



Background

In critically ill patients, undertreated pain is linked to higher mortality, poor wound healing and increased sympathetic stress (1-2). Most ICUs favor opioid-heavy management, which comes with significant side effects including respiratory depression, ileus and delirium. The role of regional anesthesia in the ICU remains an underutilized analgesic modality within a larger multimodal approach (3) and there is a relative dearth of providers caring for ICU patients who are knowledgeable and competent in performing these procedures. Based on work from our institution, we have constructed an educational model to educate ICU providers about the most common regional procedures that could benefit surgical patients.

Methods

We created a slideshow presentation built off projects that focused on the most common regional techniques performed in the cardio-thoracic ICU (4-5). **We delineated the strengths, weaknesses, indications and notable risks (Figure 1) of each block accompanied anatomical and ultrasound images to aid our viewers in understanding how to perform each block.** This presentation was delivered orally as well as disseminated via email to the ICU fellows and Physician Assistants. We did not differentiate between those with a background in anesthesiology and those with training in another specialty. Data was acquired through an online Qualtrics survey. **We assessed knowledge about the blocks prior to and after learning the material and asked for feedback about the utility of this project and regional anesthesia in the ICU.**

Results

Based on our early responses, respondents answered more questions correctly about the blocks following the presentation than prior. They found the presentation to be useful (6/10) and believed that regional anesthesia is an important part of pain management in the ICU (6.5/10). There was a stronger agreement that offering more regional options to patients in the ICU would be beneficial to them (8.5/10).

Figure 1

Thoracic Regional Techniques

Neuraxial Thoracic Epidural Strengths - Continuous, dense, bilateral analgesia of the trunk/abdomen T5-T10 - Visceral, skin, and fascial coverage Weaknesses - Sympathectomy and hypotension - Patient positioning for procedure may be challenging - Contraindicated in coagulopathy and systemic infection Indications - Thoracic trauma and surgery below T4 - Major abdominal surgery - Cardiac surgery (with caution) Notable Risks - Failed block - Epidural hematoma or abscess - Post-dural puncture headache with accidental "wet tap"	Paravertebral Block Strengths - Dense, unilateral analgesia of <5 dermatomes +/- Catheter placement (bilateral or unilateral) - Visceral, skin, and fascial coverage - Less sympathectomy if unilateral compared to TEA Weaknesses - Contraindicated in coagulopathy - Patient positioning for procedure may be challenging - Deep imaging can be challenging to visualize - May require multiple levels to be blocked Indications - Thoracic trauma and surgery, including above T4 - Upper abdominal surgery - Cardiac surgery (with caution) Notable Risks - Accidental pneumothorax - Paravertebral/epidural hematoma - Inadvertent epidural or intrathecal injection	Erector Spinae Plane Block Strengths - Unilateral analgesia of 5+ dermatome levels +/- Catheter placement (bilateral or unilateral) - May use with anticoagulation/antiplatelet therapy - May be performed under general anesthesia Weaknesses - Inconsistent spread ("patchy") Indications - Thoracic trauma and surgery, including above T4 - Upper abdominal surgery - Cardiac surgery - Spine surgery Notable Risks - Accidental pneumothorax
Serratus Anterior Plane Block Strengths - Unilateral or Bilateral T2-T9 analgesia +/- Catheter placement - May be performed supine under general anesthesia Weaknesses - Lateral posterior coverage (sparing anterior/midline) Indications - Thoracic trauma and surgery - Breast surgery - Minimally invasive cardiac surgery Notable Risks - Vascular injury of thoracodorsal artery - Accidental pneumothorax	Intercostal Nerve Block Strengths - Superficial block anatomy - Dense unilateral analgesia of single dermatome Weaknesses - High systemic absorption of local anesthetic - Lack of spread between levels (requires multiple injections) Indications - Thoracic trauma and surgery, including above T4 - Upper abdominal surgery - Breast surgery Notable Risks - Local anesthetic toxicity (LAST) - Accidental pneumothorax	

Discussion

Many ICU providers lack the background about the types of regional modalities that could be useful for their patients and do not always know how to perform them. From the information we have collected so far, we see that providers in the ICU believe that these modalities are valuable and useful for their patients. We foresee molding a curriculum that includes hands-on workshops, problem-based learning, virtual reality for anatomy and skill building, and clinical time together with the regional team in perioperative settings. Our presentation serves as a foundation in educating the providers about using regional anesthesia for these critically ill patients.

References

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