



Case Study: Using **Intelligent Ambulatory Pumps** for Perineural Local Anesthetic Infusions

SAFE AND EFFECTIVE PAIN MANAGEMENT IS A PRIORITY FOR ANY HOSPITAL, and many institutions, including UPMC Shadyside, have implemented specialized technologies and administration techniques as a means to meet this end. Located in Pittsburgh, our hospital is a 486-bed, tertiary-care hospital offering a variety of services, including primary medical care; medical cardiology and cardiothoracic surgery; oncology, and surgical oncology; orthopaedics; vascular medicine and surgery; urology; general surgery; and neurosurgery.

Our pain management team currently uses Smiths Medical's CADD-Prizm PCS II pumps to administer perineural local anesthetic infusions, also known as continuous nerve block infusions. Local anesthetic is delivered via a tiny catheter to the area around the nerve, blocking the conduction of nociceptive pain signals before the stimulus reaches the brain. The catheters are inserted immediately before surgery and are used for bolus doses of local anesthetics during surgery. Postoperatively, infusions of a lower concentration of local anesthetic are started in the recovery room. These infusions are administered for several days, with the length of therapy depending on the surgical procedure. For instance, total knee replacement surgeries are usually followed with a three-day femoral perineural infusion and a two-day sciatic perineural infusion. Surgical oncology usually keeps paravertebral catheters in place for several days, until the patient is able to take PO pain medications. And cardiothoracic surgical patients usually receive paravertebral blocks for several days, until the chest tubes can be removed.

Peripheral nerve block infusions are part of a multimodal pain management, or "balanced" analgesia, model. The objective of this pain management model is to use a combination of analgesics from different drug classes (celecoxib, pregabalin, opioids, and low-dose anesthetic agents, like bupivacaine and ropivacaine), along with regional anesthetic/analgesic techniques using local anesthetics. The application of multimodal pharmacotherapy results in reduced doses of these drugs, thereby providing more effective analgesia with fewer side effects than using one agent alone.

For example, reducing the amount of opioids required needed to control pain decreases the side effects of nausea, vomiting, and more importantly, respiratory depression. These combined strategies work at various stages of transduction, transmission, perception, and modulation of pain. There are, however, the rare side effects of nerve injury and local anesthetic toxicity, and the more common side effect of leg and arm weakness, when used for orthopaedic surgery.

Pump Selection

Ambulatory pumps are particularly well suited to the administration of peripheral

nerve block infusions because of their small size, which makes it much easier for patients to move about during infusions, promoting early ambulation.

We selected the CADD-Prizm PCS II as our new ambulatory pump for its small, easy-to-transport size; its ease of use and easy-to-read screen; and the end-user support offered by Smiths Medical. During the purchase process, pharmacy's input ensured that our ropivacaine bags could fit in the pumps' drug reservoir. We ran a pilot study with patients from a specialty orthopaedic unit and then surveyed the PACU and orthopaedic nurses to determine if the CADD-Prizm met their needs and expectations. Once confirming that it did, we rolled the pumps out facility wide.



Photos courtesy of Smiths Medical

Training, Implementation, and Use

It is always a challenge to introduce a new piece of equipment to your entire nursing staff. Covering all units and all shifts can be a daunting task. Because the CADD-Prizm PCS II pumps were completely new pieces of equipment for our staff, we needed house-wide in-services. For nearly two weeks, Smiths Medical offered around-the-clock, in-house trainers who went from unit to unit to familiarize our nurses with the new pumps. The trainers also offered some centralized in-services. There is a great need to focus training on users who do not see patients with nerve blocks on a regular basis, and to in-service the staff at all times of the day and night. After our training program, most of our nurses found the pumps easy to work with.

In addition to that initial equipment training, UPMC Shadyside now provides nurses with a self-learning module on nerve blocks, as well a skills checklist for the pumps, provided and modified by Smith's Medical. These two components make up our annual competency for using the CADD-Prizm for peripheral nerve block infusions.

To ensure a smooth implementation at your facility, I recommend starting the roll-out on a high-use unit. Train the nurses on that unit as "system experts," who can then help other units with their transition to the new pumps as needed. All in all, the pumps provide reliable drug delivery to our patients with no nuisance alarms. Nurses appreciate their ease of use, and our patients appreciate their portability.

In order to ensure that we have the necessary medications to meet the demands of our patient census, our pharmacy department tracks the number of estimated bags of anesthetic against our OR schedule on a daily basis. Using our past inventory requirements as a guide, pharmacy uses the surgery schedule to estimate the num-

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ber of ropivacaine bags we will need, as well as the appropriate concentrations. Patients with a known allergy to local anesthetics do not receive nerve blocks for surgery. Because we perform a high-volume of peripheral nerve block infusions, we contract with an outside vendor for our ropivacaine bags.

In most instances, our recovery room nurses perform the initial pump programming according to the physician order. Nurses working on the units are responsible for rate changes and/or bolus doses to address the patient's pain score during the postoperative period. A team of physicians standardizes the doses through specialized order sets, and all order sets are reviewed by the P&T committee.

Conclusion

Our use of the Smiths CADD-Prizm PCS II ambulatory pumps has improved pain management through the delivery of regional analgesia and patient safety at our hospital, and our nursing and pharmacy staff has been satisfied with the integration of the new pumps into their workflow. The CADD-Prizm pumps have been an effective and reliable means of delivering necessary medications after catheters have been inserted. Our postoperative patients use less opioids, because they receive the multimodal or balanced plan for analgesia, including the nerve block infusion. In implementing ambulatory pumps for nerve block infusions – or any new equipment, for that matter – always solicit end-user input. Your implementation will be much more successful if the end-users have a hand in the equipment's selection. ■

Lois Pizzi, BSN, has served as the acute and chronic inpatient pain coordinator for UPMC Shadyside for four and half years. Prior to assuming her current post, she was a primary nurse care coordinator and staff nurse on an orthopaedic unit. Pizzi earned a diploma from Shadyside Hospital School of Nursing and a BS in nursing from the University of Pittsburgh. She is also a board-certified pain management nurse.

Web Resources:

For more information on nerve block infusions, visit www.regionalblock.com

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	North America	Europe	Asia
Tel	201 684 1800	+45 87 400 220	+65 6468 9433
Fax	201 684 1801	+45 87 400 222	+65 6468 6772
E-mail	info@texwipe.com	europa@texwipe.com	asia@texwipe.com

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