

Regional Anesthesia Fellowship at Wake Forest University

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Mission Statement:

The purpose of the fellowship in regional anesthesia at Wake Forest University is to educate individuals who become qualified and committed to enhancing and promoting the specialty of regional anesthesia and acute pain management.

Research activities, the development of educational methods, and advanced clinical care will be emphasized to achieve this Mission.

The fellowship is also designed to enhance the clinical experience of Wake Forest University residents in regional anesthesia and to contribute to the ongoing development of the specialty of regional anesthesia at Wake Forest University.

Eligible Applicants

The ideal candidate for the fellowship will have a strong clinical base in regional anesthesia and a professional commitment to build skills and competency suitable for the development of a regional anesthesia program at an academic institution.

Fellowship Training in Regional Anesthesia at Wake Forest University:

- Outline:**
- I. Scope of Training**
 - II. Duration of Training**
 - III. Institutional Organization**
 - IV. Program Director and Faculty**
 - V. Facilities and Resources**
 - VI. Competency-Based Goals and Objectives**
 - VII. Evaluation and Advising**

I. Scope of Training:

Regional anesthesia fellowship training is concentrated on the perioperative management of patients receiving neuraxial or peripheral neural blockade for anesthesia or analgesia. The program is designed to develop a base of expertise in the practice and theory of regional anesthesia, the organization of a consultant service, and the acquisition of operating room management skills as they relate to regional anesthesia. In addition, the fellow is expected to enhance their teaching abilities and their comprehension and incorporation of practice guidelines and research in the specialty.

II. Duration of Training

The time required for fellowship training in regional anesthesia is twelve months.

III. Institutional Organization:

A) The fellow functions in close relationship with our ACGME-accredited residency in anesthesiology which includes specific rotations in regional anesthesia and acute pain management.

B) There is no ACGME designation or certification for regional anesthesia fellowships to date, but the fellowship is recognized by the Wake Forest University Office of Graduate Medical Education.

C) The fellowship stipend would be supported in part by the fellow's activity as a junior faculty anesthesiologist, one day per week, in the Inpatient OR at North Carolina Baptist Hospital.

IV. Program Director and Faculty:

A) The Director of the fellowship training program is a Board-Certified anesthesiologist who has completed a fellowship in regional anesthesia.

B) All faculty are Board-Certified or in the examination system in Anesthesiology. The number of faculty supervising fellowship training in regional anesthesia is five to seven.

V. Resources:

A) A dedicated area adjacent to the operating rooms and specific to the provision of regional anesthesia techniques is provided for the education of residents and fellows. This area provides all the necessary elements as listed below for such education:

1. Separate patient care beds with full monitoring facilities and computerized electronic record-keeping
2. Dedicated nurses responsible for care of patients receiving regional anesthetics

3. Computer access to the Institutional Patient Information System for laboratory data, progress notes and consultations, and computerized order entry
4. Equipment necessary for the performance of current regional anesthesia techniques including nerve simulators, neuraxial and peripheral block and catheter supplies, and ultrasound machines.
5. Pharmacy supplies using an AcuDose system
6. Conference area for educational activities and the use of regional anesthesia teaching material and models.
7. A library dedicated to anesthesiology with literature specific to the practice of regional anesthesia is also maintained in the Department.

VI. Competency-Based Goals and Objectives

Program Goals:

Over the course of the 12 month fellowship, the fellow will enhance his or her cognitive, psychomotor, and affective skills to safely and effectively administer and teach regional anesthesia as a consultant in anesthesiology. The fellow will be responsible for decisions related to case and block selection to facilitate the smooth flow of OR cases and to enhance patient recovery. The fellow will be expected to have the skills needed to establish regional anesthesia and acute pain management as a primary component of his or her future practice in anesthesiology.

A.) Medical Knowledge

Upon completion of the program, the fellow should be able to:

1. Match specific patient and surgical procedure requirements to appropriate regional anesthesia selection. Debate the advantages/disadvantages of regional vs. general anesthesia for various procedures and patients in regard to patient recovery, patient outcome, operating room efficiency, and cost of care.
2. Use evidence-based medicine to select local anesthetics and adjuncts for neural blockade
 - Local Anesthetics
 - A. Discuss the pharmacokinetics of local anesthetics: absorption, distribution, metabolism, and excretion.
 - B. Discuss the site and mechanism of action of local anesthetics.
 - C. Discuss the chemical structure of amino-amides and amino-esters.
 - D. Describe the concept of minimum effective concentration

of local anesthetic (Cm.)

E. Discuss effective concentrations, toxic dosage, influence of site of injection, and vasoconstrictor use in regard to clinical practice.

F. Compare attributes of various local anesthetics: motor vs. sensory blocking discrimination and relative toxicity.

G. Discuss lipid solubility, protein binding, pKa and their influence on onset, potency, and duration of block.

H. Describe signs, symptoms and treatment of local anesthetic toxicity

3. Make sound clinical decisions in the administration of systemic and neuraxial opioids, NSAIDs, and non-opioid adjuncts for analgesia.

- Neuraxial Opioids

A. Discuss available drugs, effective dose, and duration of action.

B. Compare and contrast extended release epidural morphine with standard preservative-free opioids.

C. Discuss the incidence of complications and side effects, monitoring, prevention and therapy.

D. Describe the indications/contraindications for the use of neuraxial narcotics for acute pain management.

E. Describe the mechanism of action of neuraxial narcotics.

F. Differentiate intrathecal vs. epidural administration relative to dose, effect and side effects.

G. Differentiate between hydrophilic and hydrophobic drugs to include advantages/disadvantages.

- Systemic Opioids

A. Discuss the pharmacokinetics of opioid analgesics: bioavailability, absorption, distribution, metabolism, and excretion.

B. Discuss the site and mechanism of action of opioids.

C. Discuss the differences of chemical structure of the various opioids.

D. Describe challenges of post-procedure analgesic management in the patient with chronic pain and/or opioid tolerance

- Non-Opioid Adjuncts

A. Describe the concept of multimodal analgesia and its impact on functional restoration after surgery.

B. Discuss the pharmacology of NSAIDs, COX-2 inhibitors, NMDA antagonists, alpha-2 agonists, GABA-ergic agents with respect to optimizing postoperative analgesia.

4. Skillfully and efficiently describe and perform a wide variety of modern regional anesthesia techniques including single-shot and continuous peripheral nerve block, spinal and combined spinal-epidural anesthesia, thoracic epidural, and nerve stimulator- and ultrasound-guided approaches (See detailed list below).

Spinal Anesthesia

- A. Discuss the cardiovascular and pulmonary physiologic effects of spinal anesthesia.
- B. Discuss local anesthetics for intrathecal use: agents, dosage, surgical and total duration of action, and adjuvants.
- C. Describe “baricity” of spinal local anesthetic solutions, and the effect on block level.
- D. Describe the indications and contraindications for spinal anesthesia.
- E. Discuss side effects, complications and management: inadequate anesthesia, hypotension, and ventilatory insufficiency.
- F. Define post-dural puncture headache, and describe symptoms, etiology, risk factors and treatment.
- G. Discuss the use of spinal anesthesia in an ambulatory surgery setting.
- H. Explain the relative importance of factors affecting intensity, extent and duration of block such as dose, volume, and baricity of injectate.
- I. Describe differential blockade during neuraxial blockade.
- J. Describe advantages and disadvantages of continuous spinal anesthesia.

Epidural Anesthesia (Lumbar, Thoracic, Caudal)

- A. Discuss the physiology of epidural anesthesia.
- B. Describe the contents of the epidural space.
- C. Discuss the local anesthetics available for epidural use: agents, dosage, adjuncts, and duration of action.
- D. Differentiate between spinal and epidural anesthesia with regards to reliability, latency, duration, and segmental limitations.
- C. Describe the indications and contraindications for epidural anesthesia.
- D. Discuss side effects, complications and management: inadequate anesthesia, hypotension, total spinal, accidental dural puncture, systemic toxicity, and the use

of appropriate test dosing to minimize some of these complications.

- F. Describe the volume-segment relationship and the effect of patient age, pregnancy, position, and site of injection on resultant block.
- G. Discuss combined spinal-epidural anesthesia as distinguished from lumbar epidural anesthesia, including advantages/disadvantages, dose requirements, complications, indications and contraindications.
- H. Discuss caudal epidural and thoracic epidural anesthesia as distinguished from lumbar epidural anesthesia, including advantages/disadvantages, dose requirements, complications, indications and contraindications.

Nerve Localization Techniques

- A. Understand principles, operation, advantages and limitations of the peripheral nerve stimulator to identify and anesthetize peripheral nerves
- B. Understand principles, operation, advantages and limitations of ultrasound to identify and anesthetize peripheral nerves
Subcategories of knowledge in ultrasound include:
 - 1. Physics and technical aspects of image generation
 - 2. Machine controls for image optimization
 - 3. Transducer manipulation for image optimization
 - 4. Sonoanatomic appearance of nerves and other tissues
 - 5. Needle guidance approaches
 - 6. Injectate appearance and optimization

Upper Extremity Nerve Block

- A. Describe the anatomy of the brachial plexus in relation to sensory and motor innervation.
- B. Discuss local anesthetics for brachial plexus block: agents, dosage, duration of action, and adjuvants.
- C. Discuss side effects, complications, and management: inadequate anesthesia, systemic toxicity, blockade of adjacent neural structures (phrenic, sympathetic chain and neuraxis), neuropathy.
- D. Describe the various approaches to brachial plexus blockade, along with the indications/contraindications, advantages/disadvantages, and complications specific to each.

- E. Describe peripheral nerve block in the upper extremity of the median, ulnar and radial nerves, with indications, contraindications, and complications.
- F. Discuss the use and advantages/disadvantages nerve localizing techniques including transarterial, perivascular, nerve stimulator and paresthesia-seeking techniques.
- G. Discuss the use and advantages/disadvantages specific to continuous brachial plexus anesthesia.

Lower Extremity Nerve Block

- A. Describe anatomy of the lower extremity: sciatic, femoral, lateral femoral cutaneous, obturator nerves in relation to sensory and motor innervation.
- B. Discuss local anesthetics for lower extremity block: agents, dosage, duration of action, and adjuvants.
- C. Describe the various approaches to lower extremity blockade, along with the indications/contraindications, advantages/disadvantages, and complications specific to each.
- D. Discuss side effects, complications, and management of lower extremity blockade: inadequate analgesia, systemic toxicity, blockade of adjacent neural structures, and post-operative neuropathy.
- E. Differentiate individual blockade of the femoral, lateral femoral cutaneous, and obturator nerves from the anterior and posterior approaches to the lumbar plexus.
- F. Differentiate individual blockade of the tibial and peroneal nerves from the classic and popliteal approaches to the sciatic nerve.

Truncal Blockade

- A. Discuss the anatomy of intercostal, paravertebral, rectus sheath and transversus abdominus plane (TAP) blockade.
- B. Discuss local anesthetics for truncal blockade: agents, dosage, and duration of action.
- C. Discuss the indications and contraindications for truncal blockade.
- D. Discuss the side effects, complications, and management: inadequate anesthesia, systemic toxicity, and pneumothorax.

Intravenous Regional Anesthesia

- A. Discuss the mechanism of action of IVRA.
- B. Discuss agents for IVRA: local anesthetic choice, dosage, and use of adjuvants.
- C. Describe the indications and contraindications, advantages and disadvantages of IVRA.
- D. Discuss the complications and management: systemic toxicity, inadequate anesthesia, and phlebitis.

B) Patient Care

Upon completion of the program, the fellow should be able to:

- A) Demonstrate rational selection of regional anesthesia for specific clinical situations.
- B) Recognize and intervene to manage inadequate regional anesthetic techniques with supplemental blockade or alternate anesthetic approaches
- C) Properly prepare to manage rare but serious complications of regional anesthesia including local anesthetic toxicity and total spinal anesthesia.
- D) Properly perform and teach correct technique for many of the following listed regional blocks to achieve a high success and low complication rate:

1) Basic Techniques and Approaches:

- Superficial cervical plexus block
- Axillary brachial plexus block
- Intercostobrachial nerve block
- Wrist Block
- Intravenous regional anesthesia (Bier block)
- Saphenous nerve block
- Ankle block
- Spinal anesthesia
- Lumbar epidural anesthesia
- Combined spinal-epidural anesthesia
- Femoral nerve block

2) Intermediate Techniques and Approaches:

- Deep cervical plexus block
- Interscalene block
- Supraclavicular block
- Infraclavicular block

- Sciatic nerve block: posterior approaches
- Lumbar plexus block
- Popliteal block
- Suprascapular nerve block
- Intercostal nerve block
- Thoracic epidural anesthesia

3) Advanced Techniques and Approaches:

- Continuous interscalene block
- Continuous infraclavicular block
- Continuous axillary block
- Thoraco-lumbar paravertebral block: single or continuous
- Continuous femoral nerve block
- Sciatic nerve block: anterior approaches
- Obturator nerve block
- Continuous sciatic nerve block
- Continuous popliteal block: all approaches

E) Demonstrate the ability to lead acute pain rounds with attending supervision, while managing patients at the level of a consultant. Management will include multi-modal analgesic techniques such as neuraxial and peripheral nerve catheters, local anesthetics and narcotic infusions, and non-narcotic analgesic adjuvants. Indications, contraindications, side effects, potential complications, and daily management of patients on the acute pain service will be stressed.

C. Scholarly Activities / Practice-Based Learning

Upon completion of the program, the fellow should:

A) Academic Activities:

- 1) Participate in clinical research as a major activity of the year long fellowship.
- 2) Maintain the goal of publication of two clinical studies during the year.
- 3) Expect to 'guest review' manuscripts for the faculty who serve as editors of peer-reviewed journals to gain knowledge of manuscript preparation.

To accomplish these objectives, The RAAPM faculty will be committed to mentoring the fellow in the production of research, co-author papers as appropriate, and preparation of clinical research proposals with IRB approval prior to the start of the fellowship year.

B) Teaching Activities:

- 1) Present once during the second half of the fellowship year at Anesthesia Grand Rounds covering a topic or case relevant to regional anesthesia.
- 2) Prepare resident education lectures or journal reviews for the regional anesthesia subspecialty conference.
- 3) Participate and direct portions of the fresh cadaver anatomy labs organized for anesthesia residents as part of their annual curriculum.
- 4) Participate at the Annual American Society of Regional Anesthesia and Pain Medicine Meeting with poster, lecture, or problem-based learning presentations.
- 5) Learn teaching techniques by instructing residents at the bedside in the Regional Anesthesia Area under the supervision of faculty.
- 6) Learn teaching techniques by directing the APS during the last week of every month under the supervision of faculty.
- 7) Participate in the education of residents and student nurse anesthetists as part of the fellow's one-day per week clinical commitment in the general OR.
- 8) Review and enhance web-based teaching resources including the resident handbook, curriculum document, and self study and testing materials.

C) Practice-Based Learning:

- 1) Evaluate and apply evidence from scientific studies, and expert guidelines and practice pathways to their patient's health problems.
- 2) Use information technology to obtain and record patient information, access institutional and national policies and guidelines, and participate in self education.
- 3) Evaluate their own practice with respect to patient outcomes (esp. success and complications from regional block) and compare to available literature.

D) Interpersonal and Communication Skills:

Upon completion of the program, the fellow should be able to:

A) Provide information to the patient and family with respect to the options, alternatives, risks and benefits of regional anesthesia in a manner that is clear, understandable, ethical and appropriate.

B) Employ effective listening skills and answer questions appropriately in the process of obtaining informed consent.

C) Work effectively in a team environment, communicating and cooperating with surgeons, nurses, pharmacists, physical therapists and other members of the perioperative team. This requires the fellow to:

- 1) appreciate the roles of other members of the team
- 2) communicate clearly in a collegial manner that facilitates the achievement of care goals
- 3) help other members of the team to enhance the sharing of important information
- 4) formulate care plans that utilize the multidisciplinary team skills, such as a plan for facilitated recovery.

E) Professionalism

Upon completion of the program, the fellow should be able to:

A) Continuously conduct the practice of medicine with integrity, honesty, and accountability.

B) Demonstrate a commitment to life-long learning and excellence in practice.

C) Show consistent subjugation of self-interest to the good of the patient and the health care needs of society.

D) Show a commitment to ethical principles in providing care, obtaining informed consent, and maintaining patient confidentiality.

F) Systems-Based Practice

Upon completion of the program, the fellow should be able to:

A) Effectively balance the need for operating room efficiency with a high quality of patient care in the setting of a residency teaching program. The fellow will effectively choose surgeons, patients, techniques and

approaches to achieve the best balance possible in order to use regional anesthesia to improve recovery.

B) Understand the interaction of the Acute Pain Management Service with other elements of the health care system including primary surgical and medical teams, other consultant services, nursing, pharmacy, and physical therapy.

C) Demonstrate awareness of health care costs and resource allocation, and the impact of their choices on those costs and resources.

D) Advocate for the patient and their family within the health care system, and assist them in understanding and negotiating complexities in that system.

VII.) Evaluation and Advising:

A) As per ACGME Residency Guidelines, the attending faculty will be evaluated by the fellows twice annually.

B) Written web-based evaluations of fellows by all faculty with whom they have worked shall occur monthly. Evaluation in the areas of the six competency categories as related to regional anesthesia will be evaluated and reported to the clinical competence committee. The results of these evaluations shall be recorded and reviewed with the fellows by the program director no less often than every three months.

C) The Fellowship Director will meet with the Fellow at regular intervals to review performance, scholarly activity, and achievement of personal and program objectives.