CAMRT ACTRM

RADIOLOGICAL TECHNOLOGY

CANADIAN ASSOCIATION OF MEDICAL RADIATION TECHNOLOGISTS

Companion Documents to the 2019 National Competency Profile for Entry-Level Medical Radiation Technologists in Canada

Contents

Purpose of the Companion Documents

The companion documents are a supplemental resource intended to provide additional detail to support the competencies outlined in the *2019 Entry-Level Competency Profile for Medical Radiation Technologists in Canada*, and to provide additional guidance for the curriculum of accredited medical radiation technology (MRT) programs. The companion documents also provide additional guidance to graduates of accredited programs and internationally educated MRTs preparing to write the national certification exam.

Each practice area (magnetic resonance, nuclear medicine, radiological technology and radiation therapy) has a companion document unique to their practice. The companion documents are intended to be responsive to current and evolving practice and may be updated independent of the competency profile.

The companion documents are not intended to be a comprehensive curriculum guide, but rather work to supplement the competency profile by providing additional details to help support curriculum and competency development.

Radiological Technology – Companion Resource

1. Patient Interventions

This lists the patient interventions referred to in competency:

4.3.4. Provide patient interventions, as appropriate.

Interventions	
1.1	Assist with administration of oxygen.
1.2	Assist with suctioning.
1.3	Administer bedpans and urinals.
1.4	Monitor vital signs.
1.5	Perform CPR.
1.6	Prepare power injector.
1.7	Obtain IV access
1.8	Insert IV line

2. Imaging Systems

This lists the equipment and quality control procedures referenced in competency:

Imaging Systems: RTR.2 Manage a variety of imaging systems.

Quality Control Procedures: RTR.2.8 Assess performance of imaging systems and respond.

Imaging system		Quality Control Procedures	
2.1	**Radiographic (stationary and mobile)**	2.1.1	Environmental inspection
		2.1.2	Visual inspection
		2.1.3	X-Ray beam filtration (half value layer)
		2.1.4	Daily start up and shut down procedures
		2.1.5	X-ray beam - Bucky tray (image receptor) alignment
		2.1.6	X-ray beam perpendicularity
		2.1.7	Automatic exposure control (reproducibility and linearity)
2.2	**Fluoroscopic (stationary or mobile)**	2.2.1	Environmental inspection
		2.2.2	Visual inspection
		2.2.3	Daily start-up and shut down procedures
		2.2.4	Automatic brightness control (ABC)
		2.2.5	Contrast and spatial resolution
		2.2.6	Focal spot to skin distance limitation
		2.2.7	High-level irradiation control activation
2.3	**Computed to-mography (CT)**	2.3.1	Environmental inspection
		2.3.2	Visual inspection
		2.3.3	CT number accuracy
		2.3.4	CT uniformity
		2.3.5	Linearity of CT numbers
		2.3.6	Spatial resolution
		2.3.7	Tube warm up (including tube current verification)
		2.3.8	Daily air calibration

2.4	**Computed radiography (CR)**	2.4.1	Equipment warm-up
		2.4.2	Visual inspection of equipment
		2.4.3	Assessment of display monitor using SMPT or TG18-QC test patterns
		2.4.4	IP cleaning and inspection
		2.4.5	EI accuracy and reproducibility
		2.4.6	Noise, uniformity, image artifacts
		2.4.7	Spatial resolution
		2.4.8	Digital detector residual image (erasure)
2.5	**Direct radiography (DR)**	2.5.1	Equipment warm-up
		2.5.2	Visual inspection of equipment
		2.5.3	Assessment of display monitor using SMPT or TG18-QC test patterns
		2.5.4	EI accuracy and reproducibility
		2.5.5	Noise, uniformity, image artifacts
		2.5.6	Spatial resolution
		2.5.7	Digital detector residual image (erasure)
		2.5.8	Detector calibration
2.6	**Mammography**	2.6.1	Environmental inspection
		2.6.2	Daily start up and shut down procedures
		2.6.3	Visual inspection
2.7	**Bone mineral densitometry**	2.7.1	Routine as per manufacturer

ACCESSORY EQUIPMENT

2.8	**Beam limiting device (manual; positive beam limitation, PBL)**	2.8.1	Light field - radiation field congruence
2.9	**Grids**	2.9.1	Alignment
		2.9.2	Uniformity
2.10	**Power injector (contrast media)**	2.10.1	Routine as per manufacturer
2.11	**Compensating filters**	2.11.1	Routine as per manufacturer

3. Common Pathologies, Anomalies & Conditions

This lists the pathologies, anomalies and conditions referred to in competencies:

RTR.3.2. Apply knowledge of pathophysiology as it relates to clinical procedures.

RTR.6.4. Recognize common pathologies, anomalies, and conditions

3.1	Skeletal System (Fractures)
3.1.1	Avulsion
3.1.2	Bennett's
3.1.3	Bimalleolar
3.1.4	Blow-out
3.1.5	Boxer's
3.1.6	Clay Shovelers
3.1.7	Closed
3.1.8	Colle's
3.1.9	Comminuted
3.1.10	Complete
3.1.11	Compound/Open
3.1.12	Compression
3.1.13	Contrecoup
3.1.14	Depressed
3.1.15	Displaced
3.1.16	Galeazzi
3.1.17	Hangman's
3.1.18	Impacted
3.1.19	Incomplete/Greenstick
3.1.20	Intertrochanteric
3.1.21	Jeffersons
3.1.22	Jones
3.1.23	Linear
3.1.24	LeFort
3.1.25	Longitudinal
3.1.26	March
3.1.27	Monteggia
3.1.28	Oblique
3.1.29	Pathological

3.1.30	Salter-Harris
3.1.31	Simple
3.1.32	Smith's
3.1.33	Spiral
3.1.34	Supracondylar
3.1.35	Transverse
3.1.36	Trimalleolar
3.1.37	Tripod
3.1.38	Undisplaced

3.2	Skeletal System (Other)
3.2.1	Achondroplasia
3.2.2	Acromegaly
3.2.3	Advanced or delayed bone age
3.2.4	Ankylosing spondylitis
3.2.5	Cystic bone lesion
3.2.6	Developmental dysplasia of the hip
3.2.7	Dislocation
3.2.8	Ewings sarcoma
3.2.9	Gout
3.2.10	Joint effusion
3.2.11	Kyphosis
3.2.12	Legge-Calve-Perthe's disease
3.2.13	Lordosis
3.2.14	Multiple myeloma
3.2.15	Necrosis
3.2.16	Non-accidental trauma
3.2.17	Osgood Schlatter's disease
3.2.18	Osteoarthritis
3.2.19	Osteochondritis dissecans
3.2.20	Osteochondroma
3.2.21	Osteogenesis imperfecta
3.2.22	Osteomalacia, Rickets
3.2.23	Osteomyelitis
3.2.24	Osteopenia

3.2.25	Osteopetrosis
3.2.26	Osteoporosis
3.2.27	Osteosarcoma
3.2.28	Paget's (osteitis deformans)
3.2.29	Rheumatoid arthritis
3.2.30	Scoliosis
3.2.31	Spina Bifida
3.2.32	Spondylolisthesis
3.2.33	Spondylolysis
3.2.34	Spondylosis
3.2.35	Subluxation

3.3	**Respiratory System**
3.3.1	Asthma
3.3.2	Atelectasis
3.3.3	Bronchiectasis
3.3.4	Bronchitis
3.3.5	Carcinoma of lungs
3.3.6	Chronic obstructive pulmonary disease (COPD)
3.3.7	Cystic fibrosis
3.3.8	Emphysema
3.3.9	Empyema
3.3.10	Epiglottitis, croup
3.3.11	Foreign body
3.3.12	Hemothorax
3.3.13	Lung abscess
3.3.14	Pleural effusion
3.3.15	Pneumonia
3.3.16	Pneumothorax
3.3.17	Pulmonary edema
3.3.18	Pulmonary emboli
3.3.19	Pulmonary infarct
3.3.20	Respiratory distress syndrome – adult and child
3.3.21	Severe acute respiratory syndrome (SARS)
3.3.22	Sinusitis

3.3.23	Subcutaneous emphysema
3.3.24	Tuberculosis

3.4	Gastrointestinal System
3.4.1	Achalasia
3.4.2	Ascites
3.4.3	Bowel obstruction
3.4.4	Carcinoma of stomach
3.4.5	Cholecystitis
3.4.6	Cholelithiasis
3.4.7	Cirrhosis
3.4.8	Colorectal cancer
3.4.9	Crohn's disease
3.4.10	Diabetes mellitus
3.4.11	Diaphragmatic hernia
3.4.12	Diverticulitis
3.4.13	Esophageal atresia
3.4.14	Esophageal carcinoma
3.4.15	Esophageal varices
3.4.16	Foreign body
3.4.17	Gastroesophageal reflux
3.4.18	Hemangioma
3.4.19	Hepatitis
3.4.20	Hiatal hernia
3.4.21	Hypertrophic pyloric stenosis
3.4.22	Hypoglycemia
3.4.23	Ileus
3.4.24	Imperforate anus
3.4.25	Inguinal hernia
3.4.26	Intussusception
3.4.27	Liver cancer
3.4.28	Pancreatic cancer
3.4.29	Pancreatitis
3.4.30	Peptic / duodenal ulcers
3.4.31	Pneumoperitoneum

3.4.32	Situs inversus
3.4.33	Toxic megacolon
3.4.34	Tracheoesophageal fistula
3.4.35	Ulcerative colitis
3.4.36	Volvulus and malrotation
3.4.37	Zenkers diverticulum

3.5	Urinary System
3.5.1	Adenocarcinoma
3.5.2	Bladder carcinoma
3.5.3	Calculi
3.5.4	Cystitis
3.5.5	Cysts
3.5.6	Duplication
3.5.7	Ectopic kidney
3.5.8	Horseshoe kidney
3.5.9	Hydronephrosis
3.5.10	Hydroureter
3.5.11	Phleboliths
3.5.12	Polycystic kidney
3.5.13	Prostatic hyperplasia
3.5.14	Pyelonephritis
3.5.15	Renal colic
3.5.16	Renal failure
3.5.17	Renal hypertension
3.5.18	Ureterocele
3.5.19	Vesicoureteral reflux

3.6	Reproductive System
3.6.1	Adenocarcinoma of breast
3.6.2	Adenocarcinoma of prostate
3.6.3	Carcinoma in situ of breast
3.6.4	Fibroadenoma of breast
3.6.5	Fibrocystic breast
3.6.6	Infertility (female)
3.6.7	Uterine fibroids

3.7	Neurological System
3.7.1	Alzheimer's disease
3.7.2	Cerebral hemorrhage – epidural, subdural, subarachnoid
3.7.3	Cerebrovascular accident (CVA)
3.7.4	Glioma
3.7.5	Head injuries – concussion, contusion, fractures
3.7.6	Herniated disc
3.7.7	Hydrocephaly
3.7.8	Meningitis
3.7.9	Parkinson's disease
3.7.10	Spina bifida
3.7.11	Transient ischemic attack

3.8	Cardiovascular System
3.8.1	Aneurysm
3.8.2	Angina pectoralis
3.8.3	Aortic dissection
3.8.4	Aortic stenosis
3.8.5	Arrhythmias
3.8.6	Arteriosclerosis
3.8.7	Arteriovenous fistula
3.8.8	Arteriovenous malformation
3.8.9	Atherosclerosis
3.8.10	Congestive heart failure (CHF)
3.8.11	Coronary artery disease
3.8.12	Dextrocardia, septal defects

3.8.13	Embolus
3.8.14	Hypertension
3.8.15	Myocardial infarction (MI)
3.8.16	Patent ductus arteriosus
3.8.17	Patent Foreman ovale
3.8.18	Peripheral vascular disease (PVD)
3.8.19	Stenosis
3.8.20	Tetralogy of fallot
3.8.21	Thrombus

3.9	**Hematopoietic System**
3.9.1	Leukemia
3.9.2	Lymphoma: Hodgkin's and non-Hodgkin's

3.10	**Endocrine System**
3.10.1	Pituitary tumour
3.10.2	Cushings Syndrome
3.10.3	Hyperthyroidism
3.10.4	Hypothyroidism

3.11	**General**
3.11.1	Metastases

4. Clinical Procedures

This lists the clinical procedures referred to in competencies:

RTR.3. Apply clinical principles in practice.

RTR.4. Perform diagnostic and therapeutic procedures

Modality: General Radiography			
SKELETAL		**PROJECTION/POSITION**	
4.1	**Finger**	4.1.1	Posteroanterior (PA)
		4.1.2	Anteroposterior (AP)
		4.1.3	Posteroanterior (PA) oblique
		4.1.4	Lateral
4.2	**Thumb**	4.2.1	Posteroanterior (PA)
		4.2.2	Anteroposterior (AP)
		4.2.3	Posteroanterior (PA) oblique
		4.2.4	Lateral
4.3	**Hand**	4.3.1	Posteroranterior (PA)
		4.3.2	Anteroposterior (AP)
		4.3.3	Posteroanterior (PA) oblique
		4.3.4	Anteroposterior (AP) obliques (bilateral)
		4.3.5	Lateral, extension
		4.3.6	Lateral, fan
4.4	**Wrist**	4.4.1	Posteroanterior (PA)
		4.4.2	Posteroanterior (PA) oblique
		4.4.3	Lateral
4.5	**Scaphoid**	4.5.1	Posteroanterior (PA) with ulnar deviation
		4.5.2	Posteroanterior (PA) axial
4.6	**Forearm**	4.6.1	Anteroposterior (AP)
		4.6.2	Lateral
4.7	**Elbow**	4.7.1	Anteroposterior (AP)
		4.7.2	Anteroposterior (AP) oblique (medial rotation)
		4.7.3	Anteroposterior (AP) oblique (lateral rotation)
		4.7.4	Lateral (routine)
		4.7.5	Laterals (radial head)
		4.7.6	Acute flexion

4.8	**Humerus**	4.8.1	Anteroposterior (AP)
		4.8.2	Lateral
4.9	**Shoulder**	4.9.1	Anteroposterior (AP) arm neutral rotation
		4.9.2	Anteroposterior (AP) arm external rotation
		4.9.3	Anteroposterior (AP) arm internal rotation
		4.9.4	Anteroposterior (AP) oblique (glenoid)
		4.9.5	Posteroanterior (PA) oblique scapular Y
		4.9.6	Anteroposterior (AP) oblique scapular Y
		4.9.7	Inferosuperior axial
		4.9.8	Superoinferior axial
4.10	**Clavicle**	4.10.1	Anteroposterior (AP)
		4.10.2	Anteroposterior (AP) axial
4.11	**Acromio-clavicular joints**	4.11.1	Anteroposterior (AP) with and without weights
4.12	**Scapula**	4.12.1	Anteroposterior (AP)
		4.12.2	Lateral
4.13	**Toes**	4.13.1	Anteroposterior (AP)
		4.13.2	Anteroposterior (AP) oblique
		4.13.3	Lateral
4.14	**Foot**	4.14.1	Anteroposterior (AP) axial
		4.14.2	Anteroposterior (AP) oblique (medial rotation)
		4.14.3	Lateral
		4.14.4	Anteroposterior (AP) axial weight bearing
		4.14.5	Lateral weight bearing
4.15	**Ankle**	4.15.1	Anteroposterior (AP)
		4.15.2	Anteroposterior (AP) oblique 15 – 20 degree medial rotation
		4.15.3	Lateral
4.16	**Calcaneus**	4.16.1	Plantodorsal axial
		4.16.2	Lateral
4.17	**Tibia and fibula**	4.17.1	Anteroposterior (AP)
		4.17.2	Lateral

4.18	**Knee**	4.18.1	Anteroposterior (AP)
		4.18.2	Posteroanterior (PA)
		4.18.3	Anteroposterior (AP) oblique medial rotation
		4.18.4	Anteroposterior (AP) oblique lateral rotation
		4.18.5	Posteroanterior (PA) oblique medial rotation
		4.18.6	Posteroanterior (PA) oblique lateral rotation
		4.18.7	Lateral
		4.18.8	Anteroposterior (AP) weight bearing
		4.18.9	Anteroposterior (AP) axial (intercondyloid fossa)
		4.18.10	Posteroanterior (PA) axial (intercondyloid fossa)
4.19	**Patella**	4.19.1	Anteroposterior (AP)
		4.19.2	Posteroanterior (PA)
		4.19.3	Lateral
		4.19.4	Tangential
4.20	**Femur**	4.20.1	Anteroposterior (AP)
		4.20.2	Lateral
4.21	**Hip**	4.21.1	Anteroposterior (AP)
		4.21.2	Anteroposterior (AP) (frog legs)
		4.21.3	Lateral (Lauenstein)
		4.21.4	Axiolateral (cross table)
4.22	**Pelvis**	4.22.1	Anteroposterior (AP)
		4.22.2	Anteroposterior (AP) axial (inlet and outlet)
		4.22.3	Acetabulum anteroposterior (AP) obliques (Judet)
4.23	**Cervical vertebrae**	4.23.1	Anteroposterior (AP) C1-C2 open mouth
		4.23.2	Anteroposterior (AP) axial
		4.23.3	Lateral
		4.23.4	Posteroanterior (PA) axial obliques - LAO / RAO
		4.23.5	Anteroposterior (AP) axial obliques - LPO / RPO
		4.23.6	Lateral hyperflexion
		4.23.7	Lateral hyperextension
		4.23.8	Lateral cervicothoracic (Swimmers)

4.24	**Thoracic vertebrae**	4.24.1	Anteroposterior (AP)
		4.24.2	Lateral
		4.24.3	Lateral cervicothoracic (Swimmers)
4.25	**Lumbar vertebrae**	4.25.1	Anteroposterior (AP)
		4.25.2	Lateral
		4.25.3	Posteroanterior (PA) obliques - LAO / RAO
		4.25.4	Anteroposterior (AP) obliques - LPO / RPO
		4.25.5	Lateral L5-S1
4.26	**Sacroiliac joints**	4.26.1	Anteroposterior (AP) axial
		4.26.2	Anteroposterior (AP) obliques - LPO / RPO
4.27	**Sacrum**	4.27.1	Anteroposterior (AP) axial
		4.27.2	Lateral
4.28	**Coccyx**	4.28.1	Anteroposterior (AP) axial
		4.28.2	Lateral
4.29	**Scoliosis series**	4.29.1	Posteroanterior (PA)
		4.29.2	Lateral
4.30	**Sternum**	4.30.1	Posteroanterior (PA) oblique - RAO
		4.30.2	Lateral
4.31	**Ribs**	4.31.1	Anteroposterior (AP)
		4.31.2	Posteroanterior (PA)
		4.31.3	Posteroanterior (PA) obliques
		4.31.4	Anteroposterior (AP) obliques
4.32	**Sternoclavicular joints**	4.32.1	Posteroanterior (PA)
		4.32.2	Posteroanterior (PA) obliques
4.33	**Skull**	4.33.1	Anteroposterior (AP) axial (Towne)
		4.33.2	Posteroanterior (PA) axial (Caldwell)
		4.33.3	Lateral
4.34	**Sinuses**	4.34.1	Parietoacanthial (Waters)
		4.34.2	PA axial (Caldwell)
		4.34.3	Lateral
4.35	**Facial bones**	4.35.1	Posteroanterior (PA) axial (Caldwell)
		4.35.2	Parietoacanthial (Waters)
		4.35.3	Acanthioparietral (Reverse Waters)
		4.35.4	Lateral

4.36	**Orbits**	4.36.1	Posteroanterior (PA) axial
		4.36.2	Parietoacanthial (modified Waters)
		4.36.3	Lateral
4.37	**Orbits (foreign body)**	4.37.1	Parietoacanthial (modified Waters)
		4.37.2	Lateral
4.38	**Nasal bones**	4.38.1	Parietoacanthial (Waters)
		4.38.2	Lateral
4.39	**Zygomatic arches**	4.39.1	Parietoacanthial (Waters)
		4.39.2	Tangential
		4.39.3	Anteroposterior (AP) axial (Towne)
		4.39.4	Submentovertical (SMV)
4.40	**Mandible**	4.40.1	Anteroposterior (AP) axial (modified Towne)
		4.40.2	Posteroanterior (PA) axial
		4.40.3	Anteroposterior (AP)
		4.40.4	Posteroanterior (PA)
		4.40.5	Axiolateral
		4.40.6	Axiolateral obliques
4.41	**Temporo-mandibular joints**	4.41.1	Anteroposterior (AP) axial (modified Towne)
		4.41.2	Axiolateral (open and closed mouth)
DIGESTIVE SYSTEM		**PROJECTION/POSITION**	
4.42	**Abdomen**	4.42.1	Anteroposterior (AP) supine
		4.42.2	Anteroposterior (AP) erect
		4.42.3	Left lateral decubitus
		4.42.4	Dorsal decubitus
RESPIRATORY SYSTEM		**PROJECTION/POSITION**	
4.43	**Soft tissue neck**	4.43.1	Anteroposterior (AP)
		4.43.2	Lateral

4.44	**Chest**	4.44.1	Anteroposterior (AP) supine semi erect and erect
		4.44.2	Posteroanterior (PA)
		4.44.3	Lateral
		4.44.4	Anteroposterior (AP) lordotic
		4.44.5	Lateral decubiti
URINARY SYSTEM		**PROJECTION/POSITION**	
4.45	**Kidneys ureter and bladder (KUB)**	4.45.1	Anteroposterior (AP)
		4.45.2	Bladder
MODALITY: FLUOROSCOPY			
4.46	**Gastrointestinal* (see footnote)[1]**	4.46.1	Esophagus
		4.46.2	Stomach
		4.46.3	Small bowel
		4.46.4	Large bowel
		4.46.5	ERCP / biliary tree
4.47	**Urinary**	4.47.1	Cystogram: Retrograde, Voiding
4.48	**Reproductive**	4.48.1	Hysterosalpingography
4.49	**Skeletal**	4.49.1	Joint Injection
		4.49.2	Aspiration
MODALITY: MAMMOGRAPHY			
4.50	**Mammography**	4.50.1	Craniocaudal
		4.50.2	Mediolateral obliques
MODALITY: COMPUTED TOMOGRAPHY			
4.51	**Computed Tomography (CT)**	4.51.1	Abdomen enhanced and unenhanced
		4.51.2	Chest enhanced and unenhanced
		4.51.3	Extremities
		4.51.4	Head enhanced and unenhanced
		4.51.5	Neck enhanced and unenhanced
		4.51.6	Pelvis enhanced and unenhanced
		4.51.7	Spine
		4.51.8	Interventional Procedures
		4.51.9	Virtual colonography

[1] It is realized that imaging of the gastrointestinal system is changing. The following projections / positions are listed with the understanding that some students will not obtain clinical exposure to the procedures. Therefore, the minimum expectation is academic/didactic and these will not be tested on the certification exam. However, given in some areas of the country these procedures are being done they will remain in the profile to ensure basic curriculum remains in programs.

MODALITY: BONE MINERAL DENSITOMETRY			
4.52	**Bone Mineral Densitometry**	4.52.1	Spine
		4.52.2	Hip
MODALITY: INTERVENTIONAL RADIOGRAPHY			
4.53	**Vascular**	4.53.1	Angiography
		4.53.2	Angioplasty
		4.53.3	IVC filter
		4.53.4	Embolization
		4.53.5	Thrombolysis
		4.53.6	Stent / shunt placement
		4.53.7	Tube/line insertion
4.54	**Non-Vascular**	4.54.1	Tube / line insertion
		4.54.2	Joint injection
		4.54.3	Aspiration / drainage
		4.54.4	Biopsy
		4.54.5	Radiofrequency ablation
		4.54.6	Vertebroplasty/Kyphoplasty

5. Pharmaceuticals

This lists the categories of pharmaceuticals referred to in competency:

RTR. 5.3. Apply knowledge of the effects of pharmaceutical agents.

Pharmaceutical Category	
5.01	Adrenergic
5.02	Anesthetic
5.03	Antianxiety
5.04	Anticoagulant
5.05	Antidepressant
5.06	Antidiabetic
5.07	Antihistamine
5.08	Anticholinergic
5.09	Antiperistaltic
5.10	Betablockers
5.11	Bronchodilator
5.12	Cathartic
5.13	Contrast agent
5.14	Diuretic
5.15	Fluid and electrolytes
5.16	Glucocorticoid / NSAID
5.17	Hypoglycemic
5.18	Narcotics
5.19	Sedative
5.20	Tranquilizer
5.21	Vasodilator

National Certification Exam Blueprint

Coming soon.