specialty exams, each trainee is required to obtain "Certification of Training Completion." Based on the training bylaws and executive policy (please refer to www.scfhs.org), trainees will be granted "Certification of Training Completion" once the following criteria are fulfilled:

- I. Successful completion of all training rotations.
- II. Completion of training requirements (e.g., logbook, ITERs, and others).
- III. Clearance from SCFHS Training Affairs to ensure compliance with tuition payments and completion of universal topics.

“Certification of Training Completion” will be issued and approved by the supervisory committee or its equivalent according to SCFHS policies.

3.4 Final Specialty Exams

The final specialty exam is the summative assessment component through which trainees can gain specialty certification. It has two elements:

- A. Final written exam: To be eligible for this exam, trainees are required to have “Certification of Training Completion.”
- B. Final clinical/practical exam: Trainees will be required to pass the final written exam to be eligible to participate in the final clinical/practical exam.

Due to the nature of the fellowship, the final specialty exam will be conducted in two parts. The first will be at the end of F1, and the second will be at the end of F2. The cumulative score will be the trainees’ final score. The two parts are identical in weight, but the content will be specific to the previous year.

3.5 Summative Assessment Tools

Learning Domain	Summative Assessment Tools	Passing Score
Knowledge	- Final Written Examination	At least a borderline pass in each tool according to the standard-setting method used by the Executive Administration of Assessment
Skills	- Objective Structured Clinical Examinations (OSCEs) - Structured Oral Examinations (SOEs)	At least a borderline pass in each tool according to the standard-setting method used by the Executive Administration of Assessment
Attitude	FITER: In-Training Evaluation Report	Successfully pass FITER



Example of Written Examination Blueprint

Principles of Toxicology (1.0)	14%
Pharmacology/Toxicology (1.1) Molecular Components/Mechanisms (1.2)	10%
Principles of Radiation (1.3); Mutagenesis and Carcinogenesis (1.4); Principles of Epigenetics (1.5); Mechanisms of Reproductive and Developmental Toxicology (1.6)	4%
Toxicants and Toxins (2.0)	36%
Medications and Drugs (2.1)	16%
Household Items (2.2)	5%
Supplements (2.3) Food Poisoning (2.4) Fungi (2.5) Plants (2.6) Envenomations (2.7)	5%
Agents of Warfare/Terrorism (2.8)	5%
Radiological Toxicology (2.9)	5%
Clinical Assessment (3.0)	11%
Therapeutics (4.0)	11%
Assessment and Population Health (5.0)	5%

Analytical and Forensic Toxicology and Workplace Drug Testing (6.0)	5%
Environmental Toxicology (7.0)	5%
Addiction Toxicology and Substance Use (8.0)	8%
Occupational Toxicology (9.0)	5%

This blueprint is provided for demonstration purposes, and an updated version will be published on the SCFHS website before the final examination.

Objective Structured Clinical Examinations (OSCEs) & Structured Oral Examinations

(SOE) Final Exam

The blueprint of the end-of-fellowship OSCE and SOE exam is shown in the following table:

Skill group	Weight
Approaching critical poisoning patient	20%
Identification of toxins or their effects	20%
Toxicology disaster management	10%
Approaching chronic poisoning patient	10%
Management of toxicology public health outbreaks	10%
Management of addiction patient	10%
Interpretation of forensic/laboratory results	5%
Administration station	5%
Occupational exposure management	5%
Antidotes station	5%

Suggested References:

1. Goldfrank's Toxicologic Emergencies
2. Critical Care Toxicology: Diagnosis and Management of the Critically Poisoned Patient
3. Poisoning & Drug Overdose
4. Advanced Hazmat Life Support (AHLS)
5. Digital Resources
 - a. Micromedex
 - b. American College of Medical Toxicology resources
 - c. ToxiZ

XII. PROGRAM AND COURSE EVALUATION

The SCFHS will apply variable measures to evaluate this curriculum's implementation. The training outcomes of this program will be reviewed using the quality assurance framework endorsed by the Central Training Committee of the SCFHS. The trainee assessment results (both formative and summative) will be analyzed and mapped against the curriculum content. Additional indicators incorporated into the evaluation process include:

- Annual trainee satisfaction survey reports.
- Reports from trainees' evaluations of faculty members.
- Reports from trainees' evaluations of training rotations.
- Annual survey data from program directors.
- Data obtained through program accreditation and accreditation review reports.

Goal-Based Evaluation: The achievement of the intended outcomes or competencies will be evaluated at the end of each stage to assess the effectiveness of curriculum delivery. Any deficiencies will be addressed in the subsequent stage by utilizing the time allocated to trainee-selected topics and professional sessions.

In addition to expert subject-matter input and best practices drawn from benchmarked international programs, the SCFHS will apply a robust approach to ensure that this curriculum incorporates all relevant data available at the time of future revisions.



XIII. POLICIES AND PROCEDURES

This curriculum outlines the methods, materials, and learning objectives that trainees and trainers will use to achieve the identified educational outcomes. The SCFHS maintains a comprehensive set of the “General Bylaws of Training in Postgraduate Programs” and “Executive Policies,” published on the official SCFHS website, which govern all training-related processes. These include, but are not limited to, the general bylaws on training, assessment, and accreditation, as well as the executive policies on admission, registration, formative assessment and promotion, examinations, trainee representation and support, duty hours, and leave, all of which must be implemented. Under this curriculum, trainees, trainers, and supervisors are required to adhere to the most current versions of these bylaws and policies, which are accessible through the official SCFHS website.

XIV. APPENDICES

- A. Assessment Mapping
- B. Academic Half-Day Topics
- C. Logbook Requirements
- D. Research Requirements
- E. Examples: Simulation
- F. References



A. Assessment Mapping

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V		
				How Learned / Taught										How Assessed									
Level	Rotation	Competency					How Learned / Taught						Knowledge					Skills					
F1	MT1 (Principle of medical toxicology)		Detection	Patient-driven monitoring/report	Calls	Selfstudy	Journal Club	Academic Half Day	Simulation (CTU & sim)	Clinical Rounds / M&M	SSE / Structured Oral Exam	EXPT-41 (International Exam)	Clinical project	EXPT-Local (Progress Test)	OSCE/OSPE	Research	DOPS	Logbook	Mini-CTE	EBER			
		1.1 Pharmacology/Toxicology																					
		1.1.1 Pharmacokinetics/Toxicokinetics																					
		1.1.2 Pharmacodynamics/Toxicodynamics																					
		1.1.3 Adverse Effects																					
		1.1.4 Interactions																					
		1.1.5 Premonitors																					
		1.1.6 Tolerance and Withdrawal																					
		1.1.7 Immunologic Response (e.g., Antibodies, Cytokines)																					
		1.1.8 Pharmacogenetics/Toxicogenetics																					
		1.2 Molecular Components/Mechanisms																					
		1.2.1 Channels and Pumps																					
		1.2.2 Enzymes and Transport Proteins (e.g., Metabolism, C																					
		1.2.3 Glycolysis and Oxidative Phosphorylation																					
		1.2.4 Membranes																					
		1.2.5 Neurotransmitters																					
		1.2.6 Other Metabolic Pathways (e.g., Amino Acids and Urea C																					
		1.3 Cytotoxic Mechanisms (e.g., Apoptosis, Mitochondrial Dysfunction)																					
		1.4 Principles of Radiation (e.g., Doses, Effect)																					
		1.5 Mutagenesis and Carcinogenesis																					
		1.5.1 Chromosome Alterations (Structural, Numerical)																					
		1.5.2 Development of Neoplasia																					
		1.5.3 Inhibitors of Carcinogenesis/Modulating Factors																					
		1.5.4 Inherited Carcinogenesis																					
		1.6 Mechanisms of Reproductive and Developmental Toxicity																					
		1.6.1 Conception/Implantation, Mergonensis, and Teratogenesis																					
		1.6.2 Factors Determining Fetal or Infant Exposure to Agents																					
		1.6.3 Cancer																					
		1.6.4 Pharmacology of the Neonate																					
		1.6.5 Pharmacology of Pregnancy																					

Index A: MT1 (Principles of Medical Toxicology)

1.1 Pharmacology/Toxicology 1.1.1 Pharmacokinetics/Toxicokinetics 1.1.1.1 Bioavailability and Absorption 1.1.1.2 Clearance 1.1.1.3 Distribution 1.1.1.4 Elimination 1.1.1.5 Metabolism 1.1.1.6 Models (e.g., Compartmental, Physiologic) 1.1.2 Pharmacodynamics/Toxicodynamics 1.1.2.1 Dose/Concentration Relationship to Effect 1.1.2.2 Receptor Agonism/Antagonism 1.1.2.3 Receptor Regulation 1.1.2.4 Structure–Activity Relationship 1.1.3 Adverse Effects 1.1.3.1 Idiosyncratic 1.1.3.2 Mechanistic (Predictable) 1.1.4 Interactions 1.1.4.1 Xenobiotic–Environment 1.1.4.2 Xenobiotic–Food 1.1.4.3 Xenobiotic–Xenobiotic (e.g., Drug–Drug)	1.3 Cytotoxic Mechanisms (e.g., Apoptosis, Microtubular Dysfunction) 1.4 Principles of Radiation (e.g., Decay, Units) 1.5 Mutagenesis and Carcinogenesis 1.5.1.1 Chromosome Aberrations (Structural, Numerical) 1.5.1.2 Gene Mutations (Oncogenes, Tumor Suppressor Genes) 1.5.2 Development of Neoplasia 1.5.2.1 Initiation (e.g., Genotoxic Mechanisms) 1.5.2.2 Procarcinogens and Conversion to Carcinogens (e.g., Biotransformation) 1.5.2.3 Progression (e.g., Growth, Invasiveness) 1.5.2.4 Promotion (e.g., Nongenotoxic Mechanisms) 1.5.3 Inhibition of Carcinogenesis Modulating Factors 1.5.3.1 Endogenous Factors (e.g., Age, Sex, Immune Status, Hormones) 1.5.3.2 Exogenous Factors (e.g., Diet, Radiation) 1.5.4 Interactive Carcinogenesis
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Index A: MT1 (Principles of Medical Toxicology)

1.1.5 Proteomics	1.5.4.1 Xenobiotic–Gene Interactions
1.1.6 Tolerance and Withdrawal	1.5.4.2 Xenobiotic–Physical Interactions
1.1.6.1 Behavioral (Pharmacodynamic) Tolerance	1.5.4.3 Xenobiotic–Radiation Interactions
1.1.6.2 Biological (Pharmacokinetic) Tolerance	1.5.4.4 Xenobiotic–Viral Interactions
1.1.6.3 Dependence	1.6 Mechanisms of Reproductive and Developmental Toxicity
1.1.7 Immunologic Response (e.g., Antibodies, Cytokines)	1.6.1 Conception Impairment, Mutagenesis, and Teratogenesis
1.1.8 Pharmacogenetics/Toxicogenetics	1.6.1.1 Chromosomal and Gene Abnormalities
1.1.8.1 Assessment and Profiling of Polymorphisms	1.6.1.2 Effects on Gametogenesis and Gametes
1.1.8.2 Role in Adverse Drug Events	1.6.1.3 Effects on Gonads
1.2 Molecular Components/Mechanisms	1.6.1.4 Spontaneous Abortion and Perinatal Death
1.2.1 Channels and Pumps	1.6.2 Factors Determining Fetal or Infant Exposure to Agents
1.2.2 Enzymes and Transport Proteins (e.g., Methemoglobin, G6PD)	1.6.2.1 Breast Milk Transfer
1.2.3 Glycolysis and Oxidative Phosphorylation	1.6.2.2 Placental Transfer
1.2.4 Membranes	1.6.2.3 Xenobiotic Disposition (e.g., Maternal Xenobiotic Disposition, Fetal Pharmacokinetics)
1.2.5 Neurotransmitters	1.6.3 Offspring Effects
1.2.5.1 Receptor Isoforms and Subtypes	
1.2.5.2 Regulation and Messengers	
1.2.5.3 Signal Transduction	

Index A: MT1 (Principles of Medical Toxicology)

1.2.6 Other Metabolic Pathways (e.g.,
Amino Acids and the Urea Cycle)

1.6.3.1 Cancer

1.6.3.2 Congenital Anomalies and
Malformations

1.6.3.3 Development of the
Infant/Child

1.6.3.4 Genetic Mutations

1.6.4 Pharmacology of the Neonate

1.6.5 Pharmacology of Pregnancy



Index A: MT1 (Principles of Medical Toxicology)

2.1 Drugs 2.1.1 Analgesics and Anti-Inflammatory Drugs 2.1.1.1 Acetaminophen 2.1.1.2 NSAIDs 2.1.1.3 Opioids 2.1.1.4 Salicylates 2.1.1.5 Others (e.g., Antigout Drugs, Gold) 2.1.2 Antimicrobials 2.1.2.1 Antibiotics 2.1.2.2 Antifungals 2.1.2.3 Antimycobacterials 2.1.2.4 Antiparasitics 2.1.2.5 Antiprotozoals 2.1.2.6 Antiretrovirals 2.1.2.7 Antiseptics 2.1.2.8 Antivirals 2.1.3 Chemotherapeutic Drugs 2.1.3.1 Alkylators 2.1.3.2 Antimetabolites 2.1.3.3 Hormones 2.1.3.4 Natural Drugs (e.g., Vinca Alkaloids, Antibiotics) 2.1.3.5 Miscellaneous (e.g., Platinum, Hydroxyurea) 2.1.4 Diagnostic Aids (e.g., Contrast Agents) 2.1.5 Drugs that Affect Cholesterol and Lipids	2.1.7.1 Bronchodilators and Respiratory Stimulants (e.g., Methylxanthines) 2.1.7.2 Antitussives and Cold Preparations 2.1.8 Drugs that Affect the Endocrine System 2.1.8.1 Antidiabetic Drugs 2.1.8.1.1 Insulin 2.1.8.1.2 Oral Hypoglycemics 2.1.8.1.3 Others (e.g., Metformin, Glitazones) 2.1.8.2 Bone-Active Drugs (e.g., Calcitonin, Bisphosphonates) 2.1.8.3 Electrolytes and Minerals 2.1.8.4 Glucocorticoids 2.1.8.5 Sex Hormones, Growth Hormones, and Anabolic Steroids 2.1.8.6 Thyroid Drugs 2.1.8.7 Vasopressin and Somatostatin Analogues 2.1.9 Drugs that Affect the Gastrointestinal System 2.1.9.1 Antidiarrheals 2.1.9.2 Antiemetics
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Index A: MT1 (Principles of Medical Toxicology)

2.1.6 Drugs that Affect the Cardiovascular System

2.1.6.1 Antidysrhythmics

2.1.6.1.1 Calcium Channel Blockers

2.1.6.1.2 Cardioactive Steroids

2.1.6.1.3 Potassium Channel Blockers

2.1.6.1.4 Sodium Channel Blockers

2.1.6.2 Antihypertensives

2.1.6.2.1 Angiotensin System Modulators

2.1.6.2.2 Beta-Adrenergic (and Mixed α - and β -) Antagonists

2.1.6.2.3 Centrally Acting Alpha-Receptor Agonists

2.1.6.2.4 Diuretics

2.1.6.2.5 Vasodilators (e.g., Nitrates, Nitrites)

2.1.6.3 Inotropes

2.1.7 Drugs that Affect the Respiratory System

2.1.9.3 Drugs Used for Biliary and Pancreatic Disorders

2.1.9.4 Drugs Used for Inflammatory Bowel Disease

2.1.9.5 Drugs Used to Treat Acid-Peptic Diseases

2.1.9.6 Laxatives

2.1.9.7 Prokinetics

2.1.10 Drugs that Affect the Hematologic System

2.1.10.1 Anticoagulants

2.1.10.2 Antifibrinolytics

2.1.10.3 Antiplatelet Drugs

2.1.10.4 Blood-Stimulating Drugs (e.g., Erythropoietin)

2.1.10.5 Drugs Used to Treat Bleeding (e.g., Clotting Factors, Antiplasmin Drugs)

2.1.10.6 Iron

2.1.10.7 Thrombolytics

2.1.11 Drugs that Affect the Immune System (e.g., Interferon, Cyclophosphamide)

2.1.12 Drugs that Affect the Nervous System

2.1.12.1 Anesthetics

2.1.12.1.1 Inhalational and Sedative



Index A: MT1 (Principles of Medical Toxicology)

Anesthetics
(e.g., Nitrous
Oxide,
Propofol)

2.1.12.1.2 Local
Anesthetics

2.1.12.2 Anticonvulsants

2.1.12.3 Antiparkinsonism Drugs

2.1.12.4 Drugs that Affect
Autonomic Homeostasis

2.1.12.4.1 Anticholinergics

2.1.12.4.2 Antihistamines

2.1.12.4.3 Antiserotonergics

Index B: MT2 (Toxins, Toxicants, Clinical Assessment)

2.1.12.4.4 Cholinergics (e.g., Nicotine)	2.3.4 Household Products
2.1.12.4.5 Ergot and Derivatives	2.3.4.1 Aquarium Products
2.1.12.4.6 Serotonin Agonists and Other Proserotonergic Agents (e.g., Dextromethorphan)	2.3.4.2 Art Products
2.1.12.5 Ethanol	2.3.4.3 Batteries
2.1.12.6 Muscle Relaxants	2.3.4.4 Cosmetics
2.1.12.7 Neuromuscular Blockers	2.3.4.5 Dental Products
2.1.12.8 Psychoactive Drugs and Hallucinogens (e.g., Marijuana, LSD)	2.3.4.6 Hair Products
2.1.12.9 Psychotropic Drugs	2.3.4.7 Personal Hygiene Products
2.1.12.9.1 Antidepressants	2.3.5 Hydrocarbons, Solvents, and Fuels
2.1.12.9.2 Antipsychotics	2.3.5.1 Aldehydes
2.1.12.9.3 Anxiolytics and Sedative-Hypnotics	2.3.5.2 Alcohols and Glycols
2.1.12.9.4 Mood Stabilizers	2.3.5.2.1 Diethylene Glycol
2.1.13 Pharmaceutical Additives (e.g., Excipients)	2.3.5.2.2 Ethylene Glycol
2.1.14 Veterinary Products	2.3.5.2.3 Glycol Ethers
2.1.15 Vitamins	2.3.5.2.4 Isopropanol
2.2 Drugs of Abuse	2.3.5.2.5 Methanol
2.2.1 CNS Depressants (e.g., GHB, Sedative-Hypnotics)	2.3.5.3 Aliphatic Hydrocarbons
2.2.2 Dissociatives	2.3.5.3.1 Hexane and Congeners
2.2.3 Hallucinogens	2.3.5.3.2 Mixtures (e.g., Gasoline, Kerosene)
	2.3.5.4 Aromatic Hydrocarbons
	2.3.5.4.1 Benzene
	2.3.5.4.2 Polycyclic Aromatic Hydrocarbons
	2.3.5.4.3 Toluene
	2.3.5.5 Halogenated Hydrocarbons



Index B: MT2 (Toxins, Toxicants, Clinical Assessment)

2.2.4 Inhalants (e.g., Hydrocarbons)	2.3.5.5.1 Carbon Tetrachloride
2.2.5 Opioids	2.3.5.5.2 Chloroform
2.2.6 Sympathomimetics (e.g., Amphetamines, Cocaine)	2.3.5.5.3 Methylene Chloride
2.3 Industrial, Household, and Environmental Toxicants	2.3.5.5.4 Perchloroethylene
2.3.1 Airborne Solids	2.3.5.5.5 Trichloroethylene
2.3.1.1 Asbestos	2.3.5.5.6 Vinyl Chloride
2.3.1.2 Coal Dust	2.3.5.6 Hydrazines
2.3.1.3 Organic Dust	2.3.5.7 Ketones
2.3.1.4 Silica	2.3.5.8 Peroxides
2.3.1.5 Other Minerals (e.g., Man-Made Mineral Fibers)	2.3.5.9 Terpenes
2.3.2 Cleansers and Caustics	2.3.6 Metals and Metalloids
2.3.2.1 Acids	2.3.6.1 Arsenic (Including Arsine)
2.3.2.2 Alkalis	2.3.6.2 Barium
2.3.2.3 Bleach	2.3.6.3 Beryllium
2.3.2.4 Detergents and Soaps	2.3.6.4 Cadmium
2.3.2.5 Disinfectants and Topical Anti-Infectives	2.3.6.5 Chromium
2.3.2.6 Swimming Pool Products	2.3.6.6 Cobalt
2.3.3 Food Additives (e.g., MSG, Sulfites)	2.3.6.7 Copper
	2.3.6.8 Lead
	2.3.6.9 Manganese
	2.3.6.10 Mercury

Index B: MT2 (Toxins, Toxicants, Clinical Assessment)

2.3.6.11 Nickel	2.3.10.7 Butadienes
2.3.6.12 Thallium	2.3.10.8 Carbon Disulfide
2.3.6.13 Other Metals and Metalloids	2.3.10.9 Chlorates
2.3.7 Pesticides	2.3.10.10 Coal Tar Products
2.3.7.1 Fumigants and Sterilants	2.3.10.11 Epichlorohydrin
2.3.7.2 Fungicides	2.3.10.12 Ethylene Dibromide (EDB)
2.3.7.3 Herbicides	2.3.10.13 Fluorides and Fluorocarbons
2.3.7.4 Insecticides and Repellents	2.3.10.14 Fuels
2.3.7.4.1 Carbamates	2.3.10.15 Isocyanates (e.g., Toluene Diisocyanate)
2.3.7.4.2 DEET	2.3.10.16 Maleic Anhydride (MA)
2.3.7.4.3 Moth Repellents	2.3.10.17 Mercaptans
2.3.7.4.4 Organochlorines	2.3.10.18 Nanoparticles/Nanotoxicology
2.3.7.4.5 Organophosphates	2.3.10.19 Nitriles
2.3.7.4.6 Pyrethrins and Pyrethroids	2.3.10.20 Phosphorus/Phosphides
2.3.7.5 Rodenticides	2.3.10.21 Phthalates
2.3.7.5.1 Anticoagulants	2.3.10.22 Polymers and Resins
2.3.7.5.2 Non-anticoagulants	2.3.10.23 Styrene
2.3.7.6 Other (e.g., Molluscicides)	2.3.10.24 Trimellitic Anhydride
2.3.8 Pollutants	2.3.10.25 Other Miscellaneous Toxicants
2.3.8.1 Air Pollutants (e.g., Respirable Particulates, Ozone)	2.4 Natural Products
2.3.8.2 Persistent Organic Pollutants (e.g., Polychlorinated Biphenyls, Dibenzodioxins)	2.4.1 Dietary Supplements
	2.4.1.1 Herbal Products



Index B: MT2 (Toxins, Toxicants, Clinical Assessment)

2.3.8.3 Water Pollutants (e.g., Trihalomethanes)	2.4.1.2 Performance-Enhancing Substances (e.g., Anabolics, Creatine)
2.3.9 Toxic Gases	2.4.1.3 Vitamins and Minerals
2.3.9.1 Cellular Asphyxiant Gases	2.4.2 Food Poisoning
2.3.9.1.1 Carbon Monoxide	2.4.2.1 Bacteria and Bacterial Toxins
2.3.9.1.2 Cyanide	2.4.2.2 Marine Toxins
2.3.9.1.3 Hydrogen Sulfide	2.4.3 Fungi
2.3.9.2 Irritant Gases	2.4.3.1 Mushrooms
2.3.9.2.1 Chlorine	2.4.3.2 Other Fungal Toxins (e.g., Aflatoxins, Trichothecene Mycotoxins)
2.3.9.2.2 Nitrogen Oxides	2.4.4 Plants
2.3.9.2.3 Ozone	2.4.4.1 Cardiovascular Toxic Plants (e.g., Aconitum napellus, Nerium oleander)
2.3.9.2.4 Phosgene	2.4.4.2 Cutaneous/Mucous Membrane Toxic Plants (e.g., Toxicodendron spp., Dieffenbachia spp.)
2.3.9.2.5 Sulfur Oxides	2.4.4.3 Gastrointestinal Toxic Plants (e.g., Phytolacca americana, Solanum spp.)
2.3.9.3 Simple Asphyxiants (e.g., Methane, Nitrogen)	2.4.4.4 Hepatotoxic Plants (e.g., Blighia sapida, Symphytum spp.)
2.3.10 Miscellaneous Toxicants	2.4.4.5 Multisystem Toxic Plants (e.g., Prunus spp., Ricinus communis)
2.3.10.1 Acrolein	2.4.4.6 Neurotoxic Plants (e.g., Datura spp., Nicotiana tabacum)
2.3.10.2 Acrylates and Acrylamides	
2.3.10.3 Amines, Diamines, and Amides	
2.3.10.4 Aniline Compounds	
2.3.10.5 Azides	
2.3.10.6 Bromide Compounds	

Index B: MT2 (Toxins, Toxicants, Clinical Assessment)

2.4.5 Toxic Envenomations	Clinical Assessment
2.4.5.1 Arthropods	3.1 Toxicologic Syndromes (e.g., Cholinergic, Opioid)
2.4.5.1.1 Hymenoptera	3.2 Vital Sign Abnormalities/Syndromes
2.4.5.1.2 Scorpions	3.2.1 Blood Pressure
2.4.5.1.3 Spiders	3.2.2 Heart Rate and Rhythm
2.4.5.2 Marine Animals	3.2.3 Temperature
2.4.5.3 Reptiles	3.2.4 Ventilation and Oxygenation
2.4.5.3.1 Elapidae	3.3 Differential Diagnosis by Clinical Finding
2.4.5.3.2 Viperidae	3.3.1 Cardiac
2.4.5.3.3 Other Snakes	3.3.1.1 Cardiovascular Collapse
2.4.5.3.4 Venomous Lizards	3.3.1.2 Chest Pain
2.4.5.4 Amphibians (e.g., Toads, Frogs)	3.3.1.3 Palpitations
2.5 Warfare and Terrorism Agents	3.3.1.4 Syncope
2.5.1 Biological Agents	3.3.2 Dermatologic
2.5.1.1 Bacteria (e.g., Bacillus anthracis, Yersinia pestis)	3.3.2.1 Color Change (e.g., Cyanosis, Jaundice)
2.5.1.2 Toxins (e.g., Botulinum Toxin, Staphylococcal Enterotoxin B)	3.3.2.2 Hair and Nail Abnormalities
2.5.1.3 Viruses (e.g., Smallpox Virus)	3.3.2.3 Rash and Other Cutaneous Reactions
2.5.2 Chemical Agents	3.3.3 Gastrointestinal
2.5.2.1 Acetylcholinesterase Inhibitors (e.g., Sarin, Soman, VX)	3.3.3.1 Abdominal Pain
2.5.2.2 Blister Agents (e.g., Mustard Agents)	3.3.3.2 Diarrhea/Constipation
	3.3.3.3 GI Bleeding
	3.3.3.4 Hepatic



Index B: MT2 (Toxins, Toxicants, Clinical Assessment)

2.5.2.3 Incapacitating Agents (e.g., Calmatives, BZ [3-Quinuclidinyl Benzilate])	3.3.3.4.1 Fulminant Hepatic Failure
2.5.2.4 Tear Gases (e.g., Pepper Spray)	3.3.3.4.2 Hepatic Encephalopathy
2.6 Radiological	3.3.3.5 Pancreatitis
2.6.1 Radiation Sources (e.g., Industrial, Medical)	3.3.3.6 Vomiting
2.6.2 Specific Radionuclides (e.g., Cesium, Iodine, Polonium, Radon)	3.3.4 Hematologic
	3.3.4.1 Red Blood Cell Abnormalities (e.g., Anemia, Hemolysis)
	3.3.4.2 White Blood Cell Abnormalities (e.g., Leukocytosis, Leukopenia)
	3.3.4.3 Hemostatic Disorders (e.g., Coagulopathy, Thrombocytopenia)
	3.3.5 Musculoskeletal
	3.3.5.1 Rhabdomyolysis
	3.3.5.2 Skeletal Abnormalities
	3.3.6 Neurologic
	3.3.6.1 Ataxia
	3.3.6.2 Chronic Pain Syndromes
	3.3.6.3 Delirium
	3.3.6.4 Depressed Mental Status/Coma
	3.3.6.5 Headache
	3.3.6.6 Movement Disorders
	3.3.6.7 Neuropathy/Paresthesia

Index B: MT2 (Toxins, Toxicants, Clinical Assessment)

3.3.6.10 Tremor	3.6.2 Mold
3.3.6.11 Weakness/Paralysis	3.6.3 Multiple Chemical Sensitivity Syndrome
3.3.6.12 Withdrawal Syndromes (e.g., Alcohol, Opioid)	3.6.4 Sick Building Syndrome
3.3.7 Psychiatric	3.7 Toxic Outbreaks of Historical Significance (e.g., Yusho, Toxic Oil Syndrome)
3.3.7.1 Agitation	
3.3.7.2 Depression	
3.3.7.3 Hallucinations	
3.3.7.4 Psychosis	
3.3.8 Pulmonary	
3.3.8.1 Cough	
3.3.8.2 Lung and Related Cancers	
3.3.8.3 Pulmonary Edema/Acute Lung Injury	
3.3.8.4 Restrictive Lung Disease	
3.3.8.5 Smoke Inhalation	
3.3.8.6 Wheezing/Bronchospasm	
3.3.9 Renal/Genitourinary	
3.3.9.1 Acute Kidney Injury (e.g., Acute Tubular Necrosis)	
3.3.9.2 Fertility Abnormalities	
3.3.9.3 Nephritis/Nephrosis	
3.3.9.4 Obstruction/Renal Stones	
3.3.9.5 Sexual Dysfunction	



Index B: MT2 (Toxins, Toxicants, Clinical Assessment)

3.3.10 Special Senses

3.3.10.1 Vision Loss/Changes

3.3.10.2 Pupil Changes

3.3.10.3 Hearing Loss/Tinnitus

3.4 Pediatric and Reproductive Syndromes

3.4.1 Child Abuse (e.g., Munchausen Syndrome by Proxy)

3.4.2 Developmental Disorders (e.g., Autism Spectrum Disorder, ADHD)

3.4.3 Teratogenesis (e.g., Fetal Alcohol Syndrome)

3.5 Radiation Syndromes

3.5.1 Acute Radiation Exposure

3.5.1.1 Local

3.5.1.2 Systemic

3.5.2 Carcinogenesis/Mutagenesis

3.6 Syndromes Attributed to the Environment, Not Specified Elsewhere

3.6.1 Event-Specific Syndromes (e.g., Gulf War Syndrome, World Trade Center Cough)

Index C: MT3 (Therapeutics, Assessment and Population Health) Therapeutics

4.1 ABCs – Resuscitation	4.4.7 Critical Care Procedures (e.g., Arterial Catheter and Central Venous Catheter Placement)
4.2 Initial Management	4.4.8 Fluid Resuscitation
4.2.1 Decontamination Strategies	4.4.9 Patient Monitoring
4.2.1.1 Dermal	4.4.10 Adjunctive Therapies (e.g., Granulocyte Colony-Stimulating Factor)
4.2.1.2 Gastrointestinal	4.4.11 Psychiatric Issues
4.2.1.3 Ocular	4.4.12 Social Issues
4.2.2 Enhanced Elimination Techniques	4.4.13 Transplantation
4.2.2.1 Extracorporeal Removal	4.5 Withdrawal Syndrome Management
4.2.2.2 Gastrointestinal Dialysis	4.5.1 Alcohol
4.2.2.3 Urinary Clearance	4.5.2 Opioid
4.3 Pharmacological Basis of Antidote Use	4.5.3 Sedative-Hypnotic
4.3.1 Antagonism of the Effects of Poisoning	4.5.4 Nicotine
4.3.1.1 Enzyme Inhibitors (e.g., Physostigmine)	4.5.5 Stimulant
4.3.1.2 Enzyme Reactivators (e.g., Pralidoxime)	4.5.6 Mixed Pattern
4.3.1.3 Physiological Antagonists (e.g., Calcium, Glucagon)	4.6 Radiation Exposure Management (e.g., Triage, Medical Therapy)
4.3.1.4 Receptor Antagonists (e.g., Atropine, Flumazenil, Naloxone)	4.6.1 Dosimetry (e.g., Exposure Type, Dose Measurement)
4.3.1.5 Reducing Agents (e.g., Methylene Blue, N-Acetylcysteine)	4.6.2 Decontamination
4.3.2 Dispositional Agents	4.6.3 Chelation Therapy
4.3.2.1 Alcohol Dehydrogenase Inhibitors	



Index C: MT3 (Therapeutics, Assessment and Population Health) Therapeutics

4.3.2.2 Antibodies/Antivenoms

4.3.2.3 Chelators

4.3.2.4 Cyanide Antidotes

4.3.2.5 Enzyme/Cofactor Replacement (e.g., Folinic Acid, Pyridoxine)

4.3.2.6 Oxygen/Hyperbaric Oxygen Therapy

4.3.3 Other Antidotes

4.4 Supportive and Other Care

4.4.1 Airway Management/Oxygenation/Ventilation

4.4.2 Specific Therapies (e.g., Anticonvulsants, Antidysrhythmics)

4.4.3 Control of Agitation

4.4.4 Control of Blood Pressure and Heart Rate

4.4.5 Control of Temperature

4.4.6 Correction of Electrolyte and Acid–Base Disturbances

Index C: MT3 (Therapeutics, Assessment and Population Health) Assessment and Population Health

5.1 Criteria for Causal Inference (e.g., Biological Plausibility, Consistency, Dose–Response Relationship, Strength of Association, Temporality)	5.5 Poison Centers
5.2 Monitoring	5.5.1 Administration/Organization
5.2.1 Biological Monitoring and Biomarkers (e.g., Population Norms, Indicators of Excessive Exposure)	5.5.2 Data Collection Systems
5.2.2 Environmental Sampling/Exposure Monitoring	5.5.3 Surveillance/Interaction with Other Professional Health Organizations
5.3 Occupational Assessment and Prevention	5.6 Response to Hazardous Materials (HazMat) Incidents, Including Terrorism
5.3.1 Medical Surveillance and Pre-Placement Screening	5.6.1 Decontamination (Patients and Responders)
5.3.2 Exposure Control	5.6.2 Incident Command System, Site Safety, and Control Zones
5.3.2.1 Engineering Controls	5.6.3 Incident Response Planning and Emergency Preparedness
5.3.2.2 Personal Protective Equipment	5.6.4 National Pharmaceutical Stockpile
5.3.2.3 Work Practices and Product Substitution	5.6.5 Regulatory and Legal Background (e.g., HAZWOPER, SARA, CERCLA, RCRA)
5.4 Risk Assessment and Management	5.7 Role of Government Agencies in Toxicology
5.4.1 Hazard Identification	5.8 Injury Prevention
5.4.1.1 Review of Prior Studies	5.8.1 Home Medication Errors
5.4.1.1.1 Carcinogenicity Testing	5.8.2 Intentional Poisoning Prevention
5.4.1.1.2 Human Epidemiological Studies	5.8.2.1 Depression and Suicidality
5.4.2 Dose–Response Assessment	5.8.3 Patient Safety/Medical Errors
	5.8.3.1 Epidemiology of Medical Errors



Index C: MT3 (Therapeutics, Assessment and Population Health) Assessment and Population Health

5.4.2.1 No-Observed-Adverse-Effect Level (NOAEL) and Lowest-Observed-Adverse-Effect Level (LOAEL)	
5.4.2.2 Uncertainty Factors (e.g., Extrapolation from High to Low Doses and from Animals to Humans)	
5.4.3 Exposure Assessment	
5.4.3.1 Exposure Pathways	
5.4.3.2 Interpretation of Key Terms (e.g., Recommended Exposure Limit [REL], Permissible Exposure Limit [PEL], Threshold Limit Value [TLV])	
5.4.4 Risk Characterization	
5.4.5 Target Risks (e.g., 10^{-5} or 10^{-6})	
5.4.6 Role of Risk Assessment in Formulating Regulations	
5.4.7 Risk Perception and Risk Communication	

Index C: MT3 (Therapeutics, Assessment and Population Health)

5.9.3.2 General Methodology of Patient Safety

5.9.3.3 Role of Specific Systems Factors in the Occurrence and Prevention of Medical Errors

5.9.3.4 Use of Process-Based and Evidence-Based Safety Practices in the Work Environment

5.9.4 Pediatric Exploratory Poisoning Prevention

5.9.4.1 Active Strategies

5.9.4.2 Passive Strategies

5.10 Medical Publishing

5.11 Consultation Resources (e.g., Databases, National Library of Medicine)



Index D: MT4 (Core Medical Toxicology 4): Analytical and Forensic Toxicology

Analytical and Forensic Toxicology	6.4 Forensic Toxicology
6.1 Assay Methods and Interpretation	6.4.1 Chain of Custody
6.1.1.1.1 Atomic Absorption Spectroscopy	6.4.2 Clandestine Laboratories
6.1.1.1.2 Gas Chromatography–Mass Spectrometry (GC–MS)	6.4.3 Interpretation of Postmortem Drug Levels
6.1.1.1.3 High-Performance Liquid Chromatography (HPLC)	6.4.4 Necrokinetics
6.1.1.2 Screening Tests	6.4.5 Selection of Postmortem Specimens
6.1.1.2.1 Gas Chromatography (GC)	6.4.6 Special Issues
6.1.1.2.2 Immunoassays (e.g., Enzyme-Multiplied Immunoassay Technique [EMIT])	6.4.6.1 Meconium
6.1.1.2.3 Colorimetric Tests (e.g., Color Tests, Thin-Layer Chromatography)	6.4.6.2 Vitreous Humor
6.1.1.3 Urine Drug Testing	6.5 Legal Drugs of Abuse
6.1.1.3.1 Adulteration Techniques	6.5.1 Drug-Induced Psychomotor Impairment
6.1.1.3.2 Analytical Limitations and Interferences	6.5.2 Performance and Interpretation of Laboratory Testing
6.1.1.3.3 Interpretive Challenges (e.g., Benzodiazepines, Opioids)	6.6 Legal Ethanol
6.1.2 Laboratory Issues	6.6.1 Alcohol and the Law
6.1.2.1 Point-of-Care Testing	6.6.2 Alcohol-Induced Psychomotor Impairment
6.1.2.2 Quality Assurance/Quality Control (e.g., CLIA)	6.6.3 Blood and Breath Alcohol Analysis
6.1.3 Routine Toxicology Testing	6.6.4 Collection and Storage of Alcohol Specimens
6.1.4 Specialized Toxicology Testing	6.6.5 Forensic Pharmacokinetics of Alcohol
	6.6.6 Saliva and Other Biological Matrices
	6.7 Medico-Legal Issues
	6.7.1 Ethical Standards for Testimony

Index D: MT4 (Core Medical Toxicology 4): Analytical and Forensic Toxicology

6.1.4.1 Metal Testing	6.7.2 Expert Witness Standards of Reliability (e.g., Daubert, Frye)
6.1.4.2 Cholinesterase Determinations	6.7.3 Role of the Expert Witness in Various Settings (e.g., Medical Malpractice, Tort Litigation)
6.1.4.3 Hair Analysis (e.g., Metals, Drugs of Abuse)	6.8 Workplace Drug Test Interpretation
6.1.5 Therapeutic Drug Monitoring	6.8.1 Cutoffs
6.2 Detection and Interpretation of Performance-Enhancing Substances	
6.3 Laboratory and Other Diagnostic Assessments	
6.3.1 Anion Gap	
6.3.2 Blood Gases and Co-oximetry	
6.3.3 Electrolytes	
6.3.4 Hematologic and Coagulation Tests	
6.3.5 Liver Function Tests	
6.3.6 Osmolality	
6.3.7 Urinalysis (e.g., Color, Crystals)	
6.3.8 Other Supportive Testing	
6.3.8.1 Diagnostic Radiologic Imaging	
6.3.8.2 Electrocardiography	
6.3.8.3 Electromyography (EMG), Nerve Conduction Studies (NCV), and Electroencephalography (EEG)	
6.3.8.4 Pulmonary Function Testing	
6.3.8.5 Pulse Oximetry and Related Technology	



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
THE GENERAL APPROACH TO THE POISONED PATIENT		1	Principles of Managing the Acutely Poisoned or Overdosed Patient
		1	General Approach to the Poisoned Patient
		1	Decontamination, Enhanced Elimination, and Antidote Mechanisms
		2	Laboratory Principles
		2	Principles of Diagnostic Imaging
		2	Pharmacokinetic and Toxicokinetic Principles
THE CLINICAL BASIS OF MEDICAL TOXICOLOGY	Analgesics 1	3	Acetaminophen
		3	Opioids
		3	Salicylates
	Pharmaceuticals 1	4	Antidiabetic Agents and Hypoglycemic/Antihyperglycemic Agents

Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		4	Antiepileptics
		4	Antihistamines and Decongestants
	Cardiac Poisons 1	5	β -Adrenergic Antagonists
		5	Calcium Channel Blockers
		5	Cardioactive Steroids
	PSYCHOTROPICS 1	6	Antipsychotics and Neuroleptic Malignant Syndrome (NMS)
		6	Cyclic Antidepressants
		6	Selective Serotonin Reuptake Inhibitors (SSRIs) and Atypical Antidepressants
	SUBSTANCES OF ABUSE 1	7	Sympathomimetics
		7	Sedatives/Hypnotics
		7	Cannabis and Hallucinogens
	HOUSEHOLD PRODUCTS 1	8	Caustics
		8	Toxic Alcohols



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		8	Hydrocarbons
	PESTICIDES 1	9	Insecticides: Organophosphorus Compounds and Carbamates
		9	Insecticides: Organochlorines, Pyrethrins/Pyrethroids, and Insect Repellents 1
		9	Insecticides: Organochlorines, Pyrethrins/Pyrethroids, and Insect Repellents 2
	NATURAL TOXINS AND ENVENOMATIONS	10	Arthropods
		10	Plants 1
		10	Plants 2
		11	Plant- and Animal-Derived Dietary Supplements
		11	Snake and Scorpion Envenomation in Saudi Arabia
		11	Marine Envenomations

Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
	OCCUPATIONAL AND ENVIRONMENTAL TOXINS 1	12	Carbon Monoxide
		12	Cyanide and Hydrogen Sulfide
		12	Methemoglobin Inducers
	DISASTER PREPAREDNESS	13	Radiation 1
		13	Radiation 2
		13	Radiation 3
	PHARMACEUTICAL S 2, 3	14	Chemotherapeutics 1
		14	Chemotherapeutics 2
		14	Methotrexate, 5-Fluorouracil, and Capecitabine
		15	Antimigraine Medications
		15	Pharmaceutical Additives
		15	Thyroid and Antithyroid Medications



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
	FOOD, DIET, AND NUTRITION 1, 2	16	Food Poisoning
		16	Essential Oils
		16	Iron
		17	Vitamins
		17	Athletic Performance Enhancers
		17	Dieting Xenobiotics and Regimens
	CARDIOPULMONAR Y MEDICATIONS 2, 3	18	Antidysrhythmics
		18	Antithrombotics 1
		18	Antithrombotics 2
		19	Miscellaneous Antihypertensives and Pharmacologically Related Agents
		19	Methylxanthines and Selective α_2 -Adrenergic Agonists

Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
	ANESTHETICS AND RELATED MEDICATIONS	20	Local Anesthetics
		20	Inhalational Anesthetics
		20	Neuromuscular Blockers
	SUBSTANCES OF ABUSE 2, 3	21	Ethanol
		21	Alcohol Withdrawal, Disulfiram, and Disulfiram-Like Reactions
		21	Nicotine
		22	Inhalants
		22	γ -Hydroxybutyric Acid (GHB)
		22	Phencyclidine and Ketamine
	METALS 1, 2	23	Lead
		23	Mercury



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		24	Arsenic
		24	Thallium
		24	Selenium
	HOUSEHOLD PRODUCTS 2	25	Antiseptics, Disinfectants, and Sterilants
		25	Camphor and Moth Repellents
		25	Hydrofluoric Acid and Fluorides
	Analgesics 2	26	Botulism
		26	Colchicine, Podophyllin, and the Vinca Alkaloids
		26	Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)
	ANTIMICROBIALS	27	Antibacterials, Antifungals, and Antivirals
		27	Antimalarials
		27	Antituberculous Medications
	PSYCHOTROPICS	28	Lithium

Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
	.	28	Psychiatric Principles
		28	Monoamine Oxidase Inhibitors
		29	Neurotransmitters and Neuromodulators 1
		29	Neurotransmitters and Neuromodulators 2
	Miscellaneous	30	Withdrawal Principles
		30	Addiction Principles
		30	Patient Violence
	Special Populations	31	Reproductive and Perinatal Principles
		31	Geriatric Principles
	Heavy Metals 2, 3	32	Aluminum
		32	Antimony
		32	Bismuth
		33	Cadmium



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		33	Cesium
		33	Chromium
	PESTICIDES 2, 3	34	Fumigants
		34	Barium
		34	Phosphorus
		35	Sodium Monofluoroacetate and Fluoroacetamide
		35	Strychnine
		35	Herbicides 1
	NATURAL PRODUCTS	36	Mushrooms
		36	Plants 3
		36	Herbicides 2
	OCCUPATIONAL AND ENVIRONMENTAL TOXINS	37	Smoke Inhalation

Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		37	Simple Asphyxiants and Pulmonary Irritants
	DISASTER PREPAREDNESS 2, 3	38	Chemical Weapons 1
		38	Chemical Weapons 2
		39	Biological Weapons 1
		39	Biological Weapons 2
	BIOCHEMICAL AND MOLECULAR CONCEPTS	40	Chemical Principles
		40	Biochemical and Metabolic Principles
		40	Fluid, Electrolyte, and Acid–Base Principles
		41	Cardiologic Principles I: Electrophysiologic and Electrocardiographic Principles
		41	Cardiologic Principles II: Hemodynamics
		42	Gastrointestinal Principles
		42	Hepatic Principles



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		43	Hematologic Principles
		43	Genitourinary Principles
		44	Dermatologic Principles
		44	Transdermal Toxicology and Extravasation of Xenobiotics
		44	Intrathecal Administration of Xenobiotics
		45	Ophthalmic Principles
		45	Otolaryngologic Principles
		46	Oncologic Principles
		46	Pediatric Principles
		47	Renal Principles
		47	Respiratory Principles
		48	Thermoregulatory Principles

Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		48	Hyperthermia and Hypothermia Toxicology
	Heavy Metals 4	49	Cobalt
		49	Copper
		49	Manganese
		50	Nickel
		50	Silver
		50	Zinc
	Antidotes	51	N-Acetylcysteine
		51	Activated Charcoal
		51	Atropine
		52	Antivenom: Snake
		52	Antivenom: Scorpion
		52	Antivenom: Spider
		53	Benzodiazepines



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		53	Botulinum Antitoxin
		53	Calcium
		54	L-Carnitine
		54	Dantrolene Sodium
		54	Deferoxamine
		55	Dextrose (D-Glucose)
		55	Digoxin-Specific Antibody Fragments
		55	Dimercaprol (British Anti-Lewisite [BAL])
		56	Edetate Calcium Disodium (CaNa ₂ EDTA)
		56	Ethanol
		56	Flumazenil
		57	Folates: Leucovorin (Folinic Acid)
		57	Fomepizole
		57	Glucagon

Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		58	Glucarpidase (Carboxypeptidase G2)
		58	High-Dose Insulin (HDI)
		58	Hydroxocobalamin
		59	Hyperbaric Oxygen
		59	Lipid Emulsion
		59	Magnesium
		60	Methylene Blue
		60	Nitrites (Amyl and Sodium) and Sodium Thiosulfate
		60	Octreotide
		61	Opioid Antagonists
		61	Pentetic Acid or Pentetate (Zinc or Calcium) Trisodium (DTPA)
		62	Physostigmine Salicylate
		62	Potassium Iodide



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		62	Pralidoxime
		63	Protamine
		63	Prothrombin Complex Concentrates, Direct Oral Anticoagulant Antidotes, and Vitamin K1
		64	Prussian Blue
		64	Pyridoxine
		64	Sodium Bicarbonate
		65	Succimer (2,3-Dimercaptosuccinic Acid) and DMPS (2,3-Dimercapto-1-Propanesulfonic Acid)
		65	Thiamine Hydrochloride
		65	Uridine Triacetate
		66	Journal Club and Research Day
		67	Journal Club and Research Day
		68	Journal Club and Research Day
		69	Journal Club and Research Day

Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		70	Poison Prevention and Education
POISON CONTROL CENTERS, HEALTH SYSTEMS, EPIDEMIOLOGY, AND LEGAL ASPECTS OF TOXICOLOGY		70	Poison Control Centers and Poison Epidemiology
		71	Hazardous Materials Incident Response 1
		72	Hazardous Materials Incident Response 2
		73	Principles of Occupational Toxicology: Diagnosis and Control
		73	Risk Assessment and Risk Communication
		74	Medication Safety and Adverse Drug Events
		74	Drug Development, Adverse Drug Events, and Postmarketing Surveillance
		75	Principles of Epidemiology and Research Design 1



Appendix E: Complete Map of Academic Half- Days* THEME	SUB-THEME	WEEK	Topics
		76	Principles of Epidemiology and Research Design 2
		77	International Perspectives on Medical Toxicology
		78	Risk Management and Legal Principles
		79	Medicolegal Interpretive Toxicology
		79	Assessment of Ethanol-Induced Impairment
		80	Postmortem Toxicology
		80	Organ Procurement from Poisoned Patients

* FINAL TOPIC DISTRIBUTION WILL BE DETERMINED BY THE FELLOWSHIP TRAINING COMMITTEE

Appendix F: Skills to Be Mastered Before Graduation

1. Gathering accurate, essential information in a timely manner;
2. Interpreting the results of diagnostic tests and diagnostic procedures;
3. Integrating information obtained from the patient's
4. history, physical examination, physiologic
5. recordings, and test results to arrive at an
6. accurate assessment and treatment plan;
7. Integrating relevant biological, psychosocial, social, economic, ethnic, and familial factors into the evaluation and treatment of patients;
8. Planning and implementing therapeutic treatment, including pharmaceutical, medical device, behavioral, and surgical therapies;
9. Assessing toxicologic exposures in occupational evaluations (Core);
10. Serving as the primary or consulting physician responsible for providing direct bedside patient evaluation, management, screening, and preventive services;



Appendix G: Sample Academic Day

Appendix G Time	Week 1	Week 2	Week 3	Week 4
0800	Principles of Managing the		Analgesics 1	Cardiac Poisons 1
0900	Acutely Poisoned or Overdosed Patient	Laboratory Principles	Acetaminophen	β -Adrenergic Antagonists and Calcium Channel Blockers (CCBs)
1000	General Approach to the Poisoned Patient	Principles of Diagnostic Imaging		Cardioactive Steroids
1100		Pharmacokinetic and Toxicokinetic Principles	Opioids	
1200	Prayer Break and Lunch			
1300	Decontamination, Enhanced			Research Day and Journal Club
1400	Elimination, and Antidote Mechanisms		Salicylates	

Appendix G: Detailed Toxicology Simulation Session

ASPIRIN TOXICITY

Section I: Scenario Demographics

Scenario Title:	Aspirin (ASA) Overdose
Date of Development:	05/02/2015 (DD/MM/YYYY)
Target Learning Group:	☐ Juniors (PGY 1–2) ☒ Seniors (PGY ≥ 3) ☐ All Groups

Section II: Scenario Developers

Scenario Developer(s):	Donika Orlich
Affiliations/Institution(s):	McMaster University
Contact Email (optional):	Donika.orlich@medportal.ca



Section III: Curriculum Integration

Learning Goals and Objectives	
Educational Goal:	To expose learners to the evaluation and management of a febrile patient with altered mental status resulting from aspirin (ASA) toxicity.
CRM Objectives:	1. Demonstrate situational awareness by avoiding fixation errors and reassessing and reevaluating a changing clinical picture. 2. Utilize resources effectively through an early call for help and appropriate delegation of tasks. 3. Perform a tailored and appropriately brief goals-of-care discussion with the family of a critically ill patient.
Medical Objectives:	1) Initiate a broad diagnostic workup of the febrile patient with altered mental status. 2) Identify an anion gap metabolic acidosis on critical venous blood gas (VBG) analysis and electrolyte testing. 3) Administer appropriate early treatment for aspirin (ASA) toxicity. 4) Employ a tailored approach to intubation and ventilator settings. 5) Recognize the need for dialysis.

References

Marx, J. A., Hockberger, R. S., Walls, R. M., & Adams, J. (2013). Rosen's Emergency Medicine: Concepts and Clinical Practice. St. Louis, MO: Mosby.

Case Summary: Brief Summary of Case Progression and Major Events

The learner will be presented with a febrile patient with altered mental status, requiring an initial broad diagnostic workup and management plan. The learner will receive a critical venous blood gas (VBG) report demonstrating severe acidosis, hypoglycemia, and hypokalemia, requiring prompt management. Subsequently, the remaining laboratory results and investigations will confirm the diagnosis of salicylate overdose. The patient's mental status will continue to decline, and learners should proceed with intubation while anticipating challenges related to the patient's acid-base status. The learner should also initiate urinary alkalinization and arrange for urgent dialysis.



Section IV: Scenario Script

A. Scenario Cast and Realism			
Patient:	☒ Computerized Mannequin	Realism: <i>Select the Most Important Dimension(s)</i>	☒ Conceptual
	☐ Mannequin		☐ Physical
	☐ Standardized Patient		☐ Emotional/Experiential
	☐ Hybrid		☐ Other:
	☐ Task Trainer		☐ N/A
Confederates		Brief Description of Role	
Daughter	Provides collateral history. The patient was last seen well 3 days ago. Confirms full-code status. After the test results become available, she confirms a recent emotional stressor related to being left at the altar before her second marriage.		
Nurse	Assists at the bedside and cues learners regarding the patient's respiratory status and seizure activity as needed.		
B. Required Monitors			
☒ ECG Leads/Wires	☒ Temperature Probe	☒ Central Venous Line	
☒ NIBP Cuff	☐ Defibrillator Pads	☐ Capnography	
☒ Pulse Oximeter	☐ Arterial Line	☐ Other:	
C. Required Equipment			
☒ Gloves	☒ Nasal Prongs	☐ Scalpel	
☒ Stethoscope	☒ Venturi Mask	☐ Tube Thoracostomy Kit	
☒ Defibrillator	☒ Non-Rebreather Mask	☐ Cricothyrotomy Kit	

C. Required Equipment		
☒ IV Bags/Lines	☒ Bag-Valve Mask	☐ Thoracotomy Kit
☒ IV Push Medications	☒ Laryngoscope	☐ Central Line Kit
☐ PO Tablets	☐ Video-Assisted Laryngoscope	☐ Arterial Line Kit
☐ Blood Products	☒ ET Tubes	☒ Other: Dialysis Catheter Kit
☐ Intraosseous Setup	☐ LMA	☐ Other:

D. Moulage	
Elderly male mask.	

E. Approximate Timing					
Setup:	20 min	Scenario:	15 min	Debriefing:	30 min



Section V: Patient Data and Baseline State

A. Clinical Vignette: To Be Read Aloud at the Beginning of the Case

You are working at a community hospital. The triage nurse informs you that an 82-year-old male has just been placed in a resuscitation room. He was found unresponsive by his daughter and was brought to the hospital by EMS. During triage, he was profoundly altered, febrile, and hypotensive. His daughter is in the room with him.

B. Patient Profile and History

Patient Name: John Valentine	Age: 82	Weight: 75 kg
Gender: ☒ M ☐ F	Code Status: Full	
Chief Complaint: Altered Level of Consciousness (LOC)		
History of Presenting Illness: Last seen well 3 days ago. He was not answering the phone, so his daughter went to his house today and found him unresponsive in bed. He had previously been well. He was scheduled to remarry about a week ago, but his fiancée left him at the altar. He has been feeling quite depressed since then, but nothing seemed out of the ordinary.		
Past Medical History:	Hypertension (HTN)	Medications: Metoprolol 50 mg BID
	Dyslipidemia	Crestor 40 mg OD
	Hypothyroidism	Levothyroxine 100 mcg OD
	Depression	Citalopram 20 mg OD
Allergies: None		
Social History: Lives alone. Non-smoker. Does not consume alcohol.		
Family History: None		
Review of Systems:	CNS:	Daughter is unaware of any previous complaints.
	HEENT:	“
	CVS:	“

	RESP:	“		
	GI:	“		
	GU:	“		
	MSK:	“	INT:	

C. Baseline Simulator State and Physical Examination			
☐ No Monitor Display	☒ Monitor On, No Data Displayed	☐ Monitor on Standard Display	
HR: 122/min	BP: 83/60 mmHg	RR: 35/min	O2 Saturation: 92% on NRB
Rhythm: NSR	T: 38.6 oC	Glucose: 3.1 mmol/L	GCS: 9 (E3 V2 M4)
General Status: Unresponsive in bed.			
CNS:	Opens eyes to voice. Confused. Withdraws from pain bilaterally.		
HEENT:	No signs of head injury. No meningismus. Pupils 2 mm and fixed bilaterally.		
CVS:	No murmur. No edema.		
RESP:	Agonal respirations. Marked tachypnea with increased work of breathing and bilateral crackles.		
ABDO:	Soft. Normal bowel sounds.		
GU:	Unremarkable.		
MSK:	No signs of trauma.	SKIN:	Dry.

Section VI: Scenario Progression

Scenario States, Modifiers, and Triggers			
Patient State	Patient Status	Learner Actions, Modifiers, and Triggers to Move to the Next State	
1. Baseline State Rhythm: NSR HR: 122/min BP: 83/60 mmHg RR: 35/min O ₂ Saturation: 93% on NRB T: 38.6 °C	GCS: 9 (E3 V2 M4) When asked about goals of care, the daughter indicates that he "would want everything done." RN to cue regarding high respiratory rate and increased work of breathing.	<u>Learner Actions</u> - ☐ IV access, oxygen, and monitors - ☐ Fluid bolus - ☐ Check glucose (3.1 mmol/L) and administer D50 - ☐ Order toxicology, cardiac, sepsis, CK, and TSH blood work - ☐ ECG - ☐ Portable CXR - ☐ Broad-spectrum antibiotics - ☐ Obtain collateral history and discuss goals of care with the daughter - ☐ CT head when stable	<u>Modifiers</u> <i>Changes to the patient's condition based on learner actions</i> - D50 administered → No effect on GCS - First fluid bolus → BP 95/70 mmHg, HR 108/min - Second fluid bolus → BP 100/78 mmHg, HR 97/min <u>Triggers</u> <i>Criteria for progression to the next state</i> - Capillary glucose not checked within 3 minutes 3. Seizure - Fluids administered, laboratory tests ordered, glucose corrected, or 5 minutes elapsed 2. VBG Results Available

Scenario States, Modifiers, and Triggers

2. VBG Results Available Rhythm: NSR HR: 100/min BP: 97/72 mmHg RR: 40/min O ₂ Saturation: 90% on NRB	Provide the VBG results only at the onset of this state.	<u>Learner Actions</u> - ☐ Treat hypokalemia - ☐ Recheck glucose (3.2 mmol/L) - ☐ Start D5 infusion - ☐ Recognize an anion gap metabolic acidosis	<u>Triggers</u> - Capillary glucose not rechecked within 3 minutes → 3. Seizure - Electrolytes corrected and glucose corrected → 4. Remaining Laboratory Results Available
3. Seizure Rhythm: NSR HR: 150/min BP: 100/75 mmHg RR: 18/min O ₂ Saturation: 85%	The patient begins to seize (RN to provide the cue).	<u>Learner Actions</u> - ☐ Check glucose (1.9 mmol/L) - ☐ Administer a D50 bolus - ☐ Administer an intravenous benzodiazepine	<u>Modifiers</u> <u>Triggers</u> - From State 1, with glucose corrected → 2. VBG Results Available - From State 2, with glucose corrected → 4. Remaining Laboratory Results Available



Scenario States, Modifiers, and Triggers

4. Remaining Laboratory Results Available Rhythm: NSR HR: 95/min BP: 95/65 mmHg RR: 42/min O2 Saturation: 85% on NRB	GCS: 5. The patient is vomiting. (RN to prompt that the patient is no longer protecting the airway and is becoming increasingly somnolent.) Provide the remaining laboratory results at the onset of this state.	<u>Learner Actions</u> - ☐ Update the daughter - ☐ Initiate urinary alkalization - ☐ Consult Nephrology and the ICU - ☐ Perform intubation with a plan addressing acidosis (administer NaHCO₃ beforehand) - ☐ Provide post-intubation care (set the ventilator to a high respiratory rate, provide sedation, and obtain a CXR) - ☐ Contact Poison Control	<u>Modifiers Triggers</u> - Considers acidosis during the intubation plan → End Case PRN - Does not consider acidosis during the intubation plan (ventilator respiratory rate does not match the patient's respiratory rate) → 5. VF Arrest
5. VF Arrest	The patient loses a pulse and develops ventricular fibrillation (VF) for three rounds.	<u>Learner Actions</u> - ☐ High-quality CPR - ☐ Defibrillate VF - ☐ Administer epinephrine - ☐ Administer amiodarone	<u>Triggers</u> - 15 minutes → End Case PRN

Section VII: Supporting Documents, Laboratory Results, and Multimedia

Laboratory Results						
Na: 135 mmol/L	K: 2.0 mmol/L	Cl: 100 mmol/L	HCO ₃ : 10 mmol/L	BUN: 20 mmol/L	Cr: 580 μmol/L	Glu: 3.3 mmol/L
Ca: 2.58 mmol/L	Mg: 0.65 mmol/L (low)		PO ₄ : 0.80 mmol/L		Albumin: 12 g/L	
AG = 27 mmol/L	OG = 7 mOsm/kg		CK: 500 U/L		TSH: 0.4 (normal)	
VBG	pH: 7.05	PCO ₂ : 30 mmHg	PO ₂ : 90 mmHg		HCO ₃ : 8 mmol/L	Lactate: 10 mmol/L
Troponin: 7		INR: 3.3			PTT: 40 seconds	
WBC: 18 × 10 ⁹ /L	Hb: 120 g/L		Hct: 0.52		Plt: 330 × 10 ⁹ /L	
AST: 300 U/L	Tylenol: <0.15		EtOH: <2		ASA: 7.6 mmol/L	Osm: 300 mOsm/kg



Images (ECGs, CXRs, etc.)

Hypokalemia ECG



ECG source:

<https://lifeinthefastlane.com/ecg-library/basics/hypokalaemia/>

Pre-intubation CXR – ARDS



CXR source:

http://www.radiology.vcu.edu/programs/residents/quiz/pulm_cotw/PulmonConf/09-03-04/68yM%2008-03-04%20CXR.jpg

Post-intubation CXR – ARDS



CXR source:

http://courses.washington.edu/med620/images/mv_c3fig1.jpg

Ultrasound Video Files (if applicable)

Abdomen: No free fluid (FF)

Aorta: No abdominal aortic aneurysm (AAA)

Cardiac: No pericardial effusion (PCE)

Section VIII: Debriefing Guide

General Debriefing Plan	
☐ Individual	☒ Group
☐ With Video	☒ Without Video
Objectives	
Educational Goal:	To expose learners to a febrile patient with altered mental status resulting from ASA toxicity.
CRM Objectives:	1) Demonstrates situational awareness by avoiding fixation errors and reassessing and reevaluating a changing clinical picture. 2) Adequately utilizes resources through an early call for help and appropriate delegation of tasks. 3) Performs a tailored and appropriately brief goals-of-care discussion with the family of a critically ill patient.
Medical Objectives:	4) Initiates a broad work-up of the febrile patient with altered mental status. 5) Identifies an anion gap (AG) metabolic acidosis on a critical VBG/electrolyte panel. 6) Administers appropriate early treatment for ASA toxicity. 7) Employs a tailored approach to intubation and ventilator settings. 8) Recognizes the need for dialysis.



Sample Questions for Debriefing

1. What is your differential diagnosis for a patient presenting with altered mental status and fever?
2. What conditions should be included in the differential diagnosis for an anion gap metabolic acidosis? What conditions should be considered in the differential diagnosis for an osmolar gap acidosis? What conditions should be considered in the differential diagnosis for a mixed (double-gap) acidosis?
3. What acid–base disturbances are associated with ASA overdose, and why?
4. What are the metabolic effects of ASA overdose?
5. What is the toxic dose of ASA, and when should serum ASA levels be measured?
6. List three causes of shortness of breath (SOB)/tachypnea in a patient with ASA toxicity.
7. What are the target urine pH and serum pH during urinary alkalinization?
8. What are the indications for urinary alkalinization?
9. What are the indications for dialysis?

Key Moments

Initial code-status discussion and reassessment following the diagnosis of overdose (OD).

Initiate urinary alkalinization.

Recognize the need for dialysis.

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