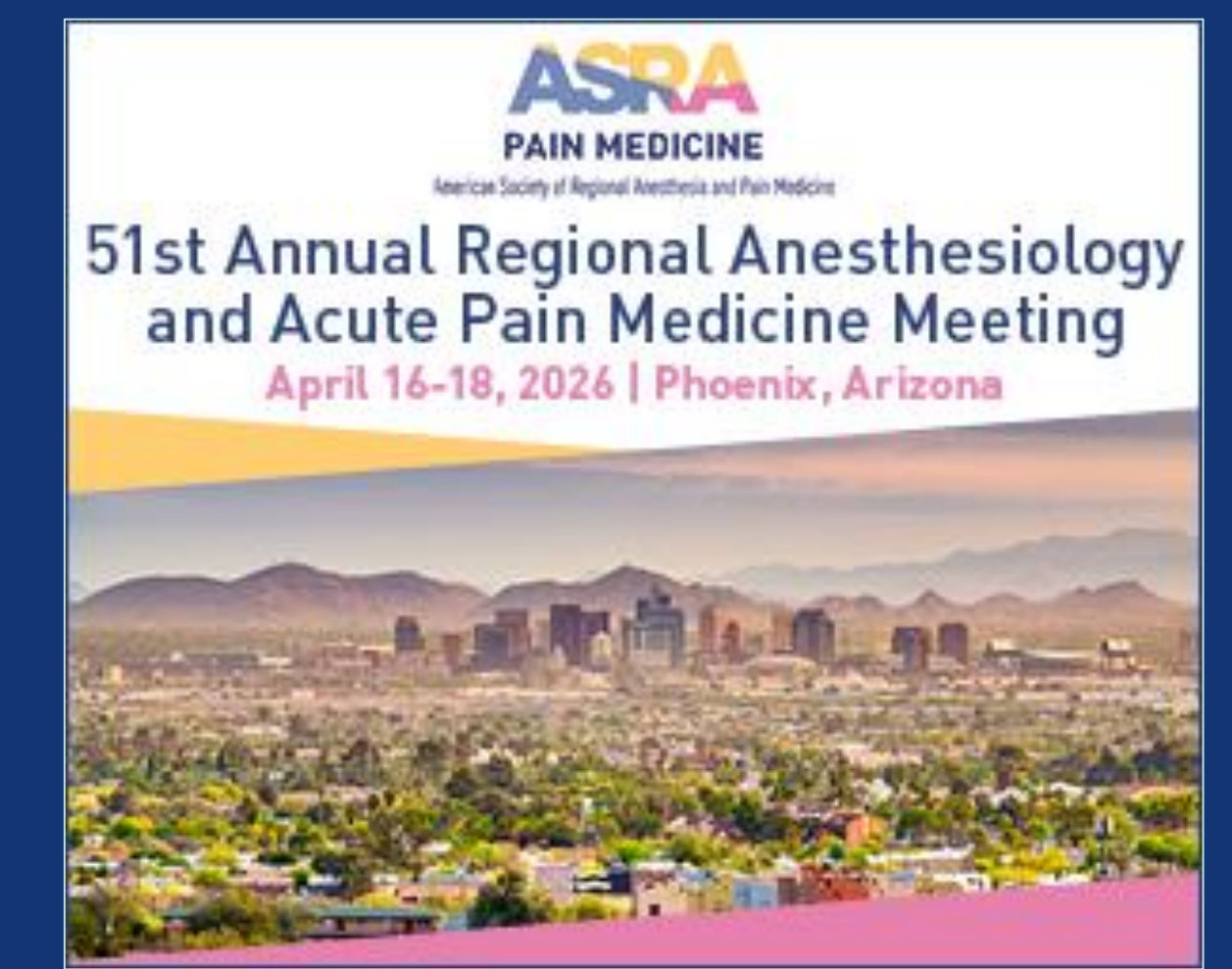




Background

Simulation-based education is increasingly recognized as a valuable modality for teaching regional anesthesia to residents in academic hospitals. Simulation offers a safe, reproducible, environment for skill acquisition and is associated with improved knowledge, technical proficiency, and confidence in performing regional anesthesia procedures.¹⁻⁵ However, there is no current formal simulation curriculum in anesthesia residency. We have created a proposed framework that integrates three core techniques: spinal anesthesia, ultrasound-guided nerve blocks, and thoracic epidural placement.

Methods

The skills will be divided into three sessions, best served during a resident's introductory exposure to regional anesthesia. Each session will be approximately 1 hour in length and overseen by faculty or regional anesthesia fellows. Once deemed proficient, residents will apply those skills to the clinical setting.

Results

Skill 1: Spinal Anesthesia (Using Task Trainer)

1. Positions patient appropriately (sitting or lateral)
2. Identifies correct intervertebral space (L3-L4 or L4-L5)
3. Demonstrates sterile technique (hand hygiene, PPE, prep, drape)
4. Identifies midline using palpation
5. Inserts introducer needle with correct angle and depth
6. Inserts spinal needle appropriately
7. Feels needle pass through ligament into intrathecal space
8. Recognizes CSF return and verbalizes confirmation
9. Administers appropriate dose of local anesthetic
10. Describes potential complications and management

Skill 2: Ultrasound-Guided Nerve Block (Using Gel Phantom)

1. Selects appropriate ultrasound probe and settings
2. Identifies relevant anatomical structures
3. Maintains proper probe orientation and image optimization
4. Demonstrates correct needle insertion (in-plane or out-of plane)
5. Visualizes needle tip throughout procedure
6. Simulates safe local anesthetic injections with knowledge of intended location of spread
7. Describes signs/symptoms and treatment of LAST
8. Implements safety steps: aspiration, incremental injection, dose limit

Skill 3: Thoracic Epidural (Using Task Trainer)

1. Uses appropriate positioning and patient instruction
2. Identifies appropriate interspace (e.g. T7-T9) or location
3. Demonstrates sterile technique
4. Inserts Tuohy needle with appropriate trajectory
5. Uses loss-of-resistance (LOR) technique correctly
6. Describes depth at which to leave catheter at skin based on LOR in the epidural space
7. Threads catheter without resistance
8. Verbalizes/simulates test dosing for safety
9. Discusses risk of high block, intrathecal/vascular placement

Discussion

Utilizing a simulation-based curricula with defined learning objectives enhances resident education and clinical performance in regional anesthesia. Simulation-based training improves technical proficiency, resident confidence, and clinical decision making, which may translate to safer and more effective patient care. While limitations include lack of simulator availability and funding, as well as challenges in creating a formal assessment, continued integration of simulation and technology-enhanced learning is a useful avenue to optimize training outcomes.

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