Competency Profile

Entry-to-Practice competencies for the professions of the Alberta College of Medical Diagnostic and Therapeutic Technologists (ACMDTT)

Radiation Therapy
Under the *Health Professions Act of Alberta (HPA)*, the ACMDTT is mandated with establishing standards and registering competent and ethical radiation therapists who can provide high quality medical therapeutic and diagnostic care to the public.

This competency profile lists the competencies required of radiation therapists at entry-to-practice. Together with the ACMDTT Standards of Practice and Code of Ethics documents it defines the expectations of practitioners on entry to the profession.

The competencies have been validated through broad consultation with the profession in Alberta. They have been cross-referenced with the Canadian Association of Medical Radiation Technologists (CAMRT) national competency profile to ensure that all the national competencies are included. The College has approved the use of the CAMRT Certification Examination as a requirement for entry-to-practice in Alberta.

In areas where the ACMDTT profile goes beyond the requirements of CAMRT, ACMDTT works with the Canadian Medical Association conjoint accreditation process to ensure that all ACMDTT competencies are included in accredited educational programs within the province.

The ACMDTT entry-to-practice competencies were originally developed and approved in 2006. An extensive re-validation process took place in 2010 involving provincial members, national partners, education providers and provincial employers. New profiles were approved on July 9, 2011.

The competency profiles will be reviewed regularly with an aim to reflect current standards for high quality patient services within an evolving work environment.

**Instructions for educational institutions**
The ACMDTT entry-to-practice competencies identify the minimum learning outcomes required of the radiation therapists at graduation. The College recognizes that achievement of entry-level proficiency in each competency requires unique cognitive, psychomotor and affective learning. This entry-to-practice competency profile is not considered a curriculum guide. The educational institution should itself determine the level of education and learning activities required to meet the minimum entry-to-practice standard at the expected level of proficiency as set out by the College.

**Structure**
The entry-to-practice competencies for all professions of the ACMDTT are uniformly structured under the following broad areas of practice:

1. **Professional Accountability and Responsibility**
2. **Workplace Health and Safety**
3. **Patient Care**
4. **Operation of Equipment**
5. **Clinical Procedures**
6. **Interpretation and Analysis**

Within each area, sub-sections have been identified. Although there is significant diversity among the professions, some of the competencies within the sub-sections are common. Other competencies reflect the unique nature and function of the individual professions.
Definitions

Competency statement
A competency statement describes a job task in which an entry-level technologist is expected to demonstrate a prescribed level of proficiency.

Cognitive learning
Learning involving knowledge and thinking skills.

Psychomotor learning
Learning involving practical skills.

Affective learning
Learning of attitudes and values that affect cognitive and psychomotor activities.

Level of proficiency
The degree of mastery that a practitioner demonstrates in a job task. Levels of proficiency range on a continuous scale from learner, to entry-level, to mastery, to expertise, to leadership.

Entry-level proficiency
The production of results consistent with generally accepted standards in the profession which involves:
- handling routine situations independently within a reasonable time frame
- anticipating likely outcomes and responding appropriately
- recognizing unusual, difficult to resolve and complex situations which are beyond the practitioner’s capacity and handling such situations through consultation, supervision, reviewing literature or referral.

Assumptions
Several assumptions have underscored the development of the entry-to-practice competencies. These are:

1. The minimum requirement for achievement of the stated competencies is that entry-level proficiency is necessary in all competencies except those denoted as “assist”. In competencies denoted as “assist”, knowledge of the technique is necessary, but not independent performance. Despite this minimum requirement, ACMDTT encourages higher levels of achievement both at entry-to-practice and beyond.

2. A strong foundation of cognitive, psychomotor and affective learning is a pre-requisite for success in achieving the competencies; this learning is initially developed through participation in an ACMDTT-approved educational program.

3. Graduation from an ACMDTT-approved educational program, together with successful completion of the CAMRT certification examination, is indicative of success in achieving the competencies.

4. Learning is expanded through active participation in the provision of high quality medical diagnostic and therapeutic services. This results in levels of proficiency beyond entry-level.

Resources


Competency Profile – Radiation Therapy (2011; amended 2014)
Alberta College of Medical Diagnostic and Therapeutic Technologists

1. Professional Accountability and Responsibility

1.1 Legislation, Standards and Ethics
1.1a Follow regulations as set out by the provincial and federal legislation, Standards of Practice and Code of Ethics governing the practice of medical radiation technologists. (see Appendix 1).
1.1b Recognize the patient’s right to accept or refuse medical services.
1.1c Provide care in a fair and unbiased manner.
1.1d Comply with employer policies and directives.
1.1e Maintain complete and secure records.

1.2 Teamwork
1.2a Interact effectively as a member of a multidisciplinary health care team.
1.2b Distinguish between the scopes of practice for health care team members.
1.2c Demonstrate respect for a diversity of opinions and values.
1.2d Manage personal workload to contribute to team productivity.
1.2e Communicate effectively both orally and in writing.
1.2f Utilize medical terminology in professional communication.
1.2g Apply basic problem solving and conflict resolution techniques.
1.2h Provide constructive feedback to colleagues.
1.2i Respond appropriately to feedback received from others.

1.3 Support to the Profession
1.3a Supervise students in the clinical environment.
1.3b Provide feedback on student performance.
1.3c Promote the profession to the general public and other health care professionals.
1.3d Portray a positive and confident demeanour and appearance in all professional activities.

1.4 Professional Competence
1.4a Practice within limits of personal knowledge and skills.
1.4b Self-evaluate and develop clear performance goals to enhance professional effectiveness.
1.4c Undertake continuing professional development.
1.4d Participate in quality improvement initiatives.

2. Workplace Health and Safety

2.1 Radiation Safety/Protection
2.1a Apply the principles of as low as reasonably achievable (ALARA) in all work practices.
2.1b Implement safety practices which adhere to the standard of the Alberta Radiation Protection Act (see Appendix 2).
2.1c Utilize personal radiation monitoring devices according to manufacturers’ specifications.
2.1d Inform others of radiation exposure risks in the work environment.
2.1e Seek clarification of orders where radiation safety may be compromised.

2.1 Radiation Safety/Protection – Sealed Sources
2.1a Post warning signs as appropriate.
2.1b Ensure security of sources.
2.1c Monitor sources for leakage.
2.1d Perform regular radiation surveys and address results.
2.1e Receive, store, handle and dispose of radioactive material according to regulation (see Appendix 2).

2.2 Occupational Health and Safety
2.2a Apply the standards of the Workplace Hazardous Materials Information System (WHMIS) in the handling, use, storage and disposal of materials (see Appendix 2).
2.2b Adhere to the workplace standards defined in the Occupational Health and Safety Regulations of the Workers’ Compensation Act (see Appendix 2).
### 2.2c
Apply the standards of Alberta Health and Wellness to prevent contamination of person, equipment and environment (see Appendix 2).

### 2.3 Emergency/Disaster Plans

<table>
<thead>
<tr>
<th>2.3a</th>
<th>Determine the nature and gravity of an emergency situation and take appropriate action.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3b</td>
<td>Contain and restrict access to areas of radioactivity.</td>
</tr>
</tbody>
</table>

### 3. Patient Care

#### 3.1 Patient Environment

<table>
<thead>
<tr>
<th>3.1a</th>
<th>Administer first aid/basic life support in emergency situations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1b</td>
<td>Perform aseptic or sterile technique as required.</td>
</tr>
<tr>
<td>3.1c</td>
<td>Recognize and respond to adverse reactions experienced by patients receiving medications or contrast agents.</td>
</tr>
<tr>
<td>3.1d</td>
<td>Administer cardiopulmonary resuscitation (CPR) according to the standard of CPR-Level C as specified by the Heart and Stroke Foundation of Canada.</td>
</tr>
<tr>
<td>3.1e</td>
<td>Perform procedures in a manner that maintains the integrity of patient ancillary devices and equipment.</td>
</tr>
<tr>
<td>3.1f</td>
<td>Regulate flow rate of portable and wall-mount oxygen supplies.</td>
</tr>
<tr>
<td>3.1g</td>
<td>Apply body-fluid precautions to prevent contamination of person(s), equipment and environment.</td>
</tr>
<tr>
<td>3.1h</td>
<td>Ensure a safe and comfortable environment for the patient.</td>
</tr>
<tr>
<td>3.1i</td>
<td>Transfer patient safely.</td>
</tr>
<tr>
<td>3.1j</td>
<td>Perform procedures in a manner that enhances patient comfort.</td>
</tr>
</tbody>
</table>

#### 3.2 Patient Assessment and Intervention

<table>
<thead>
<tr>
<th>3.2a</th>
<th>Verify patient’s identity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2b</td>
<td>Assess patient’s level of understanding of the procedure and adapt communication, assessment and screening accordingly.</td>
</tr>
<tr>
<td>3.2c</td>
<td>Adapt procedure according to patient’s mobility and stability.</td>
</tr>
<tr>
<td>3.2d</td>
<td>Assess patient for contraindications to the procedure.</td>
</tr>
<tr>
<td>3.2e</td>
<td>Verify patient’s consent for procedure.</td>
</tr>
<tr>
<td>3.2f</td>
<td>Recognize and respond to changes in patient’s physical condition, behaviours and level of consciousness.</td>
</tr>
<tr>
<td>3.2g</td>
<td>Recognize and respond to changes in patient’s vital signs.</td>
</tr>
<tr>
<td>3.2h</td>
<td>Perform procedures in a manner that maintains patient’s dignity.</td>
</tr>
<tr>
<td>3.2i</td>
<td>Assist in the administration of contrast agents as required for conducting diagnostic scans and imaging of body tissue.</td>
</tr>
</tbody>
</table>

#### 3.3 Communication and Education

<table>
<thead>
<tr>
<th>3.3a</th>
<th>Identify self and explain professional role.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3b</td>
<td>Facilitate patient’s understanding by encouraging and responding to questions and concerns.</td>
</tr>
<tr>
<td>3.3c</td>
<td>Respond to patient’s family/representative within the parameters of patient confidentiality.</td>
</tr>
<tr>
<td>3.3d</td>
<td>Refer patient concerns to other health care providers as appropriate.</td>
</tr>
<tr>
<td>3.3e</td>
<td>Explain possible radiation exposure implications for patient.</td>
</tr>
</tbody>
</table>

#### 3.4 Recording and Documentation

<table>
<thead>
<tr>
<th>3.4a</th>
<th>Maintain comprehensive records.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4b</td>
<td>Utilize information and archival systems.</td>
</tr>
<tr>
<td>3.4c</td>
<td>Maintain confidentiality of records with appropriate access.</td>
</tr>
</tbody>
</table>

### 4. Operation of Equipment

#### 4.1 Fundamental Equipment Procedures

<table>
<thead>
<tr>
<th>4.1a</th>
<th>Operate only licensed equipment while performing procedures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1b</td>
<td>Operate equipment in accordance with manufacturers’ specifications.</td>
</tr>
<tr>
<td>4.1c</td>
<td>Ensure operational readiness of equipment for specified procedure/study.</td>
</tr>
<tr>
<td>4.1d</td>
<td>Ensure regular maintenance and cleanliness of equipment.</td>
</tr>
</tbody>
</table>
### Competency Profile – Radiation Therapy (2011; amended 2014)

#### Alberta College of Medical Diagnostic and Therapeutic Technologists

**4.1e** Operate computer workstations.

#### 4.2 Equipment Quality Control (QC)

<table>
<thead>
<tr>
<th>4.2a</th>
<th>Regularly inspect equipment for functional integrity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2b</td>
<td>Ensure mechanical functionality of equipment.</td>
</tr>
<tr>
<td>4.2c</td>
<td>Perform regular QC as required by the manufacturer.</td>
</tr>
<tr>
<td>4.2d</td>
<td>Document QC procedures.</td>
</tr>
<tr>
<td>4.2e</td>
<td>Perform QC of photon beams.</td>
</tr>
<tr>
<td>4.2f</td>
<td>Perform QC of electron beams.</td>
</tr>
<tr>
<td>4.2g</td>
<td>Perform QC of portal imaging equipment.</td>
</tr>
<tr>
<td>4.2h</td>
<td>Assist in QC of brachytherapy.</td>
</tr>
<tr>
<td>4.2i</td>
<td>Identify parameters for daily equipment set-up.</td>
</tr>
<tr>
<td>4.2j</td>
<td>Ensure calibration of equipment.</td>
</tr>
<tr>
<td>4.2k</td>
<td>Ensure functionality of radiation safety and radiation monitoring equipment.</td>
</tr>
<tr>
<td>4.2l</td>
<td>Perform basic troubleshooting; correct or report as appropriate.</td>
</tr>
<tr>
<td>4.2m</td>
<td>Evaluate equipment QC and take corrective action as required.</td>
</tr>
<tr>
<td>4.2n</td>
<td>Regularly inspect equipment for functional integrity.</td>
</tr>
<tr>
<td>4.2o</td>
<td>Ensure mechanical functionality of equipment.</td>
</tr>
</tbody>
</table>

#### 5. Clinical Procedures

##### 5.1 Fundamental Clinical Procedures

<table>
<thead>
<tr>
<th>5.1a</th>
<th>Verify procedure ordered.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1b</td>
<td>Ensure procedure requisitions contain required information; address inconsistencies.</td>
</tr>
<tr>
<td>5.1c</td>
<td>Coordinate treatment scheduling with preceding or subsequent tests, procedures and treatments.</td>
</tr>
<tr>
<td>5.1d</td>
<td>Select parameters for optimal image.</td>
</tr>
<tr>
<td>5.1e</td>
<td>Apply detailed knowledge of cross-sectional anatomy as related to planning and treatment.</td>
</tr>
<tr>
<td>5.1f</td>
<td>Modify procedure based on evidence from previous data, images and reports.</td>
</tr>
<tr>
<td>5.1g</td>
<td>Utilize immobilization devices.</td>
</tr>
<tr>
<td>5.1h</td>
<td>Utilize positioning aids.</td>
</tr>
<tr>
<td>5.1j</td>
<td>Prepare the physical area for the patient.</td>
</tr>
<tr>
<td>5.1l</td>
<td>Position the patient.</td>
</tr>
<tr>
<td>5.1m</td>
<td>Set the target depth.</td>
</tr>
<tr>
<td>5.1n</td>
<td>Apply tattoo points as required.</td>
</tr>
<tr>
<td>5.1o</td>
<td>Apply surface reference markings.</td>
</tr>
<tr>
<td>5.1p</td>
<td>Utilize beam modifying devices.</td>
</tr>
<tr>
<td>5.1q</td>
<td>Assess images and data set for acceptability and completeness.</td>
</tr>
<tr>
<td>5.1r</td>
<td>Optimize, capture and store images post-procedure.</td>
</tr>
<tr>
<td>5.1s</td>
<td>Submit images for review.</td>
</tr>
</tbody>
</table>

##### 5.2 Conventional Simulation

<table>
<thead>
<tr>
<th>5.2a</th>
<th>Assist in conventional simulation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2b</td>
<td>Assist in field localization and verification.</td>
</tr>
</tbody>
</table>

##### 5.3Computed Tomography (CT) Simulation

<table>
<thead>
<tr>
<th>5.3a</th>
<th>Orient patient according to protocol parameters.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3b</td>
<td>Locate area of treatment interest.</td>
</tr>
<tr>
<td>5.3c</td>
<td>Plan relevant location for pilot views.</td>
</tr>
<tr>
<td>5.3d</td>
<td>Contour external and internal structures as required.</td>
</tr>
<tr>
<td>5.3e</td>
<td>Apply fiducial markers.</td>
</tr>
<tr>
<td>5.3f</td>
<td>Employ axial or spiral scanning techniques as appropriate for planning session.</td>
</tr>
<tr>
<td>5.3g</td>
<td>Optimize raw data from CT images.</td>
</tr>
<tr>
<td>5.3h</td>
<td>Perform pilot localization including contour identification on reference slice.</td>
</tr>
<tr>
<td>5.3i</td>
<td>Obtain focal-to-skin distance (FSD) values using external contouring features.</td>
</tr>
<tr>
<td>5.3j</td>
<td>Perform virtual simulation to input planning details.</td>
</tr>
</tbody>
</table>
### 5.4 Mould Room Procedures
- **5.4a** Fabricate shielding blocks.
- **5.4b** Fabricate electron templates.
- **5.4c** Design immobilization devices suitable for patient condition and requirements of stability and reproducibility.
- **5.4d** Fabricate immobilization devices.
- **5.4e** Fabricate beam directional devices.
- **5.4f** Prepare bolus materials (beam modifiers) according to patient physical characteristics and beam characteristics.

### 5.5 Dose Optimization
- **5.5a** Perform manual calculations.
- **5.5b** Utilize dosimetry calculation systems to determine central dose, maximum dose and exit dose.
- **5.5c** Utilize dosimetry calculation systems to determine dose modifications due to the use of wedges, compensators and blocks.
- **5.5d** Utilize dosimetry calculation systems to develop optimal dose distribution.
- **5.5e** Calculate dosage to defined points, targets and volumes.
- **5.5f** Interpret dose volume histogram (DVH) information.
- **5.5g** Develop composite plans.
- **5.5h** Prepare and label distributions.
- **5.5i** Perform beam and plan normalization.
- **5.5j** Interpret planning data with regard to critical organ doses and dose escalation studies.
- **5.5k** Calculate changes in source intensity due to decay processes.
- **5.5l** Perform recalculation as required.

### 5.6 Standard Treatment Procedures
- **5.6a** Assess images for acceptability, completeness and confirmation of treatment delivery.
- **5.6b** Perform treatment shifts on patient or immobilization devices.
- **5.6c** Verify shielding block placement and orientation.
- **5.6d** Place radiation monitors as prescribed.
- **5.6e** Perform apposition field techniques.
- **5.6f** Perform single field techniques including photon, electron and at extended FSD.
- **5.6g** Perform parallel opposed field techniques including antero posterior, lateral and oblique.
- **5.6h** Perform multi-field techniques including isocentric, non-coplanar, with adjoining fields, with photon fields and with electron fields.
- **5.6i** Perform multi-field techniques with photon/electron fields.
- **5.6j** Perform intensity modulated radiation therapy.
- **5.6k** Perform image guided radiation therapy.

### 5.7 Specialized Treatment Procedures - Brachytherapy
- **5.7a** Assist in cleaning and sterilization of applicators and equipment.
- **5.7b** Program treatment equipment for loadings and overall time as identified through dose optimization reports.
- **5.7c** Operate the C-arm for source localization and applicator positioning.
- **5.7d** Assist in the removal of radioactive sources or source applicators.

### 5.8 Specialized Treatment Procedures – Advanced Therapies
- **5.8a** Assist in Tomotherapy.
- **5.8b** Assist in stereotactic therapy.
- **5.8c** Assist in total body irradiation.

### 5.9 Treatment Locations
- **5.9a** Apply ionizing radiation for the treatment of breast malignancies.
- **5.9b** Apply ionizing radiation for the treatment of genitourinary malignancies including - prostate cancer, bladder and urethral cancer, testicular cancer, kidney cancer and penile cancer.
- **5.9c** Apply ionizing radiation for the treatment of lung malignancies.
- **5.9d** Apply ionizing radiation for the treatment of gastrointestinal malignancies including - colorectal cancer, esophageal cancer, anal cancer, gastric cancer, pancreatic cancer and hepatobiliary tract cancer.
5.9e | Apply ionizing radiation for the treatment of head and neck malignancies including - cancer of the nasopharynx, cancer of the oropharynx, cancer of the oral cavity, cancers of the hypopharynx, cancers of the larynx, cancers of the nasal cavity, cancer of the paranasal sinus and cancer of the salivary glands.

5.9f | Apply ionizing radiation for the treatment of gynaecological malignancies including - cervical cancer, endometrial cancer, ovarian cancer, vaginal cancer and cancer of the vulva.

5.9g | Apply ionization radiation for the treatment of lymphoreticular malignancies including - Hodgkin's disease and non-Hodgkin's lymphoma.

5.9h | Apply ionizing radiation for the treatment of central nervous system (CNS) malignancies including - cancers of the brain, brainstem and cerebellum.

5.9i | Apply ionizing radiation for the treatment of pediatric malignancies including - CNS tumours, Ewing's Sarcoma, Wilms' tumor, retinoblastoma, neuroblastoma and rhabdomyosarcoma.

5.9j | Apply ionizing radiation for the treatment of hematologic malignancies including - leukemia, multiple myeloma and plasmacytoma.

5.9k | Apply ionizing radiation for the treatment of endocrine malignancies including - thyroid cancer and pituitary cancer.

5.9l | Apply ionizing radiation for the treatment of malignancies of the bone and soft tissues.

5.9m | Apply ionizing radiation for the treatment of skin malignancies including - melanoma and non-melanoma.

5.9n | Apply ionizing radiation in the treatment of benign conditions including - arteriovenous malformations, exophthalmos, heterotropic bone formation, keloid scars and ovarian ablation.

5.9o | Apply ionizing radiation for palliative and supportive purposes including - brain metastases, spinal cord metastases, bone metastases, visceral recurrences and metastases.

5.10 Adapt Clinical Functions

5.10a | Adapt standard treatment protocols for pediatric patients.

5.10b | Evaluate patient outcomes and adapt procedures to reflect better outcomes as needed.

6. Interpretation and Analysis

6.1 Analysis and Enhancement of Practice

6.1a | Utilize problem-solving strategies.

6.1b | Generate and evaluate effectiveness of alternate approaches to practice.

6.1c | Critically evaluate performance to ensure best practice.

6.1d | Manage professional and personal roles to minimize risk.

6.1e | Manage resources effectively.

6.1f | Assist in research-based initiatives.

6.1g | Maintain awareness of changes within the Canadian healthcare environment as they affect the practice of radiation therapy.
Appendix 1
Provincial/Federal Legislation
   Information available through:
   - Alberta Queen's Printer (website)
   - Alberta Government: Health and Wellness (website)

2. *Health Information Act* (2000) **AB**
   Information available through:
   - Alberta Queen's Printer (website)
   - Office of the Information and Privacy Commissioner of Alberta

   Information available through:
   - Alberta Queen’s Printer (website)
   - Alberta Government: Seniors and Community Services (website)

Standards
1. ACMDTT Standards of Practice
   Information available through:
   - ACMDTT (website)

2. ACMDTT Code of Ethics
   Information available through:
   - ACMDTT (website)

Appendix 2
Workplace Health and Safety
   Information available through:
   - Alberta Queen's Printer (website)
   - Human Resources and Skills Development of Canada (website)
   
   **Key search items:**
   - Back care & lifting
   - Ergonomics
   - Storage & handling
   - Use of tools, appliances, etc.
   - Serious injuries & accidents
   - Biological hazards
   - Chemical hazards
   - Fire/explosion hazards
   - Physical hazards
   - Personal protective equipment

   Information available through:
   - Department of Justice Canada (website): search by Index listing or ‘Statutes’
   
   **Key search items:**
   - Canadian Nuclear Safety Commission Regulations.
   - Developing and Using Action Levels.

   Information available through:
   - Alberta Government: Human Resources and Employment (website)
   Information available through:
   - Alberta Health website