Nova Scotia College of MIRTP

NUCLEAR MEDICINE TECHNOLOGY

PRECEPTOR GUIDE

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PROGRAM OVERVIEW

Preceptor Guide

The preceptor guide is intended for both the candidate and preceptor to gain a full understanding of the roles and responsibilities in supervision and evaluation.

Introduction

The NSCMIRTP Refresher Program in Nuclear Medicine Technology provides nuclear medicine (NM) technologists who have not practiced for a five-year period or more the opportunity to re-attain professional competence. The refresher program includes an academic and clinical component. Both components must be completed within 18 months.

Program Goals

- Attain/demonstrate current knowledge in NM procedures, imaging equipment, radiation safety and protection practices, and patient care/ethics.
- Reorient to the healthcare environment and the role of the NM technologist in the healthcare team.
- Practise competently within the profession, meeting competencies as specified in the CAMRT NM Competency Profile.
- Value the importance of continuing professional development.

Pre-requisites

Candidates for the refresher program must have previously:

- Passed the CAMRT certification exam; and
- Been a registrant of a professional licensing body where regulated, or a member of an association where unregulated, within Canada in the practice area of NM in Canada;
- OR been approved by a regulatory body in your jurisdiction to take the program.

Academic Component

The academic portion of the refresher program is self-directed. Individuals are directed to the Required Materials and Objectives for each unit. Candidates are provided with learning activities and questions to complete to assess their theoretical competence. The topics covered and examined mirror the CAMRT competency profile.

Appendix A includes a comprehensive list of objectives and procedures covered in the academic portion of the program.

When all units are completed, candidates must write a supervised final exam. The exam is 150 multiple choice questions and includes all material from the academic portion of the refresher program. Candidates must attain a mark of 65% to proceed to the clinical portion of the program.

Topics covered and refresher exam weighting in the Academic Component are outlined in the tables below.

Primary Weightings

Competency Category	Minimum	Maximum	# Of Questions (Range)
1. Professional 2. Communicator 3. Collaborator	5%	10%	8-15
4. Care Provider	10%	20%	15-30
5. Leader	0%	0%	0
6. Scholarly Practitioner	0%	0%	0
7. Clinical Expert (further broken down below)	70%	85%	105-128
Integrate safe work principles and procedures into practice Integrate radiation safety principles and procedures into practice	10%	20%	15-30
Manage a variety of imaging systems	10%	20%	15-30
Perform radiopharmacy and laboratory procedures	5%	10%	8-15
Integrate clinical principles into practice Perform diagnostic and therapeutic procedures Administer substances required for clinical procedures	21%	35%	32-53
Analyze image and data quality and respond	9%	15%	14-23

Secondary Weightings

Category	Weighting
Cardiovascular System	High
Tumour/Inflammatory/Lymph System	High
Skeletal System	High
Endocrine System	Medium
Gastrointestinal System	Medium
Genitourinary System	Medium
PET/CT	Medium
Radiation Emitting Device Procedures - CT	Medium
Central Nervous System	Low
Radiation Emitting Device Procedures - BMD	Low
Respiratory System	Low
Therapeutic Procedures - Endocrine	Low
Therapeutic Procedures - Tumour	Low

Clinical Component

Candidates are required to secure their own clinical placements, which must be approved by the NSCMIRTP refresher program supervisor. Candidates and potential clinical sites are encouraged to reach out to the refresher program superior with any questions related to clinical site requirements.

A minimum of 420 clinical hours must be completed within a 6-month period. A designated preceptor will track clinical proficiency via the clinical summary to record successful attainment of required clinical competencies. **If a clinical site is unable to deliver all required procedures candidates may be required to arrange further clinical experiences at an alternate clinical site.**

If a candidate is unsuccessful in meeting the clinical requirements in the allotted 420 hours, a one-time extension to a maximum of 210 hours of clinical time may be requested from the refresher program coordinator.

CLINICAL COMPONENT

Pre-Requisites

Prior to commencing the clinical component candidates must meet the following criteria:

- Successful completion of the academic component
- Proof of current CPR Basic Life Support for Healthcare Providers
- Proof of Professional Liability Insurance
- Additional requirements of the clinical site
- Additional requirements of applicable provincial regulatory body

Site Criteria

It is important when selecting a clinical site to ensure the required procedures are attainable. The process of site approval requires that the candidate submit a clinical site proposal to the refresher program coordinator. Once a clinical site is approved a clinical site agreement must be signed. The required documentation is in **Appendix C** and must be completed prior to commencing the clinical component.

Sites must meet the following criteria to be considered appropriate:

- There must be a dual head SPECT/CT Unit.
- The department must have a working radiopharmacy.
  *Note: a candidate may go to a department that does not have a radiopharmacy but will be required to do a portion of their clinical time at a site with a radiopharmacy.
- Perform chromatography on all radiopharmaceuticals.
- Follow a radiation safety program that includes area monitoring, swipe tests, and personal monitoring.
- A quality assurance program to monitor equipment performance must be in place.

Time Requirements

Minimum Requirement: **420 hours**, completed within a 6-month period.
Additional: When required, a one-time 210 hour extension may be granted.

Total: Total hours must not exceed **630**.

Preceptor Expectations

Once a clinical site has been secured the director/manager of the department will assist the candidate in finding a principal preceptor. The principal preceptor should demonstrate a desire to actively participate in the continuing professional development of themselves and others. While the principal preceptor will oversee placement, it is expected that multiple technologists will act as clinical preceptors during the placement.

The preceptor(s) is/are responsible for:

- Orienting the candidate to the department.
- Assessing performance level and providing ongoing feedback for continued growth.
- Ensuring proper supervision and support.
- Selecting clinical experiences to assist the candidate achieve the required competencies.
- Facilitating growth by increasing responsibilities and promoting independent decision-making opportunities as the candidate gains competence.
- Assessing the candidate's performance in accordance with specific evaluation guidelines.
- Demonstrating professionalism through modeling of professional practice.
- Guiding candidate with reflective practice, gap analysis and learning plan throughout the clinical component.
- Providing formal evaluations, constructive feedback through completion of required evaluation forms and ongoing discussions with candidate.

Preceptor Resources

It is recommended, prior to candidates starting their clinical component that preceptors review the suggested resources. Preceptors must be aware that refresher program candidates are not students beginning their studies in NM technology. Refresher candidates have previously completed entry to practice requirements and may have many years of work experience in the field. Although the concepts presented are applicable for both types of learners the preceptor techniques should be tailored accordingly.

Canadian Association of Medical Radiation Technologists. Effective Preceptorship: A Guide to Best Practice. PreceptorGuidelines.pdf (camrt.ca)

Dalhousie University. Preceptor eLearning Course. Preceptor eLearning Course - School of Communication Sciences and Disorders - Dalhousie University

Orientation

On the first day of the clinical component, it is compulsory that candidates are familiarized with hospital and department policies and procedures. The preceptor should assist the candidate with locating resources and interpreting departmental policies and procedures. An orientation checklist is provided in **Appendix B**.

Direction Levels

For the duration of the candidate's clinical experience, it is essential the preceptor appreciates that the candidate is participating in this program to regain competence after a lapse in practice. While the candidate is progressing through the clinical portion of the program it is required that they be properly supervised. This means even once the candidate has demonstrated competence, they must always have a technologist available to them.

As the candidate progresses through the program the preceptor must determine the required level of supervision. Candidates may perform at a higher level of independence for some procedures while still requiring significant assistance with other procedures.

Candidates are not licensed technologists and should never deem a study complete and ready for reporting or release a patient without first checking with the supervising technologist.
To guide the preceptor and the candidate, three levels and descriptions of direction/supervision are provided.

1) **Guided Decision Making:** The supervising technologist must always be in the room with the candidate. Decisions or procedures/tasks performed must be done through direct supervision.
2) **Supervised Performance:** The candidate can make decisions and perform procedures/tasks accurately with minimal supervision or direction from the supervisor. The supervising technologist must always be present and checks to ensure all components of the procedure are completed accurately.
3) **Independent Performance:** The candidate can make all decisions and perform procedures/tasks independently and efficiently while under indirect supervision. The preceptor is always available to the candidate and checks the final product prior to submission for reporting.

Evaluation

Competency assessments should be completed throughout the clinical component of the program. Following the competency assessment guidelines, candidates will be evaluated regularly for level of clinical performance. Procedures are signed off in the summary when the candidate has achieved competency as defined below:

Competence:

- Demonstrated ability to perform a procedure or task of diagnostic quality.
- Proven understanding of NM procedures demonstrating integration of theory to practice.

Candidate must:

- Provide the preceptor guide and all necessary documentation and tracking tools to the preceptor.
- Collect all completed documentation and evaluations and return to the refresher program coordinator at the conclusion of clinical.
- Track all clinical hours.
- Fulfill additional requirements specific to selected clinical site such as criminal records check or a vulnerable population check.

Assessment Procedure

The candidate will indicate to the preceptor when they feel competent to perform a clinical assessment for a specific procedure or examination. The preceptor will select an appropriate examination and the candidate will perform the examination under direct supervision. When a candidate meets the competency expectations the preceptor will complete the proper documentation with date, procedure type and signature.

Any cause for interruption or intervention by the preceptor during the competency assessment will result in a rating of “needs development.” The candidate must be able to perform the procedure from start to finish unassisted. The candidate will then be required to perform the assessment at another time.

Preceptors will:

- Assess candidate performance and identify competencies met/not met.
- Provide the candidate with constructive feedback, identifying strengths and areas for development.

Evaluation Tools

The preceptor will give all original paperwork back to the candidate once completed. It is the responsibility of the candidate to ensure all original paperwork is sent to the refresher program coordinator at the completion of the clinical component. There are six evaluation and tracking tools associated with the clinical component of the refresher program. These tools are provided in the summary of clinical competence package.

- Orientation Check list
- Tracking of Clinical Hours
- Assessment of Clinical Performance – self, formative, and summative evaluations
- Clinical Competency Assessment Rubric
- Clinical Assessment and Quality Control Tracking Table
- Program Feedback

Orientation Check List

With the assistance of the preceptor, the candidate must complete an orientation checklist on the first day of the clinical component. This ensures the candidate is aware of all safety procedures and departmental policies and that they always adhere to safe work practices.

Tracking of Clinical Hours

Candidates must complete the tracking table with the dates and hours worked. A total of 420 hours is required. Should the candidate not be successful in fulfilling the clinical requirement a one-time request can be made to the refresher program coordinator for an additional 210-hour extension.

Assessment of Clinical Performance

1) **Self-evaluation** must be completed by the candidate prior to each formative evaluation. The intent is to encourage the candidate to reflect on their strengths, skills, and areas for development. At the performance review, the candidate and preceptor ratings will be compared and discussed.
2) **Formative evaluation** of a candidate's clinical performance must be completed at approximately 150 hours and 300 hours during the practicum. This will provide formal feedback to the candidate on their progress. Assessment will focus on the performance of the candidate since the last clinical evaluation. Preceptors should discuss the evaluation with candidates and provide them an opportunity to add written comments.
3) **Summative evaluation** of the candidate must be completed at the conclusion of the clinical component, which will consider the overall performance of the candidate during the clinical placement and their current ability to re-enter the clinical environment as a working technologist.

Clinical Competency Assessment Rubric

Clinical competency assessment rubric will be used throughout the clinical component of the program to help supervising technologists in assessing the candidate's competency in performing required procedures.

Clinical Assessment and Quality Control Tracking Table

The Clinical Assessment and Quality Control Tracking Table is a tool to track the progress of a candidate. Each clinical assessment and quality control assessment must be signed as they are successfully completed. All required procedures must be signed off to complete the clinical component of the refresher program.

Program Feedback

Feedback is an essential element of program evaluation and contributes to continuous improvement of the refresher program. Candidates and preceptors can provide feedback at the completion of the clinical component. Completed forms should be forwarded to the refresher program coordinator.

APPENDIX A – ACADEMIC OBJECTIVES

Professional

- Describe the Provincial Regulator (if applicable) and CAMRT code of ethics and relate it to clinical practice.
- Outline Medical Radiation Technologist (MRT) regulation in candidate's practising province or territory including Standards of Practice.
- Describe qualities of professional behaviour.
- Explain the nuclear medicine technologist's scope of practice, based on the candidate's jurisdiction, and specifically, based on candidate's education and skill set.
- Discuss the CAMRT best practice guidelines for nuclear medicine technologists.
- Outline MRT regulation in candidate's practising jurisdiction, including Standards of Practice.
- Discuss patient rights and legislation governing privacy of patient information and implications to practice.
- Identify ethical issues and actions appropriate to the practice of medical radiation technology.

Communicator

- Discuss the importance of verifying patient identity and obtaining informed consent.
- Examine the components required during an appropriate patient assessment and the factors that contribute to effective communication.
- Understand the use of verbal and non-verbal communication in clinical environments.
- Recognize the language and actions that reflect respect and dignity in practice.
- Examine when to adapt communication strategies based on the individual patient.
- Discuss how to identify clinically relevant details and provide accurate updates to the care team.

Collaborator

- Understand the role of an NMT in interprofessional teams.
- Discuss the elements of interprofessional collaboration.
- Understand what to communicate during the transfer of care for patients.
- Discuss conflict management techniques.

Care Provider

- Describe the safety measures for the patient and technologist when transporting and transferring patients.
- Explain the process of ensuring patient centered care assessments.
- Understand the different age developmental stages with provision of age specific care.
- Describe how to provide compassionate care based on the patient's physiological, cognitive, and psychological needs.
- Discuss correct administration of drugs including, rights, routes, handling, and equipment.
- Discuss standard methods of infection transfer and control techniques.
- Explain the use of vital signs including, proper assessment, normal values and terms associated with deviations from normal.
- Explain the appropriate procedure to respond to changes in patient condition and medical emergencies.
- Describe the proper procedure and precautions when caring for patients with ancillary equipment.
- Discuss how to provide education and support to patients and their families.

Leader

- Describe how to give guidance and constructive feedback to students and less experienced technologists.
- Understand what is meant by professional advocacy.
- Understand the importance of advocating for patient and family centred care.
- Understand how leadership can be applied in practice.
- Apply quality improvement practices.

Scholarly Practitioner

- Appreciate why scholarly practice is an expectation of practice.
- Recognize the importance of reflective practice.
- Appreciate the significance of continual competence and professional learning.
- Identify research activities and relate them to evidence-informed changes in practice.
- Integrate best practices into personal practice.

Clinical Expert

Cardiovascular

- Discuss the anatomy, physiology, and the pathologies of the cardiac system.
- Discuss current radiopharmaceuticals available for cardiac procedures.
- Discuss biodistribution and pharmacokinetics for cardiac radiopharmaceuticals.
- Identify appropriate indications for performing perfusion, function, and morphologic cardiac studies.
- Describe the patient education and preparation required for the cardiac procedures.
- Discuss the effects/contraindications of pharmacological intervention and patient conditions on cardiac procedures and results.
- Select correct imaging parameters and techniques for the performance of cardiac imaging.
- Evaluate cardiac procedures for diagnostic quality, normals, pathological conditions and artifacts.

Procedures Covered:

- Gated Equilibrium SPECT/CT
- Gated Equilibrium Rest
- Myocardial Perfusion Gated SPECT/CT (rest and stress)
- Myocardial Perfusion non-gated SPECT/CT (rest and stress)
- Myocardial Perfusion Pharmacological SPECT/CT
- Cardiac PET/CT
- Stress Testing

Central Nervous System

- Discuss the anatomy, physiology, and the pathologies of the CNS system.
- Discuss current radiopharmaceuticals available for CNS procedures.
- Discuss biodistribution and pharmacokinetics for CNS radiopharmaceuticals.
- Identify appropriate indications for performing CNS studies.
- Describe the patient education and preparation required for the CNS procedures.
- Discuss the effects/contraindications of pharmacological intervention and patient conditions on CNS procedures and results.
- Select correct imaging parameters and techniques for the performance of CNS imaging.

- Evaluate CNS procedures for diagnostic quality, normals, pathological conditions and artifacts.

Procedures Covered:

- Cerebral Perfusion and Metabolism Studies

Endocrine System

- Discuss the anatomy, physiology, and the pathologies of the endocrine system.
- Discuss current radiopharmaceuticals available for endocrine procedures.
- Discuss biodistribution and pharmacokinetics for endocrine radiopharmaceuticals.
- Identify appropriate indications for performing endocrine studies.
- Describe the patient education and preparation required for the endocrine procedures.
- Discuss the effects/contraindications of pharmacological agents and patient conditions on endocrine procedures and results.
- Select correct imaging parameters and techniques for the performance of endocrine imaging.
- Evaluate endocrine procedures for diagnostic quality, normals, pathological conditions and artifacts.
- Discuss the indications and use of 131I-NaI for therapeutic treatment of thyroid disease.

Procedures Covered:

- Thyroid Uptake
- Thyroid Scan
- Wholebody ^{131}I-NaI Imaging
- Thyroid Therapy for hyperthyroidism
- Therapy for Thyroid Cancer
- Parathyroid Scan

Gastrointestinal System

- Discuss the anatomy and physiology and the pathologies of the GI system.
- Discuss current radiopharmaceuticals available for GI procedures.
- Discuss biodistribution and pharmacokinetics for GI radiopharmaceuticals.
- Identify appropriate indications for performing perfusion, function, and morphologic GI studies.
- Describe the patient education and preparation required for the GI procedures.
- Discuss the effects/contraindications of pharmacological intervention and patient conditions on

GI procedures and results.

- Select correct imaging parameters and techniques for the performance of GI imaging.
- Evaluate GI procedures for diagnostic quality, normals, pathological conditions and artifacts.

Procedures Covered:

- Gastric Empty solid
- GI Bleed
- Hepatobiliary Scan
- Hepatobiliary Scan with Intervention

  Please note that there are two dosing errors in the Nuclear Medicine and PET/CT Technology and Techniques textbook. The dose for CCK is 0.02ug/kg and for morphine it is 0.04mg/kg as stated in SNM guidelines.
- Liver Spleen Scan (Colloid)
- Meckel's Diverticulum
- RBC Liver
- Gastroesophageal Swallow/Reflux *(not testable on exam)

Genitourinary System

- Discuss the anatomy, physiology, and the pathologies of the GU system.
- Discuss current radiopharmaceuticals available for GU procedures.
- Discuss biodistribution and pharmacokinetics for GU radiopharmaceuticals.
- Identify appropriate indications for performing perfusion, function, and morphologic GU studies.
- Describe the patient education and preparation required for the GU procedures.
- Discuss the effects/contraindications of pharmacological agents and patient conditions on GU procedures and results.
- Select correct imaging parameters and techniques for the performance of GU imaging.
- Evaluate GU procedures for diagnostic quality, normals, pathological conditions and artifacts.

Procedures Covered:

- Effective Renal Plasma Flow
- Glomerular Filtration Rate
- Renal Cortical Scan

- Renal Function Scan
- Renal Scan Pharmacological Intervention
- Renal Transplant
- Voiding Cystogram* (not testable)

Respiratory System

- Discuss the anatomy and physiology and the pathologies of the respiratory system.
- Discuss current radiopharmaceuticals available for respiratory procedures.
- Discuss biodistribution and pharmacokinetics for respiratory radiopharmaceuticals.
- Identify appropriate indications for performing perfusion, function, and morphologic respiratory studies.
- Describe the patient education and preparation required for the respiratory procedures.
- Discuss the effects/contraindications of pharmacological agents and patient conditions on respiratory procedures and results.
- Select correct imaging parameters and techniques for the performance of respiratory imaging.
- Evaluate respiratory procedures for diagnostic quality, normals, pathological conditions and artifacts.

Procedures Covered:

- Perfusion Lung Scan
- Quantitative Lung Scan
- Ventilation Lung Scan

Skeletal System

- Discuss the anatomy and physiology and the pathologies of the skeletal system.
- Discuss current radiopharmaceuticals available for skeletal procedures.
- Discuss biodistribution and pharmacokinetics for skeletal radiopharmaceuticals.
- Identify appropriate indications for performing perfusion, function, and morphologic skeletal studies.
- Describe the patient education and preparation required for the skeletal procedures.
- Discuss the effects/contraindications of pharmacological agents and patient conditions on skeletal procedures and results.
- Select correct imaging parameters and techniques for the performance of skeletal imaging.

- Evaluate skeletal procedures for diagnostic quality, normals, pathological conditions and artifacts.

Procedures Covered:

- Bone Marrow Imaging
- Bone Scan SPECT
- Three Phase Bone Scan
- Whole body Bone Scan

Tumor/Oncology/Inflammatory Processes

- Discuss the anatomy and physiology of tumor and inflammatory processes.
- Discuss current radiopharmaceuticals available for tumor and inflammatory procedures.
- Discuss biodistribution and pharmacokinetics for tumor and inflammatory radiopharmaceuticals.
- Identify appropriate indications for performing studies on tumor and inflammatory processes.
- Describe the patient education and preparation required for tumor and inflammatory procedures.
- Discuss the effects/contraindications of pharmacological agents and patient conditions on tumor and inflammatory procedures and results.
- Select correct imaging parameters and techniques for the performance of tumor and inflammatory imaging.
- Evaluate tumor and inflammatory procedures for diagnostic quality, normals, pathological conditions and artifacts.
- Identify appropriate indication for performing sentinel node imaging.
- Discuss expected results for sentinel node imaging.

Procedures Covered

- Gallium Scan
- MIBG Imaging
- Somatostatin-Receptor Imaging
- WBC Scan
- Sentinel Node Imaging

Radiation Protection

- Discuss the anatomy and physiology of tumor and inflammatory processes.
- Discuss current radiopharmaceuticals available for tumor and inflammatory procedures.
- Discuss biodistribution and pharmacokinetics for tumor and inflammatory radiopharmaceuticals.
- Identify appropriate indications for performing studies on tumor and inflammatory processes.
- Describe the patient education and preparation required for tumor and inflammatory procedures.
- Discuss the effects/contraindications of pharmacological agents and patient conditions on tumor and inflammatory procedures and results.
- Select correct imaging parameters and techniques for the performance of tumor and inflammatory imaging.
- Evaluate tumor and inflammatory procedures for diagnostic quality, normals, pathological conditions and artifacts.
- Identify appropriate indication for performing sentinel node imaging.
- Discuss expected results for sentinel node imaging.

Radiopharmacy

- Contrast reactor and accelerator-produced radionuclides.
- Compare secular and transient generators.
- Discuss the principles of ^{99}Mo-^{99m}Tc generators.
- Describe characteristics of pertechnetate as a labelling agent.
- Explain the role of oxidization in labelling ^{99m}Tc radiopharmaceuticals.
- Identify and explain appropriate uses of ^{99m}Tc radiopharmaceuticals.
- Discuss preparation methods, quality control requirements and dosages for ^{99m}Tc radiopharmaceuticals.
- Discuss proper storage, handling, and transportation of radioactive materials.
- Discuss preparation methods, QC requirements and dosages for non-99mTc radiopharmaceuticals.
- Describe the uses of therapeutic radioactive preparations used in nuclear medicine.
- Radiolabel autologous cellular components for re-injection.

Pharmacological Interventions - Application and Management

- Understand the MRT's role in intervention application and management.
- Understand the use, administration, and effects of pharmacologic agents.
- Explain indications, contraindications, preparation, administration procedure and risks of pharmacologic and contrast agents.
- Classify contrast media reactions and appropriate responses.
- Discuss contrast induced nephropathy (CIN) and outline methods to reduce risk.
- Understand the process of sterile tray set up.
- Understand responsibilities to patient care regarding pharmacologic interventions.

Manage Imaging Systems and Data

- Review the operating principles associated with common nuclear medicine instrumentation.
- Apply theoretical knowledge of image acquisition and processing.
- Communicate the concepts of image acquisition parameters and computerized image manipulation methods.
- Describe the positive and negative effects of parameter modifications on image quality.
- Contrast image reconstruction and display options for planar and SPECT/CT images.
- Compare filtered back projection (FPB) and iterative construction techniques in SPECT/CT imaging.
- Discuss filtering in SPECT/CT imaging.
- Identify common artifacts in SPECT/CT imaging and their causes.
- Discuss corrections available in SPECT/CT imaging.
- Perform and evaluate basic quality control procedures required in a nuclear medicine department.
- Demonstrate a basic understanding of current and emerging imaging, planning and therapeutic technologies used by interdisciplinary practices.

Computed Tomography

- Discuss the basic components and operating principles of a CT scanner.
- Explain how a helical and multidetector scanner works.
- Convert attenuation coefficients to Hounsfield Unit (HU) equivalents.
- Relate CT numbers to proper tissue equivalent.

- Identify the parameters set by technologist in CT imaging.
- Demonstrate an understanding of factors affecting image quality in CT.
- Identify common artifacts in CT and their prevention.
- Describe post processing options for CT images.
- Discuss the use of CT in fusion imaging.
- Contrast radiation exposure in CT to routine general imaging procedures.
- Describe methods of dose reduction in CT.
- Describe a quality assurance program for a CT scanner.

Positron Emission Tomography

- Describe positron decay and the production of annihilation photons.
- Identify radiation safety issues in a PET environment.
- List common PET radionuclides produced.
- Describe the process of cyclotron production of radionuclides.
- Discuss the various types of current PET scanner designs and detector materials.
- Summarize the operation of a PET scanner.
- Classify the potential interactions during the data acquisition process for PET including true events, random coincidences, scatter, and noise.
- Discuss potential significance of time-of-flight technology.
- Explain data reconstruction for PET acquisitions.
- Differentiate between 2D and 3D imaging in current practice.
- Describe quality control procedures for PET imaging systems.
- Discuss benefits of image fusion in PET/CT.
- Outline the biodistribution and pharmacokinetics of ^{18}F-FDG.
- Associate the effects of patient preparation, contrast enhancement and normal physiologic variants on the biodistribution of ^{18}F-FDG.
- Discuss the impact of using CT contrast media in PET/CT procedures.
- Describe the uses of ^{18}F-FDG PET imaging in staging, follow up, and treatment planning in oncology.
- Summarize the quantitative techniques used in PET clinical exams.

Continuous Quality Improvement

- Describe quality control procedures for survey meters.
- Discuss the quality control procedures required for dose calibrators including how each procedure is performed and the expected results.
- Discuss quality control requirements for non-imaging scintillation detectors.
- List and discuss quality control procedures required for the scintillation camera system.
- Define NEMA standards and their application to nuclear medicine.
- List the required QC calibrations for PET systems.
- Examine quality improvement programs and their relationship to nuclear medicine services.
- Identify the various components for a comprehensive quality management program in medical imaging.
- Describe methods to improve quality in medical imaging.
- List the factors that affect quality.
- Describe the required procedures for quality control of a CT unit.
- Relate the importance of a proper quality control program to clinical practice.
- Understand the Canadian requirements for CT QC as set out by Safety Code 35 standards.

APPENDIX B - SAFETY AND ORIENTATION CHECKLIST

Candidate Name:

Clinical Site:

The safety and orientation checklist are to be completed by the candidate and the preceptor upon the candidate's arrival in the clinical area. It is essential the candidate is aware of all safety procedures and departmental policies and always adheres to safe work practices. The following checklist is designed to help guide the candidate's orientation to the department. The preceptor will provide a tour of the clinical site and ensure all policies are followed.

The preceptor will ensure the following take place:

- Dose labeling
- QC of radiopharmaceuticals
- Compliance with CNSC regulations
- Availability of GM Survey meter
- Regular area monitoring and swipe testing performed
- Regular Personnel monitoring performed
- Compliance with lab regulations to include:
- No food stored or consumed in designated radioactive areas
- Lab coats to be worn in department only
- Gloves always worn for dispensing and injecting radiopharmaceuticals
- Practice one handed needle re-capping
- Long term radiation storage and daily needle storage levels shielded to within acceptable levels

The candidate will ensure knowledge of:

- Departmental organizational chart
- Bomb threat policy and procedures
- Safety policy and procedures
- Fire policy and procedures
- Hospital emergency codes

- WHMIS policy and procedures
- Incident reporting policy and procedures
- Location of crash cart, exits, fire extinguishers, emergency equipment
- Areas of Diagnostic Imaging (reporting, booking, reception, washrooms)
- Other services provided within the clinical site (Blood collection, X-Ray, CT, MRI, US, etc.)

Preceptor Name: _____ Date: _____

Signature: _____

Candidate Name: _____ Date: _____

Signature: _____

APPENDIX C - CLINICAL SITE PROPOSAL

Candidate:

Anticipated Start Date:

Proposed Preceptor:

NOTE: If additional space is required, please attach to this form.

List all nuclear cameras and bone density machines available on site:

Does the department perform radiopharmacy preparations?

Does the department perform chromatography on all radiopharmaceuticals?

If not, how does the candidate propose competency will be gained in these areas?

Does the department have a radiation safely program that includes area monitoring, swipe testing and personal monitoring?

Does the department participate in a quality assurance program?

Provide a basic description of the workings of the department:

Preceptor: Having reviewed the required clinical competencies outlined in the clinical guide, do you believe the candidate will have sufficient opportunity to gain competence during the clinical period? Explain.

Other comments or concerns:

Preceptor Signature: _____ Date: _____

Candidate Signature: _____ Date: _____

Approval NSCMIRTP refresher program coordinator: _____

Date: _____

APPENDIX D - CLINICAL SITE AGREEMENT

(between)

Site	Candidate
Name: Signature: Address:	Name: Signature: Address:

Role and Responsibilities of Clinical Sponsor/Site:

1. Name one individual responsible for coordinating the program and be the contact person at the clinical site.
2. Receive verification from the Refresher Program Coordinator of candidate's successful completion of the *Academic Exam.*
3. Ensure that the physical resources available to the candidate are equal to those normally required in the current practice of the profession.
4. Ensure that precepting staff have been identified and adequately prepared to fulfill this role.
5. Ensure that precepting staff practice in the same area of practice as the candidate.
6. Ensure that precepting staff are physically present and available to assist the candidate in the performance of restricted activities.
7. Forward a verification of the candidate's completion of the clinical component to the Refresher Program Coordinator.
8. Not be obligated to provide any salary, medical benefits or other compensation whatsoever to the candidate.
9. Reserve the right to request a security clearance check from the candidate.
10. Reserve the right to request the removal of any candidate from its supervision by written notification to the Refresher Program Coordinator.

Role and Responsibilities of Upgrading Candidate:

1. Become familiar with, and adhere to, all clinical site policies governing the conduct of staff on-site.
2. Act in accordance with the requirements of any regulation governing the profession.
3. Exhibit initiative to inquire for clarification, to perform tasks, and to seek opportunities to increase knowledge and skills.
4. Perform all duties in an ethical and professional manner.
5. Establish and maintain effective communication channels with preceptors, tutors, and instructors.
6. Pay any clinical site fees, if applicable, prior to commencement of the clinical component of the refresher program.

Clinical Component Projected Timeline:

Start date: _____ Projected end date: _____

Candidate Signature: _____ Date: _____

Preceptor Signature: _____ Date: _____

This signed agreement will be provided to the Refresher Program Supervisor. The candidate will receive a copy, and the clinical practicum site will retain a copy on file.