NMAA Exam Content Outline

I. Patient Care (Assessment, Management and Education)
   a. Patient Based Decision Making
      i. Patient and family education
      ii. Patient history and physical examination
      iii. Evaluation of Diagnostic and Laboratory Results
         1. Cardiac function and myocardial injury
         2. Hepatic function
         3. Pulmonary function
         4. Renal function and electrolytes
         5. Thyroid function
         6. Parathyroid function
         7. Complete Blood Count (CBC)
         8. Blood glucose
         9. Pregnancy tests (HCG)
      iv. Identify and implement a plan of care
         1. Order and administer sedation
         2. Alternative options
      v. Administration into existing catheters or routes
         a. VP shunts
         b. Central lines
         c. Intrathecal
         d. Intra arterial
      vi. Establish additional routes of administration
         a. Urinary catheter
         b. Feeding tube
         c. Rectal
         d. Subcutaneous port
         e. Intradermal
      vii. Monitor vital signs and physiologic parameters
      viii. Evaluate the need for contrast media

b. Systems Based Practice
   i. Medical/Legal/Professional/Government/Regulatory
      1. Standards for Informed Consent
      2. Elements of written directives
      3. HIPAA
      4. Medical events and incidents
   ii. Quality Assurance and Management
      1. Patient safety

c. Patient Emergency Management
   i. Provide supportive medical management
      1. Advanced life support
      2. Blood glucose management
      3. Contrast media reactions
      4. Allergic response
      5. Adverse response

II. Clinical Procedures
   a. Cross sectional imaging anatomy
   b. Pathophysiology
   c. Patterns of biodistribution for radiopharmaceuticals
   d. Identify and/or assess for each diagnostic procedure:
      i. Indications and Contraindications
      ii. Patient preparation
      iii. Existing correlative examinations
iv. Complications
v. Limitations
vi. Appropriate Radiopharmaceutical
vii. Radiopharmaceutical dose range
   1. Adjustment for patient size and age
viii. Route of administration
ix. Imaging technique
x. Image quality and need for additional imaging
xi. Quantitative data analysis
xii. Need for pharmacological interventions in nuclear medicine procedures (Appendix B- Adjunctive Drugs)

xi. Need for complementary/correlative diagnostic imaging procedures

e. Analyze Results
i. Assess image quality and other associated data
   1. Adequacy
   2. Artifact
   3. Incidental findings

f. Therapy
i. Identify and/or assess for each therapeutic procedure:
   1. Indications and Contraindications
   2. Patient preparation and informed consent
   3. Existing correlative examinations
   4. Complications
   5. Limitations
   6. Appropriate Radiopharmaceutical
   7. Radiopharmaceutical dose range
   8. Route of administration
   9. Dosimetry and dosimetric consequences
   10. Patient release requirements
   11. Need for complementary/correlative diagnostic imaging procedures

g. Nuclear Cardiology Stress Testing
i. Indications and Contraindications to stress testing
ii. Physiologic measures of stress capacity/ performance
iii. Treadmill operation
iv. Patient assessment and monitoring
v. Isometric exercise protocols
vi. Pharmacologic stress protocols
vii. ECG
viii. Acquisition
ix. Rate calculation
x. Normal and abnormal rhythms
xi. Heart blocks
xii. Indicators of ischemia and infarction
xiii. Identification of significant cardiac events during stress test
xiv. Interpretation
xv. Interventions
xvi. Endpoints

Appendix A Procedures- Diagnostic & Therapy

III. Diagnostic and Therapeutic Pharmaceuticals
a. Knowledge of drug characteristics:
   i. Mechanism of action
   ii. Indications of use
   iii. Contraindications
   iv. Appropriate management of adverse events and/or side effects
v. Appropriate follow-up and monitoring of pharmacologic effects  
vi. Drug toxicity  
vii. Cross reactivity of similar medications  

b. Special considerations for contrast media agents:  
i. Premedication  
ii. Hydration status  
iii. Renal status  
iv. Diseases of concern  
v. Incompatible medications  
vi. Allergies  
vii. Appropriate management of adverse events and/or side effects  
viii. Conflicts with other procedures (e.g. another contrast procedure)  

c. Methods to reduce medication errors  
d. Evaluating and reporting adverse drug events  
e. Pharmacology  

Appendix B- Adjunctive Drugs  
Appendix C- Radiopharmaceuticals  
Appendix D- Contrast Agents  

IV. Radiation Safety and Radiobiology in Clinical Practice  
a. Radiation Safety  
i. Understanding of absorbed dose principles  
   1. Knowledge of critical organ versus total body effective dose equivalent  
   2. Typical values from routine nuclear medicine procedures  
   3. Typical values from CT  
      a. Diagnostic versus attenuation correction  
      b. Pediatric versus adult  
      c. Dose units  
   ii. Methods to reduce patient exposure  
   iii. Methods to reduce occupational exposure  

b. Radiobiology  
i. Cell Growth and Division  
ii. Radiosensitivity of cells  
iii. Effects of radiation  
   1. Deterministic effects versus stochastic effects  
   2. Background radiation  
   3. Dose-response relationships  
   4. Skin effects  
   5. Acute radiation syndrome  
   6. Local tissue damage  
   7. Hematological effects  
   8. Carcinogenesis  
   9. Fetal effects  
   10. Genetic effects  
   11. Fertility effects  

iv. Dosimetry calculations  
   1. Fetal calculations  
   2. Organ calculations  
   3. Whole body calculations