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. Intra thecal
    - 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)
xiii. 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. <u>Diagnostic and Therapeutic Pharmaceuticals</u>

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