Regional anesthesia has strong outcomes for care, efficiencies

Patients who have surgery today are more likely to be awake during their procedures, thanks to regional anesthesia. Rather than being intubated and given inhalational anesthesia, patients have a nerve block that numbs the surgical region plus some sedation.

Among benefits—better pain control with less use of opioids, less nausea and vomiting, shorter recovery stays, and fewer hospital admissions.

There could be big economic benefits as well. A cost analysis from one hospital finds that converting its 3,000 annual invasive outpatient orthopedic procedures from general gas anesthesia to nerve blocks could save over $1 million a year.

There are some obstacles—critics say regional anesthesia is time-consuming, not easy to learn, and has its own risks.

Reimbursement has lagged, dampening anesthesia providers’ enthusiasm.

But advocates say many of the shortcomings can be overcome with planning and education.

OR Manager talked with experts about what is needed to plan and implement a safe, effective program for regional anesthesia.

Blocking the pain

Types of regional anesthesia include:

- epidural and spinal anesthesia (ie, neuraxial anesthesia or central blockade)
- peripheral nerve blocks (such as axillary, interscalene, and femoral blocks).

Peripheral nerve block is the best option, if possible, according to a study by Klein and Buckenmaier. A single-injection block lasts about 12 to 18 hours, whereas a continuous block can provide postoperative pain relief for 2 to 3 days. Outpatients can use patient-controlled regional anesthesia (PCRA) pumps to deliver local anesthetic. When the pump reservoir is empty, the patient removes the catheter and begins taking oral analgesics.

An old technique returns

Women have been receiving epidurals for childbirth since the 1970s, but regional anesthesia is much older than that.

A century ago, all operations were done under peripheral nerve block because it was the safest option, says Terese Horlocker, MD, professor of anesthesiology at the Mayo Clinic in Rochester, Minn, and president of the American Society of Regional Anesthesia & Pain Medicine (ASRA, www.asra.com).

As general and spinal anesthesia became safer, they replaced peripheral blocks, which require more injections, local anesthetic, and technical skill.

"Now we’ve kind of come back to the old techniques again," she tells OR Manager.

Currently, regional anesthesia is used predominantly in orthopedics to numb only the extremity in question. According to ASRA, about 30% of patients request regional anesthesia for their orthopedic procedures. Regional anesthesia is also used:

- in plastic surgery, particularly for breast operations such as mastectomy
- obstetrics and gynecology
- cardiac procedures.

Thoracic and abdominal surgery usually include light general anesthesia in combination with regional anesthesia.

Reduced pain and opioid use

Local anesthetics given before surgery can reduce or eliminate the need for opioids and avoid side effects such as nausea and vomiting, respiratory depression, drowsiness, and constipation.
In knee operations, 14% of patients had nausea and vomiting after regional anesthesia versus 36% after general anesthesia, according to a report by Brian Williams, MD, MBA, and his colleagues at the University of Pittsburgh Medical Center.

Horlocker finds nerve blocks “last so long and provide such adequate pain relief, that the only thing patients need in addition to the blocks are oral analgesics—they never need morphine PCA as they would have in the past.”

More efficient process

Not only do nerve blocks mean more comfortable patients—they can also mean a more efficient, cost-effective surgical process.

In a new report, Dr Williams and his team compared 5 types of anesthesia plans for anterior cruciate ligament (ACL) repair. By using peripheral nerve blocks rather than the usual gas anesthesia without a nerve block, they found that:

- 82% of nerve-block patients by-passed the Phase I postanesthesia care unit (PACU)
- unplanned hospital admissions were reduced from 17% to 4% and less.

The nerve-block scenario was associated with cost reductions of:

- 12% from bypassing the PACU ($420 per patient)
- 11% from avoiding hospital admission ($385 per patient).

Patients who stayed in the PACU were more likely to have pain (48% versus 14%) and needed more nursing care for pain and nausea and vomiting.

Hitting pain where it lives

External pain pumps are one method for helping patients cope with postoperative pain without the side effects of opioids like morphine. The devices were first designed for cancer patients but now are used primarily for patients recovering from orthopedic surgery, cardiology, and obstetrics.

Infuser pump releases a continuous flow of medication over several days.

Catheters can supply local anesthetic to nerves.

Extra dosage can be self-administered by pressing a button.

...or they are inserted directly into the wound, bathing the area in medication.

Illustration by Thomas McKay, Denver Post.
Sources: McKinley Medical, Denver Post. Reprinted with permission.
The observational study of 948 patients was conducted over 4 years.

Based on this experience, Dr Williams estimated that converting all of the hospital’s 3,000 annual invasive outpatient orthopedic procedures from gas anesthesia with no nerve block to nerve blocks could save the hospital $1.2 million annually.

At a facility that does a high volume of outpatient orthopedic cases and can make a wholesale shift to regional anesthesia, “the cost savings can be tremendous,” he says.

Franklin Dexter, MD, PhD, a researcher on OR efficiency who published an analysis on the subject in 1999, adds, “This increase in the PACU bypass rate is more than enough to result in financially important reductions in perioperative costs.”

But even hospitals with extensive regional anesthesia programs don’t often use PACU bypass, Dr Dexter notes.

“That’s important because intermittent use of Phase I PACU bypass does not reduce costs. It has to be a sustained program used for almost all eligible cases. That way, staffing can be adjusted.”

That requires anesthesia providers skilled in regional and ambulatory anesthesia and policies that can streamline postoperative care.

**Impact on OR time**

When nerve blocks are performed outside the OR before a case begins, use of regional anesthesia reduces anesthesia-controlled time by an average of 9 minutes compared with general anesthesia, Dr Williams and his group showed in a 2000 process analysis.

Regional anesthesia does not increase surgical time versus general anesthesia when averaged over many different orthopedic procedures, a meta-analysis by Dr Dexter and his colleagues found.

“There definitely is not an increase in OR time with regional anesthesia; rather, it is just the opposite,” notes Dr Dexter, who is at the University of Iowa.

Though reductions in OR time are statistically significant, he adds, they are not likely to be great enough to increase overall OR efficiency in a financially important way in a busy surgical suite, as he demonstrated in 1995 and 2003 studies.

The principal economic benefit is in the improved postoperative recovery.

**Special skills needed**

Regional anesthesia is labor intensive and requires special skills. The type of block and nerve distribution must be determined correctly. Typically, a nerve stimulator is used to locate the appropriate nerve.

In knee surgery, the anesthesia team and surgeon need to work together to define the intensity of the procedure, nerves to be blocked, and single injection versus continuous infusions and combinations, Dr Williams explains. A single block may take 10 to 15 minutes, while a continuous catheter block could take 20 to 60 minutes.

He cautions against overtreating patients with nerve blocks because every block procedure carries a small but important risk of nerve damage. Estimates of nerve damage range from 2 per 10,000 to 4 per 1,000 patients.

Other considerations include the patient’s age, health status, anesthesia history, previous drug reactions, any history of chronic pain, and type and extent of surgery.

**A framework for change**

Making the shift from general anesthesia to regional anesthesia is a cultural change that takes a team effort, Dr Williams says.

Over 1 1/2 years, his facility was able to convert ACL patients from 85% gas anesthesia with opioids to 85% regional anesthesia. A framework for change is described in his 2002 article in *Best Practice & Research Clinical Anesthesiology*, which includes a chart on applying the Plan-Do-Check-Act cycle.

Some obstacles to regional anesthesia include:

- traditional practice patterns of anesthesiologists who may see no incentive to change
• concerns of surgeons about potential nerve-block failures, time to perform blocks if done in the OR, patients being awake during surgery, and adequate muscle relaxation
• changes in nursing practice, including patient teaching before surgery and PACU bypass.

Changes for nursing

Before an operation, nurses assist with blocks and help position patients. After surgery, they perform neurovascular checks, monitor the limb to prevent pressure sores, help with ambulation, check for catheter leaks and local anesthetic toxicity, and give additional medication if necessary.

Communication between nurses and physicians is key, Horlocker says: “It’s very important that nurses are aware of what the expectations are from the anesthesiologist and the surgeon. If these blocks are done, how long they are going to last, and which parts specifically are supposed to be numb.”

PACU staff need to “learn as much as possible about regional anesthetics, specifically the techniques utilized by the anesthesiologists, medications, and preparation for any side effects,” advises David Miller, RN, unit director of the PACU at Presbyterian University Hospital and Montefiore University Hospital, University of Pittsburgh Medical Center.

The best education, he believes, is through in-services with anesthesiologists.

Horlocker says that at her institution, it only took about 3 or 4 weeks to get up to speed with the protocol and for nurses to become comfortable with regional anesthesia.

“When everybody got on the same page, it was incredible” in benefits to the patient, she says. Because patients have no nausea and ambulate sooner, she believes regional anesthesia “is just perfect from the nursing standpoint—it has decreased the level of intensity of their interventions, and it has really made their life a lot easier.”

Where should blocks be done?

To avoid taking time in the OR, nerve blocks can be performed in an induction room, the holding area, or the PACU.

Dr Williams performs blocks in the PACU in the community hospital where he currently works. Because patients having nerve blocks require less time in the PACU, more of that space is freed up for administering the blocks. But for this arrangement to work, a significant proportion of patients need to be converted to regional anesthesia.

In a large hospital main OR where he previously worked, a sitting room was converted to a nerve-block induction area. The space does not need to be large.

“If you have small portable monitors with oxygen and resuscitation equipment available, you really have what you need,” he says.

Bypassing the Phase I PACU

With regional anesthesia, anesthesiologists generally give “light” general anesthesia, typically with propofol and an anesthetic mask or LMA (laryngeal mask airway), Dr Dexter notes. The propofol is turned off at the start of wound closure. Patients start waking up and undergoing Phase I recovery while still in the OR, which is why they are so often able to bypass the Phase I PACU.

The difference in patients in the PACU is remarkable, Miller says. “They come out in a more awake state. There’s not a question of emergence problems or emergence delirium. You have stable vital signs in those cases, and pain is not an issue as the extremity is generally nice and numb.” The PACU’s interaction with them is about 15 minutes compared with 1 to 2 hours for inhalational general anesthesia.

Dr Williams has established a scoring system for determining which outpatients are eligible for PACU bypass, which is in his 2000 article in Anesthesiology. According to the bypass criteria, patients having a regional anesthetic do not need to be admitted to Phase I recovery if they are awake, their vital signs are stable, they are breathing well, their oxygen saturations are OK, there doesn’t appear
to be a surgical complication, and the attending anesthesiologist is in agreement to have them bypass.

**Keeping patients safe at home**

Patients with an extremity nerve block lose their pain reflex for 24 hours or more, raising concerns about falls, trauma, and immobility. Studies have found discharge with a numb limb is safe, however. Klein and Buckenmaier showed the rate of accidental injury or block complication was only 0.2% in more than 2,000 patients having long-acting peripheral nerve block with ropivacaine in the arm or leg.

Patients need careful instruction and discharge planning (sidebar).

The safety of anticoagulation with regional anesthesia has been questioned. Surgical patients often receive anticoagulation therapy to prevent deep vein thrombosis and pulmonary embolism. Epidural anesthesia can be safely given with unfractionated subcutaneous heparin, but low-molecular-weight heparin should be used with caution. Sufficient time must be allowed between the start of the spinal or epidural and the start of anticoagulation, and patients must be monitored closely.

**Reimbursement**

Unfortunately, reimbursement for anesthesiologists hasn’t kept up with the progress in regional techniques.

New CPT codes for nerve blocks and nerve block catheters were approved in 2003 and were assigned a reasonable number of anesthesia billing units.

But negotiated rates and payments from third-party payers are inconsistent, in Dr Williams’s experience.

“Sometimes it feels like roulette—sometimes you get paid nothing, and sometimes you are paid the full value. It is very frustrating,” he says.

Though the government published guidelines for acute pain management in 1992, and the Joint Commission on Accreditation of Healthcare Organizations emphasizes pain relief, physicians say payers still don’t adequately recognize the importance of pain treatments.

**Regional anesthesia’s appeal**

Most anesthesiologists use regional anesthesia only occasionally, and most residency programs include limited training in peripheral nerve blocks. But use may increase as workshops become more common, such as those held by ASRA and at the Regional Anesthesia Study Center of Iowa.

Dr Williams says it doesn’t take long for a practitioner to see the appeal because of the difference regional techniques make in pain management and in minimizing other symptoms such as nausea, vomiting, and drowsiness.

Once anesthesiologists are converted, they rarely go back to traditional general endotracheal anesthesia because they find their professional satisfaction is enhanced by the quality of care they are delivering and patient satisfaction, he notes.

Horlocker is equally enthusiastic: “It’s a win-win situation—the surgeons love it, the nurses love it, the patients love it, and we anesthesiologists love doing these.”

—Laura J. Ninger, ELS

—Pat Patterson

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OR Manager thanks Franklin Dexter, MD, PhD, of the University of Iowa, for his assistance with this article.

**References**


A regional anesthesia-friendly process

Advice for change from Brian Williams, MD, of the University of Pittsburgh:

• “Think outside the box.” Physicians and staff need to brainstorm and question existing practices. Every process of perioperative care is subject to change and needs a team-oriented plan.
• Organize a team with an anesthesiologist as the team leader.
• Seek buy-in by all parties involved, with an extensive effort to build consensus, both from the grassroots and senior administration.
• Set a goal, such as converting 50% of outpatient invasive orthopedic procedures within the first year.
• Collect data to compare outcomes for procedures performed with nerve block with gas anesthesia without nerve block.
• Consider indicators such as:
  — “anesthesia-controlled” time in the OR
  — PACU admissions
  — unplanned hospital admissions
  — nursing interventions for nausea and vomiting and pain in the PACU
  — patient satisfaction.

Once physicians begin to see the outcomes from the nerve-block procedures, they may be willing to go a step further and agree on a preferred regional anesthesia technique. Then the team can organize education for physicians and staff and begin developing policies, standard orders, and patient education materials to support the transition.

“It does require a combination of grassroots management and top-down management,” Dr Williams says. “Grassroots tends to work a little better because folks start to see this can work if we give it a reasonable try.”

Patient teaching

Before discharge

Before a patient who has had regional anesthesia (RA) goes home, the surgeon and nurses should:

• Instruct the patient about RA before surgery and about home care of the blocked limb.
• Warn about the block wearing off and need to begin oral pain medication early.
• Before discharge, check intravascular placement of the peripheral nerve catheter.
• Instruct the patient and caregiver about use of pain pump and care of the catheter.
• Give verbal and written information on signs and symptoms of anesthetic toxicity.
• Give the patient a telephone number to call the physician with problems.
• Call the patient every day to ask about side effects and pain control.

After discharge

After discharge, patients should:

• Avoid weight-bearing on a lower extremity for 24 hours.
• Protect the extremity from heat and cold, monitor its position, and elevate it.
• Start taking oral acetaminophen or nonsteroidal anti-inflammatory drugs (NSAIDs) (eg, Cox-2 inhibitors) at discharge or at completion of PCRA use; take oral opioids for pain.
• Use common sense and reduce activities of daily living.
• Use ice as needed.