



## **Scope of Practice for the Nuclear Medicine Advanced Associate 2009**

NMAA Scope of Practice Task Force of the NMAA Committee, SNM Technologist Section

The proposed NMAA Scope of Practice was developed by the Scope of Practice Task Force with members appointed by the SNMITS President. Members of the task force 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 Harolds, MD; Robert Henkin, MD; Lyn Mehlberg, BS, CNMT, FSNMITS; Mary Anne Owen, MHE, RT(N), FSNMITS; Martha Pickett, MHSA, CNMT, FSNMITS; Lynne Roy, MBA, CNMT, FSNMITS.

This document is not intended to modify or alter existing tort law; rather it should serve as a concise outline of the duties and responsibilities of the Nuclear Medicine Advanced Associate (NMAA).

### **NUCLEAR MEDICINE ADVANCED ASSOCIATE**

Nuclear medicine 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.

A Nuclear Medicine Advanced Associate (NMAA) is an advanced-level nuclear medicine technologist working under the supervision of a licensed physician, who is also an authorized user of radioactive materials, to enhance patient care in the diagnostic imaging and radiotherapy environments.

The Nuclear Medicine Advanced Associate is an NMTCB- or ARRT-certified nuclear medicine technologist who has successfully completed an advanced academic program at the graduate level encompassing a nationally recognized NMAA curriculum and a nuclear medicine physician-, nuclear cardiologist-, or radiologist-directed clinical preceptorship.

The duties of the NMAA may include those of the Nuclear Medicine Technologist but with added responsibilities specific to the NMAA's advanced education and training. Accordingly, by implication the NMAA scope of practice incorporates all duties also identified in the Nuclear Medicine Technologist scope of practice, which is appended to this document for informational purposes. The NMAA has completed advanced coursework in the NMAA curriculum that includes, but is not limited to, patient care, clinical nuclear medicine, radionuclide therapy, nuclear cardiology, interpersonal and communication skills, practice-based decision making, professionalism, systems-based

practice, patient assessment, pathophysiology, pharmacology, contrast media, radiation biology and radiation safety.

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

NMAAs work in general nuclear medicine settings as well as in specialty settings such as oncology and cardiology. They work in large research facilities and small rural settings, in in-patient and out-patient settings. Consequently, the spectrum of NMAA responsibilities varies widely across the country.

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**

These competencies reflect the primary clinical tasks of an NMAA, but NMAAs may take on additional responsibilities at the discretion of the supervising physician. The supervising physician may delegate to the NMAA any procedures for which the NMAA is appropriately trained and qualified to perform and that are routinely performed within the normal scope of the physician's practice.

Under physician supervision, the NMAA performs patient assessment, patient management and selected nuclear medicine procedures as summarized below.

1. Perform and document a comprehensive review of clinical information, such as pertinent lab work, including blood, urine and other tissue samples and pathology studies, as well as correlative imaging studies to facilitate optimal interpretation of the nuclear medicine procedure by the supervising physician.
2. Perform, update, and document a 'history and physical' in the medical record, obtaining a comprehensive clinical history from the patient or medical record to optimize the clinical value of the requested nuclear medicine procedure.
3. Assist the supervising physician in obtaining informed consent for invasive and therapeutic procedures, as well as procedures involving more than minimal risk, as defined by state law and institutional policy.
4. Furnish adjunctive and interventional medications that enhance diagnostic imaging and therapeutic procedures, as defined by state regulations and institutional policy.
5. Perform minimal sedation (anxiolysis) and moderate sedation (as defined by the American Association of Anesthesiology) under the direct supervision of an appropriately credentialed physician as determined by state law and institutional policy.
6. Educate the patient undergoing invasive procedures, therapeutic procedures, and procedures involving more than minimal risk regarding pre-procedural preparation and post-procedural care, as defined by state law and institutional policy and documenting appropriately in the patient's medical record.

7. Perform pre- and post-procedure assessment and monitoring in patients undergoing invasive and therapeutic procedures, as well as procedures involving more than minimal risk, as defined by state law and institutional policy.
8. Under the direction of the supervising physician, perform invasive or therapeutic procedures as recognized through institutional policy and defined by state and federal law.
9. Monitor and supervise cardiac exercise or pharmacologic stress testing in association with diagnostic nuclear medicine imaging procedures.
10. Assess imaging procedure for quality, recommend additional views as necessary, and order additional diagnostic procedures as necessary to provide additional information to optimize the nuclear medicine procedure
11. Analyze the imaging, correlative and laboratory data provided and prepare a preliminary description of findings for the supervising physician to use when interpreting the results and formulating the written report.
12. Communicate report findings in the physician's finalized and authenticated reports to the referring physician and provide necessary documentation.

## **PATIENT CARE**

NMAA patient care responsibilities include but are not limited to the following:

1. Communicate effectively and demonstrate caring, respectful, and ethical behaviors when interacting with the patient, the family, physicians, and other health care professionals.
2. Counsel and educate the patient and family
  - A. Obtain patient informed consent for required procedures according to state law and institutional policy
  - B. Educate the patient on preprocedural preparation and postprocedural care
3. Make informed decisions about diagnostic and therapeutic procedures under the direction of the supervising physician and based on patient information and preferences, up-to-date scientific evidence, and clinical judgment
  - A. Gather and evaluate essential information, including correlative studies, about the patient and arrange follow-up as necessary under the direction of the supervising physician
  - B. Obtain history and perform physical examination
  - C. Evaluate findings for contraindications to testing and for indicators of additional patient pathology
  - D. Consult with the physician as needed
  - E. Counsel the patient and family as indicated
4. Determine and implement a plan of care
  - A. Use professional judgment to recommend or adapt protocols for procedures to improve diagnostic quality and outcome
  - B. Consult with the supervising physician or appropriate health care provider to determine a modified action plan when necessary
  - C. Report findings to the supervising physicians and the patient per protocol
5. Order and administer sedating pharmaceuticals under the direction of the supervising physician and monitor the patient who is receiving sedating pharmaceuticals as indicated by patient profile and diagnostic or therapeutic procedure as allowable by institutional, state, and federal statutes

6. Implement additional requirements for patient care for diagnostic or therapeutic procedures
  - A. Perform patient bladder catheterizations
  - B. Implement additional routes of radiopharmaceutical administration other than intravenous injection or oral
  - C. Monitor vital signs and physiologic parameters
  - D. Evaluate the need for contrast media in consultation with the supervising physician
7. Provide indicated intervention per patient emergency event
  - A. Provide supportive medical management
  - B. Basic life support
  - C. Advanced life support
  - D. Facilitate transfer to definitive care environment

### **GENERAL DIAGNOSTIC NUCLEAR MEDICINE**

NMAA responsibilities in general diagnostic nuclear medicine include but are not limited to the following:

1. Review requests and physician directives for nuclear medicine procedures
  - A. Review request for imaging procedures per protocol
  - B. Ensure the appropriate diagnostic study has been requested for the clinical presentation in consultation with the referring physician
  - C. Evaluate collaborative laboratory test results for indications/contraindications
  - D. Order or facilitate adjunctive pharmaceuticals for the imaging procedure under the direction of the supervising physician
2. Competently perform clinical nuclear medicine procedures considered essential in the area of practice
  - A. Perform routine nuclear medicine procedures
  - B. Perform sentinel node imaging and lymphatic mapping
  - C. Prepare the patient and ancillary equipment for radiation therapy planning using positron and multimodality imaging systems
3. Prescribe and administer 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
  - A. Perform preprocedure requirements and interventions as may be required
  - B. Perform intraprocedure requirements as may be required
  - C. Perform postprocedure requirements as may be required
4. Order complementary diagnostic procedures as indicated by patient testing results under the direction of the supervising physician
5. Analyze results of the procedure and prepare a preliminary description of findings for the supervising physician
  - A. Assess image quality and other associated data
  - B. Make a preliminary assessment
  - C. Document initial observations of imaging procedures according to protocol
  - D. Communicate initial observations as per the supervising physicians' discretion
  - E. Report findings to referring physicians and the patient per protocol
6. Manage pain and sedation for the patient receiving diagnostic testing or therapeutic treatment
  - A. Prescribe pharmacologic and nonpharmacologic interventions as allowable by

- state and federal statutes
- B. Monitor patient response to sedation and provide intervention according to accepted standards of practice
- 7. Administer radiopharmaceuticals for radionuclide cisternography, cerebrospinal fluid shunt evaluations, cerebrospinal fluid leaks, or intraperitoneal procedures using aseptic technique and radiation safety standards at the discretion of the supervising physician
  - A. Explain complete procedure to the patient/family
  - B. Ensure scheduled imaging timeline compliance
  - C. Prepare injection site, adhering to predetermined aseptic/sterile technique
  - D. Conduct a Joint Commission–recommended “time out” procedure
  - E. Monitor room, equipment, and personnel as per institutional Radiation Safety Guidelines
- 8. Participate in image-guided biopsy at the discretion of the supervising physician
  - A. Prepare sterile field and biopsy area using aseptic/sterile technique
  - B. Obtain informed consent for biopsy
  - C. Conduct a Joint Commission–recommended “time out” procedure
    - Evaluate for complications prohibiting safe biopsy
  - D. Identify appropriate instruments and use according to recommended standards of practice
  - E. Prepare biopsy tissue specimens for pathologic examination according to guidelines for specific tissue type, include appropriate transport media slide preparation and documentation
  - F. Close and dress the wound according to recommended standards of practice
  - G. Order appropriate follow-up imaging studies appropriate to biopsy site and procedure
  - H. Appropriately intervene for complications
  - I. Advise the patient of needed follow-up care

## **NUCLEAR CARDIOLOGY**

1. Successfully complete Advanced Cardiac Life Support credentialing
  - A. Assess normal electrocardiogram to determine patient safety for stress testing
  - B. Assess abnormal electrocardiographic conduction in preparation for stress testing
2. Develop procedural policies and standards for pre–cardiac arrest emergencies that might occur within the department as directed by institutional policy and practice standards
  - A. Identify the signs and symptoms of symptomatic bradycardia and symptomatic tachycardia
  - B. Follow a step-by-step course of action for the patient who develops asymptomatic bradycardia or tachycardia while in office (before, during, or after stress test)
  - C. Follow a step-by-step course of action for the patient who develops signs and symptoms of bradycardia or tachycardia while in office (before, during, or after stress test)
  - D. Identify the proper medications and dosages for stable cardiac rhythms
  - E. List contraindications and precautions of common cardiac medications
  - F. Follow a step-by-step approach to handling an ST elevated myocardial infarction
  - G. Follow a step-by-step approach to handling a stroke situation
  - H. Follow a step-by-step approach to handling other patient incidents

- I. Identify and delegate personnel to perform various tasks in preparation for cardiac emergencies
- J. Incorporate the appropriate federal, state, and institutional guidelines into departmental policies and procedures
- 3. 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 a cardiac emergency event
  - A. Establish intravenous access
  - B. Identify and administer the appropriate medications for commonly occurring cardiac arrhythmias under the direction of the supervising physician
  - C. Perform cardiac compression or defibrillate patient if required
  - D. Facilitate the ordering of laboratory tests or other tests as needed for a cardiac arrest event under the direction of the supervising physician
  - E. Facilitate admission of the patient to the hospital if necessary
- 4. Provide indicated intervention for noncardiac emergency events
- 5. Manage crash cart for compliance
  - A. Follow the appropriate guidelines in implementing regulation for managing the department's crash cart
  - B. Inventory crash cart components according to institutional policy
  - C. Properly dispose of expired drugs
  - D. Replace expired drugs
  - E. Perform quality assurance testing on defibrillator and document results
- 6. Take comprehensive patient history and evaluate for patient pathology
  - A. Interview the patient and document on department form a complete past and current cardiac history
  - B. Establish "nothing by mouth" compliance
  - C. Evaluate ambulatory ability
  - D. Review noncardiac history for prevalence to study requested
  - E. Perform physical assessment
- 7. Evaluate patient laboratory biochemical markers relevant to cardiac pathology
  - A. Review most recent laboratory test results relevant to cardiovascular diseases
  - B. Order relevant blood tests if necessary (including pregnancy testing)
- 8. Evaluate patient medications for contraindications to stress testing
  - A. Understand contraindications to each type of stress test and evaluate for each
  - B. Review patient medications for contraindications to exercise stress testing
  - C. Conduct preoperative evaluation for orthopedic or other surgery
- 9. Obtain patient informed consent as required for nuclear cardiology procedures according to state law and hospital policy
  - A. Understand the ethical and legal guidelines of informed consent
  - B. Determine the capability of the patient to give informed consent
  - C. Explain the procedure to the patient, including all components of a valid informed consent
  - D. Obtain the patient's or guardian's signature
- 10. Conduct treadmill testing per all protocol options under the direction of the supervising physician
  - A. Prepare the patient for exercise protocol
  - B. Determine type of exercise stress test
  - C. Monitor electrocardiographic tracings and blood pressure for specific pathology and cardiac events during stress testing
  - D. Use the appropriate termination protocols
  - E. Calculate the Duke Treadmill Score

11. Prescribe and administer interventional drugs for pharmacologic stress under the direction of the supervising physician
  - A. Explain the indications and contraindications for each pharmacologic stress agent
  - B. Identify the physiologic action of each pharmacologic agent as it relates to stress testing
  - C. Calculate total dose, volume, and dose rate for each of the most common pharmacologic stress agents
  - D. Set up drug administration pump
  - E. Prepare pharmacologic agents for administration utilizing sterile technique
  - F. Administer pharmacologic agents
  - G. Monitor patient response to pharmacologic agents and treat the patient appropriately in the event of an adverse effect
12. Analyze results of the stress test and imaging portion of the examination and prepare a preliminary description of findings for the supervising physician
  - A. Create a preliminary description of findings detailing the results of the stress portion of the test
  - B. Examine rotating raw data from both stress and resting image acquisitions and evaluate image quality
  - C. Review data for incidental finding outside of the heart
  - D. Compare and contrast stress versus resting processed images for perfusion defects
  - E. Determine if the heart-to-lung ratio and transient ischemic dilation are abnormal
  - F. Evaluate the wall motion of stress and resting images for ejection fraction and kinetic abnormalities
  - G. Review and evaluate bull's eye polar maps and summed stress scores
  - H. Create a preliminary description of findings detailing the results of the imaging portion of the test
13. Facilitate or recommend patient-specific cardiac-related procedures based on nuclear cardiology examination results (outcomes management) according to the supervising physician
  - A. Order or facilitate scheduling of complementary diagnostic procedures as indicated
  - B. Identify the clinical pathways as outlined by the American Medical Association/American College of Cardiology for cardiac disease

## **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.

## **RADIATION SAFETY**

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

1. Maintaining compliance with all applicable regulations.
2. Performing appropriate radioactive contamination monitoring and decontamination procedures.
3. Disposing of radioactive waste in accordance with federal, state and institutional regulations.
4. Participating in programs designed to instruct other personnel about radiation hazards and principles of radiation safety.



## REFERENCES

1. SNMITS Socioeconomic Affairs Committee. Performance and Responsibility Guidelines for the Nuclear Medicine Technologist. *J Nucl Med Technol.* 2003;31:222–229.
2. Nuclear Medicine Technology Certification Board. Components of Preparedness. <http://www.nmtcb.org> > NUCLEAR MEDICINE EXAM > COMPONENTS OF PREPAREDNESS. Last accessed 07/18/07.
3. Blondeau K, Harten S, Pickett M, Bridges J. Critical Task Analysis Report. 2000. Nuclear Medicine Technology Certification Board, 3558 Habersham at Northlake, Bldg I, Tucker, GA 30084, board@nmtcb.org.
4. Joint Review Committee on Educational Programs in Nuclear Medicine Technology. *Essentials and Guidelines for an Accredited Educational Program for the Nuclear Medicine Technologist.* 2003. <http://jrcnmt.org/essentials.asp>. Last accessed 07/18/07.
5. American Registry of Radiologic Technologists. Task Inventory for Nuclear Medicine Technologist. 2005. <http://www.arrt.org/index.html?content=examinations/practiceanalysis/taskinventories.htm>. Last accessed 07/18/07.
6. American Society of Radiologic Technologists. Nuclear Medicine Practice Standards. 2000. [http://www.asrt.org/media/pdf/standards\\_nm.pdf](http://www.asrt.org/media/pdf/standards_nm.pdf). Last accessed 07/25/07.
7. SNMITS Nuclear Medicine Advanced Associate Curriculum Guide 2008, 1<sup>st</sup> edition. [http://interactive.snm.org/docs/Nuclear\\_Medicine\\_Advanced\\_Associate\\_Curriculum\\_Guide\\_1st\\_E.pdf](http://interactive.snm.org/docs/Nuclear_Medicine_Advanced_Associate_Curriculum_Guide_1st_E.pdf)