Healthcare facilities across North America are experiencing a shortage of several formulations of bupivacaine affecting analgesia and anesthesia care, particularly for obstetric services. This editorial will discuss evidence-based considerations to address the bupivacaine shortage including interprofessional team engagement for planning, alternative anesthetic and analgesic management strategies for the obstetrical patient, and safe drug preparation. As leaders in healthcare, nurse anesthetists are encouraged to work closely with their anesthesia, pharmacy, obstetric, and facility leadership to develop best alternative solutions during this drug shortage to provide safe analgesic and anesthetic care.

**Keywords:** Bupivacaine shortage, drug shortage, obstetric anesthesia.

Healthcare facilities across North America are experiencing a shortage of several bupivacaine formulations affecting analgesia and anesthesia care, particularly for obstetric services. The US Food and Drug Administration (FDA) reports that the shortage is due to increases in drug demand and manufacturing delays from suppliers. Drug shortages are a concern for patient safety due to increased risk of medication errors, inappropriate substitution, lack of therapeutically acceptable drug regimens, and improper preparation of single-dose sterile drugs.

The purpose of this editorial is to provide evidenced-based guidance regarding alternative analgesic and anesthetic management strategies for the obstetrical patient to address the bupivacaine and other drug shortages that may occur. The following considerations do not supersede standards of practice, federal, state or local laws or regulations, or facility policy and do not guarantee specific outcomes.

**Drug Shortage Preparedness and Response**

Development of an interprofessional, collaborative drug supply management policy and procedure outlining how drug shortages will be identified, communicated, and addressed will best prepare the healthcare team to provide optimal care in the event of a drug shortage. Consider the establishment of an interprofessional team to monitor drug availability to proactively identify and address an anticipated or sudden drug shortage. In addition to anesthesia professionals, the team may include representatives from administration, pharmacy, and obstetrics. Inclusion of the finance and reimbursement team is important when there are budget implications due to unbudgeted increase in cost. The team may meet when a drug shortage has been identified to consider monthly neuraxial analgesia and anesthesia utilization rates to develop a comprehensive plan to optimize available drugs through drug and clinical management alternatives. The early identification of a pending or developing drug shortage provides the team time to prioritize the allocation and location of the remaining stock and develop and implement new practice changes (e.g., select alternative drug(s) or techniques) as necessary. In addition to resourcing a drug or drugs from existing purchasing channels, collaboration with other facilities and alternative purchasing channels may be considered. Communication of practice changes, drug availability information, related quality improvement data, and staff education are important for both staff engagement and patient safety during a shortage.
Safe Drug Preparation

Safe drug preparation practices are important in daily practice and even more important in the face of a drug shortage if staff is engaged in drug preparation.5,6 Drug preparation is always best accomplished by the facility or compounding pharmacy. AANA Safe Injection Guidelines for Needle and Syringe Use3 also provides detailed information regarding safe medication preparation and administration.

During the bupivacaine shortage, the facility pharmacy may offer the International Standards Organization (ISO) Class 5 conditions and staff with competencies to prepare single-dose, preservative-free, sterile syringes from large-volume single-dose vials of bupivacaine for administration to one patient.6,8 Pharmacy staff are trained and closely monitored to comply with United States Pharmacopeia Chapter <797> compounding procedures for sterile preparations, Centers for Disease Control and Prevention (CDC) guidance, and most recent regulatory requirements.7,9 Anesthetizing locations and staff do not meet these same requirements. An alternative is for the facility pharmacy to consider the purchase of pre-filled, pre-labeled syringes from a compounding pharmacy.

Alternative Analgesia and Anesthesia Strategies

The Society for Obstetric Anesthesia and Perinatology (SOAP) Advisory in Response to Shortages of Local Anesthetics in North America2 provides possible alternative strategies related to the bupivacaine shortage, which described in Table. An additional alternative to bupivacaine not mentioned in the advisory is spinal tetracaine, typically administered at 10–12 mg in 0.5% solution with 5% dextrose.12 Tetracaine with dextrose has a duration of approximately two to three hours.12

It is important to note that an isobaric block has a slower (more unpredictable) onset and a slightly longer duration of action compared to hyperbaric bupivacaine.10,11,13,14 In addition, there may be an inevitable upward spread of local anesthetic that may result in a slightly higher sensory level due to the absence of hyperbaric local anesthetic in the dependent thoracic curve preventing cephalad spread of isobaric bupivacaine.15

MedPro Group, a malpractice insurer who works in conjunction with AANA Insurance Services, has noted that off-label use of preservative-free isobaric bupivacaine that is labeled ‘not for spinal use,’ is a viable substitute medication for hyperbaric bupivacaine during the shortage, due to its safe widespread use as a spinal anesthetic.

A multimodal approach to analgesia may be considered to minimize the use of opioids and improve the effectiveness of the neuraxial block. The AANA’s Analgesia and Anesthesia for the Obstetric Patient Practice Guidelines provide detailed guidance on the use of multimodal obstetric analgesia and methods to mitigate the need for supplemental opioids.

Continued Shortage Monitoring and Reporting

The AANA continues to monitor the bupivacaine shortage and will post
relevant information on the webpage: www.aana.com/bupivacaineshortage. Information concerning other anesthesia-related drug shortages is available at www.aana.com/fda. Nurse anesthetists can also sign up to receive drug shortage notices directly from the FDA at http://go.fda.gov/subscribemanagement. If your facility is experiencing a shortage, report it to drugshortages@fda.hhs.gov to help the FDA gauge the extent of the shortage. The FDA may not respond to your communication.

Conclusion
Nurse anesthetists use safe injection practices to provide safe analgesic and anesthetic care for patients.4 During drug shortages, it is important to develop strategies to continue providing safe neuraxial labor analgesia and surgical anesthesia through therapeutically equivalent medications and techniques.4 Nurse anesthetists are encouraged to collaborate with their pharmacy and the interprofessional team to prepare for and address drug shortages by monitoring drug availability, providing continued communication, assessing alternative medication options, following safe drug preparation and injection procedures, and educating staff to deliver high quality analgesia and anesthesia care. The Society for Obstetric Anesthesia and Perinatology (SOAP) Advisory in Response to Shortages of Local Anesthetics in North America,2 listed in the resources below, provides specific important information about the bupivacaine shortage as it relates to obstetric practice. Send questions or practice considerations regarding the bupivacaine or other analgesic or anesthetic shortages to the AANA Professional Practice Division at practice@aana.com or 847-655-8870.

RESOURCES
• Society for Obstetric Anesthesia and Perinatology (SOAP) Advisory in Response to Shortages of Local Anesthetics in North America
• American Society of Health-System Pharmacists Guidelines on Managing Drug Product Shortages in Hospitals and Health Systems
• AANA Safe Injection Guidelines for Needle and Syringe Use
• AANA USP Chapter <797> and Anesthesia Practice

REFERENCES

AUTHORS
Brian Kasson, MHS, CRNA, is assistant clinical professor at Northern Kentucky University, Highland Heights, Kentucky. Email: bklasson@nku.edu.

Victoria Hledin, MPH, is a research analyst for the American Association of Nurse Anesthetists (AANA), Park Ridge, Illinois, providing research support for AANA Practice Committee activities. Email: vhledin@aana.com.

Beth Clayton, DNP, MS, CRNA, is assistant professor of clinical nursing and program director of the Nurse Anesthesia Specialty at the University of Maryland School of Nursing, Baltimore, Maryland. Email: pclerigmi@umaryland.edu.

Joseph Pellegrini, PhD, CRNA, FAAN, is associate professor and program director of the Nurse Anesthesia Specialty at the University of Cincinnati College of Nursing, Cincinnati, Ohio. Email: claytonbua@ucmail.uc.edu.

Lynn Reede, DNP, MBA, CRNA, FNAP, is chief clinical officer for the AANA, providing staff leadership to the AANA Practice Committee in the development and revision of evidence-based anesthesia clinical practice guidelines, position statements, standards, and member resources. Email: lrede@aana.com.

DISCLOSURES
The authors have declared no financial relationships with any commercial entity related to the content of this article. The authors did discuss off-label use within the article.

ACKNOWLEDGEMENT
Thank you to the Society for Obstetric Anesthesia and Perinatology (SOAP) for permitting the AANA to reproduce information from the SOAP Advisory in Response to Shortages of Local Anesthetics in North America.