Nuclear Medicine Technology

Certification and registration requirements for nuclear medicine technology are based on the results of a comprehensive practice analysis conducted by The American Registry of Radiologic Technologists (ARRT) staff and the Nuclear Medicine Technology Practice Analysis Committee. The purpose of the practice analysis is to identify job responsibilities typically required of nuclear medicine technologists at entry into the profession. The results of the practice analysis are reflected in this document. The attached task inventory is the foundation for ARRT's clinical competency requirements and content outline which in turn is the foundation for the examination content specifications and CQR SSA content specifications.

Basis of Task Inventory

In 2020, the ARRT surveyed a large, national sample of nuclear medicine technologists to identify their responsibilities. When evaluating survey results, the committee applied a 40% criterion. That is, to be included on the task inventory, an activity must have been performed by at least 40% of nuclear medicine technologists. The committee could include an activity that did not meet the 40% criterion if there was a compelling rationale to do so (*e.g., a task that falls below the 40% criterion but is expected to rise above the 40% criterion in the near future).

Application to Clinical Competency Requirements

The purpose of the clinical competency requirements is to verify that individuals certified by the ARRT have demonstrated competence performing the clinical activities fundamental to a particular discipline. Competent performance of these fundamental activities, in conjunction with mastery of the cognitive knowledge and skills covered by the certification examination, provides the basis for the acquisition of the full range of procedures typically required in a variety of settings. Demonstration of clinical competence means that the candidate has performed the procedure independently, consistently, and effectively during the course of his or her education. An activity must appear on the task inventory to be considered for inclusion in the clinical competency requirements. For an activity to be designated as a mandatory requirement, survey results had to indicate that technologists performed that activity. The committee designated clinical activities performed by fewer technologists or which are carried out only in selective settings, as elective. The *Nuclear Medicine Technology Didactic and Clinical Competency Requirements* are available from ARRT's website (www.arrt.org).

Application to Content Specifications

The purpose of the exam is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required of the staff technologist at entry into the profession. The content specifications identify the knowledge areas underlying performance of the tasks on the task inventory. Every content category can be linked to one or more activities on the task inventory. Note that each activity on the task inventory is followed by a content category that identifies the section of the content specifications corresponding to that activity. The *Nuclear Medicine Technology Content Specifications* are available from ARRT's website (www.arrt.org).

*The abbreviation "e.g.," is used to indicate that examples are listed in parentheses, but that it is not a complete list of all possibilities.

Activity		Content Categories Legend: PC = Patient Care, S = Safety, IP = Image Production, P = Procedures
1.	Sequence imaging procedures to avoid affecting subsequent examinations (e.g., radiopharmaceuticals, residual contrast media).	PC.1.G.1.E.
2.	Verify the patient's identity.	PC.1.A.2.A.
3.	Evaluate the patient's ability to understand and comply with requirements for the requested procedure.	PC.1.B.2.
4.	Obtain pertinent medical history.	PC. 1.B.3.
5.	Manage interpersonal interactions in an effective manner.	PC.1.B.
6.	Explain and confirm the patient's preparations (e.g., diet restrictions, preparatory medications).	PC.1.B.3.B.
7.	Review the examination request to verify information is accurate, appropriate, and complete (e.g., patient history, clinical diagnosis, physician's order).	PC. 1.A.2.A.
8.	Explain the procedure instructions to patient, patient's family, or authorized representative (e.g., pre-procedure, post-procedure).	PC.1.B.3.A.
9.	Respond as appropriate to procedure inquiries from the patient, the patient's family, or authorized representative (e.g., scheduling delays, exam duration, other imaging modalities).	PC.1.B.3.
10.	Monitor the patient's auxiliary medical equipment (e.g., IVs, oxygen) during the procedure.	PC.1.C.2.
11.	Follow environmental protection standards for handling and disposing of bio-hazardous materials (e.g., sharps, blood, body fluids).	PC.1.F.
12.	Follow environmental protection standards for handling and disposing hazardous materials (e.g., disinfectants).	PC.1.F.
13.	Provide for the patient's safety, comfort, and modesty.	PC.1.A.
14.	Notify appropriate personnel of adverse events or incidents (e.g., patient fall, wrong patient injected).	PC.1.C.3.
15.	Demonstrate and promote professional and ethical behavior (e.g., confidentiality, regulation compliance).	PC.1.A.
16.	Verify informed consent as necessary.	PC.1.A.1.A.
17.	Recognize abnormal or missing lab values (e.g., TSH, bilirubin, β-hCG) relative to the procedure ordered.	PC.1.G.1.D.
18.	Communicate relevant information to appropriate members of the care team.	PC.1.B.
19.	Practice Standard Precautions.	PC.1.E.3.
20.	Follow appropriate precautions and procedures when caring for patients with communicable diseases (e.g., MRSA, Clostridium difficile).	PC.1.E.

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21.	Use positioning aids, as needed, to reduce patient movement and/or promote patient safety.	PC.1.A.2.
22.	Use proper body mechanics and/or ergonomic devices to promote personnel safety.	PC.1.C.1.
23.	Prior to administration of a medication other than a radiopharmaceutical, review pertinent information to prepare appropriate type and dosage.	PC.1.G.
24.	Prior to administration of a medication other than a radiopharmaceutical, determine if the patient is at risk for an adverse event.	PC.1.G.
25.	Use sterile or aseptic techniques when indicated.	PC.1.E.2.
26.	Obtain vital signs.	PC.1.C.3.A.
27.	Recognize and communicate the need for prompt medical attention.	PC.1.D.
28.	Assist with providing emergency care (e.g., CPR).	PC.1.D.
29.	Clean and disinfect or sterilize facilities and equipment.	PC.1.E.3.
30.	Document required information on patient's medical record (e.g., imaging procedure, documentation, images, adverse events).	PC.1.
31.	Screen female patients of childbearing age for the possibility of pregnancy and take appropriate action.	S.1.D.3., D.FOQ. (focus of questions)
32.	Screen female patients of childbearing age to determine if she is breastfeeding and take appropriate action.	S.1.D.3., D.FOQ.
33.	Take appropriate measures to minimize radiation exposure to patient (Image Wisely®, Image Gently®).	S.1.C.6.
34.	Take appropriate precautions to minimize occupational radiation exposure (ALARA).	S.1.C.
35.	Advocate radiation safety and protection.	S.1.
36.	Wear personnel radiation monitoring devices appropriately while on duty.	S.1.C.3.
37.	Evaluate individual occupational exposure reports to determine if values for the reporting period are within established limits.	S.1.D.
38.	Ensure that appropriate signs are posted in radiation areas.	S.1.F.3.C.
39.	Perform radiation surveys and wipe tests in indicated areas and record as prescribed by governing regulations.	S.1.F.
40.	Manage radioactive spills to reduce risk of contamination.	S.1.F.4.
41.	Identify a medical event according to governing regulations (e.g., NRC).	S.1.E.
42.	Order appropriate unit dose from radiopharmacy.	P.1.

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43.	Perform required procedures for receipt and return of radioactive materials.	S.1.G.
44.	Prepare and store radiopharmaceutical/pharmaceutical as directed in the kit instructions provided by the manufacturer or according to department protocol.	P.1.C.
45.	Label and record the radiopharmaceutical/pharmaceutical indicating date, type, activity, concentration, and other data as required by governing regulations.	P.1.C.3.B.
46.	Store radioactive material in appropriate shielding.	P.1.C.3.A.3.
47.	Check all radiopharmaceutical/pharmaceutical kits and doses for color and clarity.	P.1.C.1.C.4.
48.	Perform chromatography on a radiopharmaceutical kit as applicable.	P.1.A.2., P.1.C.1.C.5.
49.	Determine radiopharmaceutical required to perform the study.	P.1.B., D.FOQ.
50.	Verify that the radiopharmaceutical is correct for the procedure to be performed prior to administrating the dose.	P.1.C.
51.	Determine appropriate radiopharmaceutical dosage to be administered.	P.1.C.2.
52.	Withdraw the appropriate volume of radiopharmaceutical using aseptic technique and radiation safety precautions.	P.1.C.2.
53.	Verify activity to be administered using a dose calibrator.	IP.1.B.
54.	Administer oral dose of radiopharmaceutical.	P.1.C.3.
55.	Perform venipuncture.	PC.1.E.3.E., P.1.C.3.C.
56.	Administer intravenous injection of radiopharmaceutical.	P.1.C.3. D.FOQ.
57.	Administer or assist in the administration of interventional pharmaceuticals (e.g., Lugol solution, Regadenoson, morphine sulfate).	P.1.C.3.C., D.FOQ.
58.	Observe patient for adverse reactions to radiopharmaceutical or other medications.	PC.1.D.
59.	Inspect inventory of radiopharmaceuticals, pharmaceuticals, and supplies to ensure that adequate quantities are available to complete scheduled procedures.	D.1.
60.	Record patient and radiopharmaceutical information to comply with regulatory requirements.	D.1.
61.	Store and/or dispose of pharmaceutical waste according to regulations.	S.1.H.
62.	Store and/or dispose of radioactive waste according to regulations.	S.1.G.

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63.	Deface radioactive labels and survey all containers that no longer contain radioactive materials.	S.1.
64.	Perform constancy test on a survey meter with a check source.	IP.1.A.
65.	Perform accuracy test on a dose calibrator.	IP.1.B.2.A.1.
66.	Perform constancy test on a dose calibrator.	IP.1.B.2.A.2.
67.	Perform linearity test on a dose calibrator.	IP.1.B.2.A.3.
68.	Perform geometry test on a dose calibrator.	IP.1.B.2.A.4.
69.	Perform quality control on the following scintillation detection systems: a. well counter b. uptake probe	IP.1.C.
70.	Calibrate scintillation well counter to appropriate photopeak using a radioactive source.	IP.1.C.1.A.
71.	Calibrate uptake probe to appropriate photopeak using a radioactive source.	IP.1.C.1.B.
72.	Determine the efficiency of the scintillation well counter to calculate the disintegrations per minute.	IP.1.C.2.B.2.
73.	Prepare radioactive aerosol systems in accordance with regulations.	IP.1.D.
74.	Prepare radioactive gas delivery systems in accordance with regulations.	IP.1.D.
75.	Peak gamma camera to appropriate photopeak using a radioactive point or sheet source.	IP.1.E.
76.	Prepare radioactive sources/phantoms for gamma camera quality control using radiation safety precautions.	IP.1.E.2.
77.	Perform spatial linearity and resolution tests of a gamma camera using a radioactive source and an appropriate phantom.	IP.1.E.2.
78.	Perform uniformity test on a gamma camera using a radioactive source.	IP.1.E.2.B.1.
79.	Perform high count uniformity correction on a gamma camera according to manufacturer’s guidelines.	IP.1.E.2.B.2.
80.	Perform center of rotation test on a SPECT system.	IP.1.E.2.B.8.
81.	Perform tomographic resolution/uniformity test using an appropriate SPECT phantom.	IP.1.E.2.B.9.
82.	Perform PET scanner quality control.	IP.1.F.2.
83.	Perform CT scanner quality control.	IP.1.F.5.
84.	Interpret results of instrumentation quality control tests to assure that performance standards are met.	IP.1.

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85.	Initiate corrective action for deficiencies demonstrated on instrumentation quality control tests.	IP.1.
86.	Record and maintain results of instrumentation quality control tests to comply with governing regulations.	IP.1.
87.	Operate a gamma camera to obtain high quality images.	IP.1.E.
88.	Operate a PET or PET/CT scanner to obtain high quality images.	IP.1.F.
89.	Monitor equipment to detect and report malfunctions.	IP.1.
90.	Process images.	IP.1.G.
91.	Operate a medical information system (e.g., PACS, EHR).	IP.1.H.
92.	Restore/import electronic images.	IP.1.H.2.
93.	Perform image fusion/registration from two separate disciplines using software (e.g., PET and MR).	IP.1.G.3.B.
94.	Observe patient during imaging to detect motion.	D.FOQ.
95.	Determine correct placement of electrocardiographic (ECG) leads.	P.2.
96.	Evaluate patient images for technical quality.	D.FOQ.
97.	Annotate images with information necessary for identification and interpretation.	D.FOQ.
	Set up equipment and position patient to obtain the following Diagnostic Procedures:	
98.	Infection and Inflammation	D.5.A.
	BONE	
99.	Planar/Whole Body	D.5.B.1., D.5.B.3.
100.	3-Phase	D.5.B.2.
101.	SPECT or SPECT/CT	D.5.B.4.
102.	PET or PET/CT	D.5.B.5.
	BRAIN	
103.	Brain Death	D.5.C.1.
104.	SPECT or SPECT/CT	D.5.C.2.
105.	PET or PET/CT	D.5.C.3.
106.	CSF Cisternogram/CSF Leak	D.5.C.4.
107.	Shunt Patency	D.5.C.5.
	CARDIAC	
108.	Gated Blood Pool	D.2.A.

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109.	Myocardial Perfusion	
	a. SPECT or SPECT/CT	D.2.B.
	b. PET or PET/CT	D.2.B., D.2.C.
110.	Myocardial Viability	D.2.C.
111.	Amyloid Imaging	D.2.D.
	GASTROINTESTINAL	
112.	Gastric Emptying	D.4.A.
113.	Gastroesophageal Reflux	D.4.B.
114.	Meckel Diverticulum	D.4.C.
115.	GI Bleed	D.4.D.
	GENITOURINARY	
116.	Renal Function without Pharmacological Intervention	D.4.H.
117.	Renal Function with Pharmacological Intervention (e.g., Diuretic)	D.4.H.
118.	Renal Morphology	D.4.I.
119.	Renal SPECT or SPECT/CT	D.4.I.
	LIVER	
120.	Hepatobiliary Function	D.4.E.
121.	RBC Hemangioma	D.4.F.
122.	Liver/Spleen	D.4.G.
	LUNG	
123.	Perfusion	D.5.D.2.
124.	Quantitative Perfusion	D.5.D.3.
125.	Ventilation – Gas	D.5.D.1.
126.	Ventilation – Aerosol	D.5.D.1.
127.	Hepatic Artery Perfusion Study (HAPS) for Pretherapy Lung Shunt Fraction	D.5.D.4.
	LYMPHOSCINTIGRAPHY	
128.	Sentinel Node	
	a. Breast	D.5.E.1.
	b. Skin Lesion (e.g., Melanoma)	D.5.E.2.
129.	Lymphoangiography (Extremity)	D.5.E.3.

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	ENDOCRINE	
130.	Thyroid Uptake	D.3.A.1.
131.	Thyroid Imaging	D.3.A.1.
132.	Parathyroid (Planar)	D.3.A.2.
133.	Parathyroid SPECT or SPECT/CT	D.3.A.2.
	TUMOR	
134.	Planar/Whole Body	D.3.A.3., D.3.A.4., D.3.B.1.
135.	SPECT or SPECT/CT	D.3.A.3., D.3.A.4., D.3.B.2.
136.	PET or PET/CT	D.3.A.3., D.3.A.4., D.3.B.3.
	Perform the Following:	
137.	CT for Attenuation Correction/Anatomic Correlation with SPECT	P.2., P.3., P.4., P.5.
138.	CT for Attenuation Correction/Anatomic Correlation with PET	P.2., P.3., P.4., P.5.
	Administer or Assist with the Administration of the following Therapeutic Procedures:	
139.	Bone Therapy	D.3.C.1.A., D.3.C.2.
140.	Thyroid Therapy for Ablation	D.3.C.1.B., D.3.C.2.
141.	Thyroid Therapy for Hyperthyroidism	D.3.C.1.C., D.3.C.2.
142.	Selective Internal Radiation Therapy (SIRT) with Hepatic Artery Perfusion Study (HAPS)	D.3.C.1.D., D.3.C.2.
143.	Targeted Radiotherapy (e.g., Neuroendocrine)	D.3.C.1.E., D.3.C.2.