Medical Physics Associate Training Outline

These training guidelines are derived from the results of a survey conducted by the Organization of Medical Physics Associates of Canada (OMPAC). Specific job responsibilities for this title vary between different institutions and thus the following training objectives may not apply to all centers.

These outlines are not intended to set a minimum standard that shall be met within each radiation treatment facility, nor are they intended to be a required component. The intent of the document is to outline a benchmark for training physics associate, overseen by qualified medical physicists. The document has been reviewed by COMP's Professional Affair Committee (PAC) members.

Recommended time frame for practical training should be divided to

- Observation, trainee shadows a qualified individual while performing the task
- Performance, trainee is shadowed by a qualified individual while performing the task, and
- Independence, trainee demonstrates the skills/theory to perform each test sufficiently to move forward independently while a qualified individual is available for troubleshooting should the need arises.

Module1: Radiation Safety and Administration

Time Frame: 1 week

- ☐ Radiation Safety Training, as directed by the site's Radiation Safety Officer, which should include
    - Introduction to the Nuclear Safety Control, Regulations and Regulatory Bodies (including the Canadian Nuclear Safety Commission and relevant provincial regulator)
    - Role of the Radiation Safety Officer
    - Nuclear Energy Worker Designation, Implications, and Responsibilities
    - Prescribed Equipment and Radioactive Sources
    - ALARA and Principles of Radiation Safety
    - Personal Dosimetry and Dose Limits
    - Site Contact Information

- ☐ General workplace orientation such as patient privacy and confidentiality, IT training, local policies, etc.
- ☐ Orientation on Job Responsibilities
- ☐ Introduction to Quality Assurance (QA) Concepts and its Role in Safe and Efficient Patient Treatment

By the end of the 1st Module, the trainee should be familiar with his/her responsibilities and hospital rules and regulations relevant to his/her department.

Module2: External Beam and Linear Accelerators (Linac)

2.1. Theory of Operation and Operating Linac

Time Frame: 1 Weeks

- ☐ Introduction to Radiation Oncology and Radiation Therapy Process
- ☐ Introduction to Radiation Therapy Equipment and Procedures
- ☐ Linac Training
    - Introduction to Linacs
        - Principals of Radiation Interactions with Matter
        - Measurement of Ionizing Radiation
        - Principles of Linear Accelerators Operation, Generation and Delivery of Ionizing Radiation
    - Using Linacs:
        - Morning Warmup
        - Running Beams and Modes of Delivery
        - OnBoard Imaging, Gating and Other Devices/Accessories
        - Emergency Procedures
        - End of the Day Shutdown and Emergency Stops Check

2.2. Daily to Monthly Quality Assurance (QA) of Linacs

Time Frame: 2 Weeks

- ☐ Introduction to the theory of Linac QA measurements performed at frequency of daily, weekly, bi-weekly or monthly including CPQR and AAPM recommendations
- ☐ Introduction to local procedures for daily to monthly QA
- ☐ Introduction to Linac's mounted imaging systems including CPQR and AAPM recommendations on their QA

2.3. Low Frequency QA of Linacs

Time Frame: 1 Week

- ☐ Introduction to the theory of Linac QA measurements performed at low frequency such as semi-annual, annual and scenario-specific tests
- ☐ Review the relevant CPQR and AAPM guidelines
- ☐ Introduction to local procedures for these tests

2.4. Quality Control of Supporting QA Equipment

Time Frame: 1 Week

- Cross calibration of electrometers and ion chambers
- Calibration of common medical physics equipment used in the RT department such as ICProfiler, ArcCHECK, Beamchecker, etc.
- Introduction to Patient Dosimetry System(s) and Dosimeters such as OSL, MOSFET and TLD
    - Follow a trail of Patient Dosimetry from irradiation to reading and reporting results
- Dosimetry and Calibration of Radiochromic Film

At the completion of the second module the trainee should be able to competently operate Linac, explain the logic behind QA tests and perform all Linac QA procedures and operate and calibrate all supporting QA equipment.

Module 3: Radiation Planning Simulators

Time Frame: 1 Week

- Introduction to radiation planning simulation and simulators such as CT, MR and US
- Learning CPQR and AAPM recommendation on radiation planning simulators QA
- Learning to perform QA procedures on simulators

By the end of this module the trainee should be competently operate and QA radiation planning simulators

Module 4: Radiation Treatment Planning System (RTPS) QA

Time Frame: 3 Weeks

- Introduction to RTPS
- Learning CPQR and AAPM recommendations for RTPS QA
- Learning different components and functionalities of the RTPS
    - Importing and fusing images
    - Creating and importing phantoms
    - Learning how contouring tools work
    - Inserting beam(s) and calculating dose and isodose distribution
    - Exporting dose to QA phantom(s)
- Learning how to create and maintain QA documents for RTPS(s)

By the end of this module the trainee should be competently use the RTPS(s)

Module 5: Patient Specific Delivery QA (DQA)

Time Frame: 1 Week

- ☐ Introduction to Patient specific DQA and different ways to perform DQA
- ☐ Learning to work with patient DQA measurement equipment and software
- ☐ Learning how to create patient DQA plan and understanding how patient DQA plans are calculated
- ☐ Learning protocols and tolerances of patient specific DQA including CPQR and AAPM recommendations
- ☐ Learning how to measure patient specific DQA
- ☐ Learning how to record and maintain patient DQA results

By the end of this module the trainee should be competently calculate and perform patient specific DQA measurements and properly record and maintain DQA results

Module 6: Beam Analysis Equipment

Time Frame: 3 Weeks

- ☐ Introduction to Beam Analyzers
    - Setup and Operate beam analyzers (water tanks) with different dose monitors (ion chambers and diodes)
    - Irradiate films, read and analyze them using film analyzers
- ☐ Learning CPQA and AAPM recommendations for commissioning new radiation treatment machines and annual beam check requirements such as beam energy, flatness and symmetry
- ☐ Learning how to create commissioning documents and reports
- ☐ Learning how to enter parameters for new machines in RTPS(s)
- ☐ Understand the overall process of new machine commissioning in RTPS(s)

By the end of this module the trainee should competently setup and operate commissioning equipment under physicist supervision and carry on measurements unsupervised.

Module 7: Brachytherapy

Time Frame: 1 Week

- ☐ Introduction to Brachytherapy
- ☐ CPQR and AAPM recommendations for QA of Brachytherapy source and equipment
- ☐ Learning how to calibrate and measure source activity of HDR and LDR sources
- ☐ Learning how to order, receive and maintain inventory records and storage protocols for HDR and LDR seeds
- ☐ Learning how to operate HDR treatment console
- ☐ Getting familiar with different HDR Brachytherapy applicators and their commissioning measurements and inventory
- ☐ Learning how to perform HDR applicator commissioning measurements
- ☐ Learning how to perform a recovery room survey
- ☐ Learning remote afterloader emergency procedures

By the end of module 5, trainee should be able to competently operate HDR machine, order, receive, calibrate, measure activity and store radioactive seeds and be familiar with all HDR applicators and how to commission them.

Module 8: Research

Time Frame: Ongoing

- ☐ Introduction to all ongoing research projects at the clinic
- ☐ Introduction to research ethics and statistics
- ☐ Select one project and help in collection and analysis of data
- ☐ Prepare poster and oral presentation of his/her selected project

At the end of this module, trainee should be to carry a research project with minimal supervision.