Welcome to the Vanderbilt Regional Anesthesia Rotation. During this month, you will gain a significant portion of your regional anesthesia experience while at Vanderbilt. This rotation provides an excellent opportunity to learn regional anesthesia including ambulatory neuraxial anesthesia, peripheral nerve blocks, and peripheral nerve catheters. The emphasis is on applied regional anatomy, procedural techniques, indications and contraindications, communication between services, and perioperative care including postoperative pain management.

**OUTLINE**
I. Educational Goals
II. Goals and Educational Objectives
III. Procedural Guidelines
IV. Resident Responsibilities
V. Recommended Reading
VI. Evaluations

I. **Educational Goals:**
The Vanderbilt Regional Anesthesia rotation is designed to provide residents with the core knowledge and skill sets needed to practice advanced regional anesthesia effectively in both academic and private practices as a consultant in anesthesiology. It is also provides experience in management of outpatient perioperative services.

II. **Goals and Educational Objectives:**
A. **Professionalism:**
   a. Demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society that supersedes self-interest; accountability to patients, society, and the profession; and a commitment to excellence and on-going professional development.
   b. Demonstrate a commitment to ethical principles pertaining to confidentiality of patient information, and informed consent.
   c. Demonstrate sensitivity and responsiveness to patients’ culture, age, gender, and disabilities.
   d. Communication and coordination with the orthopedic service and staff.

B. **Practice-Based Learning and Improvement:**
   a. Engage in routine assessment of case outcomes and complications.
   b. Self-assessment, reflection and targeted improvement.
   c. Evaluate and assimilate scientific advances.
d. **Postoperative assessment on all block patients** and discuss any adverse outcomes with attending. Residents should ensure that blocks have completely resolved.

e. Initiate and/or provide proper care for complications resulting from regional anesthesia; assist in implementation of measures to avoid similar complications in future anesthetics.

f. Discuss daily performance and obtain feedback from attending.

g. Review literature relating to topics of acute pain and regional anesthesia.

h. Facilitate the learning of other residents and medical students.

### C. Communication and Interpersonal Skills; System-Based Practice

a. Communicate with the primary service regarding the primary anesthetic and pain management plan.

b. Coordinate NSC resources, including the CRNAs and other anesthesia personnel, to efficiently complete NSC procedures in a timely manner.

c. Discuss alternative pain management options, taking into consideration patient disposition and surgical plan.

d. Implement pain management strategies that are efficacious for the particular surgery and discharge from the NSC.

e. If applicable, communicate with the APS service regarding the pain management plan for patients with Continuous Peripheral Nerve Blocks (CPNBs).

f. Continue coordinated management of the patient with the surgical team postoperatively to optimize the patient’s course.

g. Coordinate management of patient complications related to regional procedures.

h. Residents must demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value. Residents are expected to practice cost-effective health care and resource allocation that does not compromise quality of care.

### D. Patient Care:

a. Accurately identify those patients who are good candidates for regional anesthesia and combined general/regional techniques.

b. Gather essential and accurate medical information about their patients, including a complete review of systems with emphasis on the cardiac, pulmonary, neurological, and hematologic systems.

c. Use this information to develop an optimal anesthetic plan (general vs. central regional vs. peripheral regional) based on the patient’s needs, surgical site, duration, and need for postoperative...
pain control.

d. Confirm that the patient has a signed surgical consent, anesthesia consent for regional anesthesia, and verify correct site.

e. Communicate effectively and accurately the risks and benefits of regional anesthesia in a manner that empowers the patient to give informed consent.

f. Provide an adequate degree of assurance, anxiolysis, and sedation while performing blocks.

g. Select which concentrations and mixtures of local anesthetics and adjuncts are appropriate for a given patient and operation.

h. Oversee perioperative patient care including pre-operative evaluation, intra-operative supervision of CRNAs, and PACU care.

i. Develop proficiency in performing the following regional procedures.

1. Spinal
2. Epidural
3. Combined Spinal Epidural
4. Continuous Spinal Anesthesia
5. Interscalene Block—classic and posterior
6. Supraclavicular Block
7. Infraclavicular Block
8. Axillary Block
9. Paravertebral Block
10. Lumbar Plexus Block
11. Sciatic Block
12. Femoral Block
13. Popliteal Block—Posterior and Lateral
14. Saphenous Block
15. Ankle Block
16. Intravenous regional anesthesia (Bier Block)
17. Wrist Block

j. Perform appropriate rescue blocks for any failed primary peripheral nerve block approach.

k. Demonstrate effective use of continuous peripheral nerve blocks using either nonstimulating or stimulating catheters.

l. Demonstrate use of nerve stimulator and stimuplex needles.

m. Demonstrate use of ultrasound for nerve blocks and perform appropriate nerve blocks under ultrasound guidance.

n. Articulate differences in various CPNB pumps available and choose proper pump settings. Educate the patient, family, and other health professionals in use of the pumps.

o. Efficiently evaluate patients in the holding room, perform blocks on the appropriate patients, and assist in the supervision of up to three operating rooms with CRNAs.

p. Communicate with the primary service regarding the pain management plan.
q. Supervise PACU care of patients until all patients have been discharged.

r. If applicable, communicate with the APS service regarding the pain management plan for patients that have ambulatory CPNBs.

E. Medical Knowledge:

Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognate (e.g. epidemiological and social-behavioral) sciences and the application of this knowledge to regional anesthesia. Residents are expected to demonstrate understanding at a deep level of all topics listed in the ABA content outline including basic science and clinical knowledge, with an emphasis on the following:

a. Anatomy and physiology of pain transmission, pain fibers, and pain pathways.

b. Deep understanding of applied anatomy relevant to regional anesthetic including the anatomy of vertebral column and spinal canal, dermatome (motor and sensory) anatomy, as well as peripheral nerve (motor and sensory) anatomy.

c. Pharmacology of local anesthetic drugs including chemical properties, protein binding, pKa, lipid solubility, absorption, and duration of action:
   1. Cocaine
   2. Procaine
   3. 2-Chloroprocaine
   4. Tetracaine
   5. Benzocaine
   6. Mepivacaine
   7. Prilocaine
   8. Bupivacaine
   9. Ropivacaine

   d. Pharmacology and practical application of adjuvants used with local anesthetic drugs:
      1. Epinephrine
      2. Opioids
      3. Clonidine
      4. Sodium bicarbonate
      5. Dexamethasone
      6. Ketorolac

   e. Factors associated with systemic toxicity:
      1. Site of injection
      2. Drug selection
      3. Dose
      4. Speed of injection
      5. Vasoconstrictors
      6. Co-existing diseases
f. Understand the physics and physiology of the peripheral nerve stimulator.
g. Understand the technical aspects of ultrasound regional anesthesia and the limitations of ultrasound.
h. Describe pharmacology and effective use of multimodal analgesia including ketamine, alpha 2 agonists, anticonvulsants, oral opioids, and NSAIDs.
i. Discuss the management of complications associated with regional anesthetic techniques:
   1. Local anesthetic toxicity
   2. Seizures
   3. Hematoma
   4. Total spinal
   5. Post-dural puncture headache
   6. Spinal hematoma or abscess
   7. Cauda equina syndrome
   8. Pneumothorax
   9. Nerve injury/paresis
   10. Failed block
   11. “Expected” complications, such as
      i. Phrenic nerve paralysis
      ii. Horner’s syndrome
      iii. Hoarseness

III. **Procedural Guidelines:**
A. Verify appropriateness of block with attending surgeon, anesthesiologist, and VOS attending.
B. All patients will have a completed pre-operative evaluation and consent in the chart prior to initiation of any regional technique.
C. Ensure block area is prepared for regional anesthesia procedures, including suction, O2 source, resuscitation bag-mask, airway equipment, **propofol and succinylcholine, and intralipid** immediately available.
D. Position the patient appropriately.
E. Perform a time-out to confirm correct patient, site of surgery, consent, and verify surgical mark.
F. Consider use of nasal cannula oxygen @ 2L per minute prior to sedation.
G. Apply monitors including pulse oximetry, ECG, and blood pressure.
H. Prepare solution for injection. 0.5% Ropivacaine or 1.5% Mepivacaine for USG blocks; clonidine 100mcg is frequently added. Reserve dexamethasone 4mg for nondiabetic patients who are having major surgery usually involving bone pain. Add 1:400,000 epinephrine for nerve stimulation only blocks.
I. Sedate patient with midazolam 1-5mg and ketamine 10mg and/or fentanyl 25-100 mcg.
J. Notify NSC attending.
Identify and mark landmarks.

Sterile prep, using Chloraprep and sterile gloves.

All procedures are done using sterile technique.

Anesthetize skin and subcutaneous tissues with 1% lidocaine.

Identify anatomy and target nerves using ultrasound (optional).

With attending present, begin localization of desired nerve(s).

Once desired twitches obtained if using nerve stimulator, begin slow injection of local anesthetic solution over 1-2 minutes with frequent aspiration.

Visualize spread of local anesthetic using ultrasound (optional).

When injection is completed, withdraw needle, verify hemostasis.

Dispose of all sharps and waste in designated container.

Continue ASA monitors for 30 minutes or until patient goes to the OR.

Check block efficacy including anticipated motor and sensory blockade before operation begins.

Follow up on block efficacy, complications after the case.

**IV. Resident Responsibilities:**

**A. 1st Day of Rotation:**

1. Take the Pre-rotation Regional Anesthesia Anatomy Quiz. Review with faculty during the rotation.
2. Participate in an intensive review of anatomy, risks and benefits, local anesthetics and adjuncts, nerve stimulation and ultrasound, and pumps and catheters. Ordinarily, this review will occur on the second day of the rotation as an extensive, 9 hour didactic session.
3. Participate in Simulation Training with the Blue Phantom and Ultrasound training using volunteers throughout the month.
4. Review the “Clinical Protocols for Nashville Surgery Center” which discusses in detail standard blocks and operating procedures for common surgical procedures and common regional anesthesia techniques.

**B. The day before:**

1. Residents will review the surgical schedule and review the preoperative evaluations. Challenging patients should be discussed with the attending.
2. Communicate with the front desk prior to 14:30hrs the priority for preparing patients for the next morning (checking in, paperwork, changing, IV access, etc).

**C. In the morning:**

1. Arrive between 6-6:30 to begin setting up equipment and drugs for first start blocks. Ensure block area is prepared for regional anesthesia procedures, including suction, O2 source, resuscitation bag-mask, airway equipment, propofol and succinylcholine, and emergency medications immediately available including phenylephrine, atropine, and intralipid.
2. Since there is no pharmacy at the NSC, opioids and benzodiazepines can be checked out from nursing staff or co-signed by another anesthesia provider prior to 0645hrs. Ketamine must be checked out as a separate 10ml vial from pharmacy.

3. The regional cart will be locked on arrival. The key is available in the hide-a-key behind the cart. Ensure the key is not misplaced.

4. Check Patient Tracker for schedule changes and potential blocks that were not listed on earlier schedules.

5. Discuss regional technique and pain control options with the patient and complete the pre-operative evaluation as well as a block specific written consent.

6. The first block should be started by 06:45 in order to allow time for multiple blocks to be completed by 07:30.

7. All blocks must be completed by their respective case start time.

8. At 07:30, go to the first case OR for induction. This is a great opportunity to receive additional intraoperative experience in a fast-paced, highly efficient operating room suite. Communicate block details with the CRNA in the OR.

9. All blocks will have notes written in StarPanel. There are templates for most blocks in StarNotes. Ensure that notes are accurate including drug, adjuncts, dose, level of current with nerve stimulation, use of ultrasound, sedation, and vital signs. Ensure that the “Indication” (“primary anesthesia” vs “postoperative analgesia” is consistent with Gas Chart documentation by discussing the attending prior to the note.

10. For CPNBs, see separate list of responsibilities regarding care of patients with ambulatory CPNBs in the “Clinical Protocol” document. Ensure we have 2 separate phone numbers for contacting patients with ambulatory CPNBs.

B. Throughout the day:
   1. Pre-op new patients after they have been checked in.
   2. Blocks may be done more than an hour in advance of a case start. If a regional technique is going to be the primary anesthetic, allow a minimum of 20-30 minutes for a block to set up.
   3. Follow case progression and anticipated finish times.
   4. Give breaks and lunches to CRNAs if necessary.
   5. You will also act as the PACU resident at the NSC, clearing for discharge, and handling the various issues that may arise.

C. At the end of the day:
   1. Ensure the regional carts are restocked if not performed by Anes Tech. Close and lock the regional cart.
   2. Return your controlled substance box to the nursing staff in charge of narcotics.

4. An attending must stay until the last patient leaves the surgicenter; once your work is complete for the day (printing and reviewing OR schedule for next day, completing all documentation from current day of surgery including redcap, calling all postop patients including home catheter patients) check out with the attending before leaving.

D. Postoperative Care:

1. **Single Shot Blocks:** On POD 1 or 2, call all patients to assess nausea/vomiting, block resolution, block duration, pain scores, and patient satisfaction. Record all information in REDCAP Database noted above.

2. **CPNBs:** All patients with indwelling CPNBs must be called every postop day until the catheter is out and their numbness or weakness is resolved. Check patients for satisfaction, analgesia, rescue analgesics for breakthrough pain, pump function, signs of infection, dislodgement, or leaking at the catheter site, fall risk, protection of the numb extremity; answer any questions relating to acute pain management. Record all information in the “Followup” section of Redcap, as well as in Star Panel as an “APS Encounter Note”.

3. **Discussion with the Attending Anesthesiologist.** Any patients with poor or fair patient satisfaction, complications or side effects, or residual block, and all CPNB patients must be discussed with an attending anesthesiologist every day.

V. **Recommended Reading:**

A. **Reference books:**


B. **Websites:**

3. Dartmouth’s Center for Ultrasound Guided Regional Anesthesia) http://www.dhmc.org/webpage.cfm?site_id=2&org_id=594&gsec_id=0&sec_id=0&item_id=33614


C. See topics covered in CD.

VI. Evaluations:
   A. Daily verbal feedback by each faculty after assessing the medical care provided each day as well as the documentation created by the resident.
   B. Evaluations of the resident will be completed by the attending staff and other perioperative staff during and at the conclusion of the rotation.
   D. Each resident will maintain a personal procedure log in RedCap Database that may be reviewed by the attending.