SNMTS
Advancing Molecular Imaging and Therapy

Scope of Practice for the Nuclear Medicine Advanced Associate
2009

NMAA Scope of Practice Subcommittee of the NMAA Committee, SNM Technologist Section

A SNM Technologist Section (SNMTS) Committee developed the following SNMTS Scope of Practice for the Nuclear Medicine Advanced Associate (NMAA). Members of the sub-committee of the NMAA Committee were: Mark Wallenmeyer, MBA, Chair; James Bellamy, MPH, CNMT; Jeremy Flowers, NP, CNMT; David Gilmore, MS, CNMT, NCT, ARRT(R)(N), FSNMITS, Bennett Greenspan, MD; Jay Haroldt, MD; Robert Henkin, MD; Lyn Mehlberg, BS, CNMT, FSNMTS; Mary Anne Owen, MHE, RT(N), FSNMITS; Martha Pickett, MHSA, CNMT, FSNMTS; Lynne Roy, MBA, CNMT, FSNMTS.

This document is not intended to modify or alter existing tort law; rather it should serve as a concise outline of nuclear medicine technology skills and responsibilities.

NUCLEAR MEDICINE TECHNOLOGY and the NUCLEAR MEDICINE ADVANCED ASSOCIATE

Nuclear medicine technology is the medical specialty that utilizes sealed and unsealed radioactive materials in the diagnosis and treatment of disease. This practice also includes the use of pharmaceuticals and other imaging modalities to enhance the evaluation of organ and molecular function. In addition, it includes the delivery of therapeutic radiopharmaceuticals to treat a number of pathologies.

The practice of nuclear medicine technology encompasses multidisciplinary skills, which use rapidly evolving instrumentation, radiopharmaceuticals and techniques to diagnose and treat disease. The responsibilities of the NMAA include, but are not limited to, an empathetic and instructional approach to patient contact, care, and monitoring; the procurement, preparation, quality control, dispensing, dose calibration, administration, and disposal of radiopharmaceuticals; the administration of pharmaceuticals including adjunct oral and IV contrast (under the direction of an authorized user); the performance of quality control procedures; and the operation of imaging, laboratory, and computer instrumentation.

In order to perform these tasks, the NMAA must successfully complete didactic and clinical education. Recommended coursework includes, but is not limited to, anatomy, physiology, pathophysiology, chemistry, physics, mathematics, computer applications, biomedical sciences, ethics, radiation health and safety, medico-legal considerations, and systems management. Direct patient contact hours are obtained by training in a clinical
education setting. The NMAA has extended education and training beyond that of a Nuclear Medicine Technologist. The duties of the NMAA will entail not only the duties of the nuclear medicine technologist, but also includes duties specific to NMAA advanced education and training. Recommended extended coursework in the NMAA curriculum includes, but is not limited to, patient care, clinical nuclear medicine, radionuclide therapy, nuclear cardiology, interpersonal skill, communication skills, practice-based decision making, professionalism, systems-based practice, patient assessment, pathophysiology, pharmacology and contrast media. Direct patient contact hours are obtained by training in a clinical education setting under the supervision of a licensed physician.

Graduates of accredited programs will be eligible to sit for the Nuclear Medicine Advanced Associate certification examinations offered by the Nuclear Medicine Technology Certification Board.

The spectrum of nuclear medicine technology skills and responsibilities varies widely across the country and often goes beyond the basic skills outlined in the nuclear medicine technologist scope of practice, initial education and certification. Practice components presented in this document provide a basis for establishing the areas of knowledge and performance for the NMAA. It is assumed that for all activities included in this scope of practice, the NMAA has received the proper education (in compliance with federal, state, and institutional requirements) supported with the proper documentation of initial and continued competency in those practices and activities. Continuing education is a necessary component in maintaining the skills required to perform all duties and tasks of the NMAA in this ever-evolving field of new equipment, radiopharmaceuticals, and applications.

THE SCOPE OF PRACTICE

The scope of practice of the Nuclear Medicine Advanced Associate (NMAA) includes, but is not limited to, the following areas and responsibilities:

- **Patient Care**: Requires the exercise of judgment to assess and respond to the patient’s needs prior to, during, and after procedures in the nuclear medicine department, and in patient medication reconciliation.
- **Quality Control**: Requires the evaluation and maintenance of a quality control program for all instrumentation to ensure its proper performance and stability.
- **Diagnostic Procedures**: Requires the utilization of appropriate techniques, and administration of non-radiopharmaceutical agents when part of standard procedures, to ensure quality diagnostic images and/or laboratory results.
- **Radiopharmaceuticals**: Involves the procurement, preparation, quality control, dispensing, dose calculation, identification, documentation, administration, disposal, storage, and safe handling of radioactive materials used by the NMAA.
- **In Vivo Diagnostic Testing**: Involves the procurement, preparation, quality control, dispensing, dose calibration of radiopharmaceuticals and oral, inhalation, or intravenous administration. In some cases radiopharmaceuticals may be administered by other routes under the direct supervision of a physician.
• **In Vitro Diagnostic Testing:** Involves the procurement, preparation, quality control, dispensing, dose calibration of radiopharmaceuticals and oral, inhalation, or intravenous administration.

• **Transmission Imaging:** Involves, but is not limited to, the operation of gamma cameras with sealed sources of radioactive material for transmission imaging with single photon emission computed tomography (SPECT) or positron emission tomography (PET) and operation of cameras with x-ray tubes for transmission imaging when performed as part of SPECT/CT or PET/CT. Additionally includes diagnostic CT when performed on SPECT/CT or PET/CT cameras, including the administration of oral and intravenous contrast (requires education in CT) and the operation of scanners with x-ray tubes for the measurement of bone density.

• **Radionuclide Therapy:** Involves, but is not limited to, assisting an authorized user in the application, management, preparation, and administration of radiotherapeutic procedures and administration of non-radiopharmaceutical agents by oral and intravenous routes when part of standard procedures required for treatment.

• **Radiation Safety:** Involves, but is not limited to, educating the public while practicing techniques that will minimize radiation exposure to the patient, general public, and health care personnel, through consistent use of protective devices, shields, monitors, and other devices consistent with ALARA (as low as reasonably achievable), as well as decontaminating spills and other inappropriate releases of radiation.

• **Cardiology:** Involves, but is not limited to, all phases involved in obtaining an appropriate and technically accurate cardiac test result in a safe and professional manner for each individual patient.

• **Interpersonal & Communication Skills:** Involves, but is not limited to, effective communicating with patients, family, colleagues, scholarly communication, the ability to deliver bad news, encourage patients to change their behavior, and public speaking.

• **Practice-Based Decision Making:** Involves, but is not limited to, track, analyze and improve practice processes and outcomes, seeking out, gather, analyze and act on a combination of quantitative and qualitative data to improve the nuclear medicine department.

• **Professionalism:** The NMAA is expected to demonstrate professionalism with the following qualities: humanism, reliability, responsibility, integrity, maturity, respect for others, altruism, duty, caring, compassion, scholarship, leadership, adaptability, accountability, autonomy, and knowledge.

• **Systems-Based Practice:** Involves, but is not limited to, awareness and responsiveness to the larger context and system of health care and the ability to effectively call on systems resources to provide care that is of optimal value.

I. **Patient Care**

   A. A NMAA provides patient care, including but not limited to:

      1. Providing for proper comfort and care of the patient prior to, during and after a procedure, including but not limited to monitoring of intravenous lines (i.e.,
1. The tasks a NMAA must perform when preparing the patient for an examination include, but are not limited to:

   a. Verifying patient identification, pregnancy status, breast-feeding status, and written orders for the procedure.
   b. Confirming that the indication for the procedure is appropriate and consulting with the authorized user and/or referring physician whenever necessary to ensure that the proper procedure is performed.
   c. Ensuring that any pre-procedural preparation has been completed, including but not limited to fasting, hydration, thyroid blocking, voiding, bowel cleansing, and suspension of interfering medications.
   d. Explaining the procedure to the patient and/or family and, where appropriate, to the parents and/or legal guardian, including but not limited to patient involvement, length of study, and radiation safety issues.
   e. Collecting samples for laboratory procedures and performing pertinent waived in vitro diagnostic testing laboratory analyses, including urine pregnancy testing and fasting blood sugar. Additionally, in vitro diagnostic testing laboratory procedures include, but are not limited to, secretions, saliva, breath, blood, and stool, to measure biodistribution of radiopharmaceuticals.
C. Make informed decisions about diagnostic and therapeutic procedures under the direction of the supervising physician.

1. Gather and evaluate essential information, including correlative studies about the patient and arrange follow up as necessary.
2. Perform history and physical exams
3. Determine and implement a plan of care
4. Order and administer sedating pharmaceuticals, monitor the patient as allowable by institutional, state, and federal statutes.
5. Implement additional requirements for patient care for diagnostic or therapeutic procedures.
6. Provide indicated intervention per patient emergency event.

D. An NMAA performs administrative procedures, including but not limited to:

1. Maintaining an appropriate inventory of medical/surgical supplies, radiopharmaceuticals, storage media, and other items required to perform procedures in a timely manner.
2. Scheduling patient procedures appropriate to the indication and in the proper sequence.
3. Maintaining appropriate records of administered radioactivity, quality control procedures, patient reports, and other required records.
4. Developing and revising when necessary policies and procedures in accordance with applicable regulations.
5. Actively participating in total quality management/continuous quality improvement programs (i.e., age-specific competencies, patient education, and patient restraint and immobilization).

II. Quality Control—Nuclear Instrumentation

An NMAA ensures the proper performance of imaging systems, storage media, and radiation detection and counting devices, including but not limited to scintillation cameras, dose calibrators, survey instruments, scintillation probes and well counters, and data processing and image production devices.

III. Diagnostic Procedures

A. An NMAA reviews requests and physician directives for nuclear medicine procedures including but not limited to:

1. Review request for imaging procedures per protocol
2. Ensure the appropriate diagnostic study has been requested for the clinical presentation in consultation with the referring physician.
3. Evaluate collaborative laboratory test results for indications/contraindications
4. Order or facilitate adjunctive pharmaceuticals for the imaging procedure under the direction of the supervising physician.

B. A nuclear medicine advanced associate performs imaging including but not limited to:

1. Preparing, evaluating and properly administering the appropriate radiopharmaceuticals and/or pharmaceuticals and contrast (under the direction of an authorized user).
2. Establishing and/or properly maintaining venous access routes of various configurations (in accordance with hospital policies and procedures).
3. Selecting the appropriate imaging or data collection parameters.
4. Administering radiopharmaceuticals/pharmaceuticals through various routes, including but not limited to oral, intravesical, inhalation, intravenous, intramuscular, subcutaneous, and intradermal (under the direction of an authorized user).
5. Positioning the patient for imaging, adapting the protocol to patient limitations, and acquiring diagnostic quality images.
6. Positioning and verifying the proper placement of electrocardiographic leads.
7. Reviewing images to ensure that required information has been acquired, processed properly, and is of the highest quality.
8. Assisting in cardiac stress testing procedures when performed in conjunction with nuclear medicine procedures.
9. Performing data collection, processing, and analysis.
10. Archiving data to and from storage media.

C. An NMAA performs non-imaging in vivo and/or radioassay studies, including but not limited to:

1. Operating laboratory equipment including well counters, probes, and other detection devices to measure the biodistribution of radiopharmaceuticals.
2. Preparing doses and standards.
3. Collecting the appropriate specimen for procedures using standard precautions.
4. Gathering, validating and documenting data.
5. Managing biohazardous, chemical, and radioactive waste in accordance with applicable regulations and specific facility policies.

D. A nuclear medicine advanced associate prescribes and administers pharmacologic and nonpharmacologic interventions under the direction of the supervising physician and as indicated by patient profile and diagnostic procedure as allowable by state and federal statutes, which includes, but is not limited to:

1. Perform pre-procedure requirements and interventions as may be required.
2. Perform intra-procedure requirements as may be required.
3. Perform post-procedure requirements as may be required.

E. A nuclear medicine advanced associate may order complementary diagnostic procedures as indicated by patient testing results under the direction of the supervising physician.

F. A nuclear medicine advanced associate may analyze results of the procedure and prepare a preliminary description of findings for the supervising physician, including but not limited to:
   1. Assess image quality and other associated data
   2. Make a preliminary assessment
   3. Document initial observations of imaging procedures according to protocol.
   4. Communicate initial observations as per supervising physician’s discretion
   5. Report findings to referring physicians and the patient per protocol.

G. A nuclear medicine advanced associate may manage pain and sedation for the patient receiving diagnostic testing or therapeutic treatment including but not limited to:
   1. Order and administer sedating pharmaceuticals under the direction of the supervising physician.
   2. Prescribe pharmacologic and nonpharmacologic interventions
   3. Monitor patient response to sedation and provide intervention according to accepted standards of practice.

IV. Radiopharmaceuticals
   A. An NMAA procures and maintains radiopharmaceutical products and adjunct supplies.
   B. An NMAA properly prepares and administers diagnostic radiopharmaceuticals under the direction of an authorized user in accordance with all federal, state and institutional guidelines.

V. Radionuclide Therapy
   An NMAA properly prepares and administers therapeutic radionuclides, radiopharmaceuticals, and pharmaceutical agents by oral and/or intravenous routes when these agents are part of a standard procedure that is required for treatment under the direction of an authorized user in accordance with federal, state, and institutional regulations, including but not limited to:
   1. Review request for radionuclide therapy procedures under the direction of the supervising physician, analyzing the indications, contraindications, and complications for therapeutic interventions.
a. Interpret epidemiologic data, research, and trends related to incidence and prevalence of cancer
b. Identify risk factors for cancer.
c. Understand dosimetry and dosimetric consequences
d. Understand the physiologic and radiobiological mechanisms by which differing radioisotope therapies are effective
e. Conduct imaging protocols and evaluate images and laboratory values for presence of disease and metastasis.
f. Evaluate clinical criteria for radionuclide therapy, including expected biodistribution of radiotherapeutic pharmaceutical.

2. Counsel and educate the patient and family regarding the proposed therapeutic intervention

3. Explain in detail the processes, guidelines, and timeliness for the radioisotope therapy regimen according to institutional policy and guidelines.

4. Obtain patient informed consent for required procedures according to state law and institutional policy.

5. Educate the patient on pre-procedural and post-procedural care.

6. Calculate appropriate therapeutic dosage based on dosimetry, patient well-being, diagnostic imaging, and laboratory results under the direction of the supervising physician, including but not limited to:
   a. Calculate radionuclide therapy dose for benign thyroid disease.
   b. Calculate radionuclide therapy dose for malignant thyroid disease.
   c. Calculate radionuclide therapy dose for palliative bone therapy.
   d. Calculate radionuclide therapy dose for non-Hodgkin’s lymphoma.
   e. Calculate radionuclide therapy dose for polycythemia.
   f. Calculate radionuclide therapy dose for malignant effusion
   g. Calculate radionuclide therapy dose for selective internal radiation therapy.

7. Order or facilitate adjunctive pharmaceuticals for therapy.

8. Administer therapeutic dose.

9. Monitor therapy patient and provide post therapy interventions as needed.

VI. Radiation Safety

An NMAA performs all procedures utilizing ionizing radiation safely and effectively, applying federal, state, and institutional regulations, including but not limited to:

A. Maintaining compliance with all applicable regulations.
B. Performing appropriate radioactive contamination monitoring and decontamination procedures.

C. Disposing of radioactive waste in accordance with federal, state and institutional regulations.

D. Participating in programs designed to instruct other personnel about radiation hazards and principles of radiation safety.

VII. Cardiology

A nuclear medicine advanced associate performs advanced cardiologic procedures according to federal and state guidelines utilizing knowledge of cardiac physiology and pathology, stress testing techniques, drug interactions, emergency procedures, electrocardiography and image assessment including but not limited to:

A. Developing procedural policies and standards for pre-cardiac emergencies.

B. Develop procedural policies and standards for cardiac arrest emergencies that occur within the department as directed by institutional policy and practice standards and provide indicated intervention for cardiac emergency event.

C. Provide indicated intervention for non-cardiac events

D. Manage crash cart for compliance

E. Take comprehensive patient history and evaluate for patient pathology

F. Evaluate patient laboratory biochemical markers relevant to cardiac pathology.

G. Evaluate patient medications for contraindications to stress testing.

H. Review patient medications for contraindications to stress testing.

I. Obtain patient informed consent as required for nuclear cardiology procedures.

J. Conduct treadmill testing per all protocol options under the direction of the supervising physician.

K. Prescribe and administer interventional drugs for pharmacologic stress testing.

L. Analyze the results of the stress test and imaging portion of the examination and prepare a preliminary description of findings for the supervising physician.

M. Facilitate or recommend patient-specific cardiac-related procedures based on nuclear cardiology examination results.

VIII. Interpersonal & Communication Skills

A nuclear medicine advanced associate is expected to communicate with patients and physicians on a highly professional level to include but not limited to:

A. Demonstrate team communication and leadership skills to work effectively with others as a member or leader of a health care team or professional group.

B. Protect and preserve personal and confidential information of others.
C. Use effective listening skills and elicit and provide information using effective verbal, nonverbal, explanatory, questioning and writing skills.

D. Demonstrate emotional resilience and stability, adaptability, flexibility, and tolerance of ambiguity and anxiety.

E. Follow appropriate protocol in resolution of conflict, exhibiting proper restraint when presented with potentially volatile situations.

F. Maintain comprehensive, timely, and legible records for medical, legal, quality improvement, and financial purposes.

G. Maintain appropriate protocol, courtesy, tact, and confidentiality in business communications, both written and oral.

H. Apply concepts of teaching and learning theories in design, implementation, and evaluation in the education of the patient, family, colleagues, and the community.

IX. Practice-Based Decision Making

A nuclear medicine advanced associate will track, analyze, and improve practice processes and outcomes, based on practice-based decision making to include but not limited to:

A. Track and analyze processes, procedures, and outcomes using appropriate statistical and/or qualitative techniques

B. Use Benchmarking analysis and adjust processes, procedures, and operations for comparison with published standards of care.

C. Critically evaluate current literature and extant research to assess the effectiveness of diagnostic and therapeutic procedures.

D. Use feedback and observations to verify that changes were implemented to optimize patient care delivery and outcomes were effective.

E. Use information technology to effectively access, collect, analyze, and disseminate data.

F. Provide discipline-specific education to patients, students, colleagues, and the public.

X. Professionalism

A nuclear medicine advanced associate will act in a professional manner, with calm, compassion, dignity, respect, sensitivity, excellence, integrity, positive attitude, accountability, confidentiality, autonomy, medico-legal and ethical principles.

XI. Systems-Based Practice

A nuclear medicine advanced associate will investigate and evaluate patient care practices, appraise and assimilate scientific evidence, and improve patient care including but not limited to:

A. Practice cost-effective health care and resource allocation that do not compromise quality of care.
B. Ensure compliance with all local, state, regional, and federal requirements for laboratory operations and personnel training and credentialing.

C. Conduct procedures and provide documentation for laboratory accreditation

D. Implement Joint Commission Standards

E. Partner with health care managers and health care providers to assess, coordinate, and improve health care.
REFERENCES


