8 Regional Anesthesia in the Community Practice Setting

Joseph Marino and Brian E. Harrington

Introduction

The appropriate management of pain has many benefits. Evidence for improved patient outcomes, in particular, has given physicians a popular and professional mandate to better manage pain [1]. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) now requires the recording of pain as a "5th vital sign." Unfortunately, there is well-publicized evidence that pain continues to be inadequately managed [2, 3].

By virtue of their clinical training, scope of practice, and historical innovation, anesthesiologists are uniquely qualified and, indeed, expected to assume a leadership role in acute perioperative pain management. As the primary practitioners of regional techniques, anesthesiologists play a critical role in the delivery of state-of-the-art multimodal opioid-sparing techniques designed to maximize pain relief while minimizing side effects [4]. Within the specialty, this has led to a renaissance in the field of regional anesthesia. Yet, effectively responding to the many challenges presented by the expansion of anesthesia practice into the realm of pain management requires a conscious effort by practitioners, especially by those in community practice whose formal training may not have adequately prepared them for this eventuality. Therefore, it is not surprising that despite evidence-based data to support their benefits, these opioid-sparing regional techniques appear to remain underutilized, especially in the community practice setting.

In many respects, the pain associated with orthopedic surgical procedures is ideally suited to a multimodal approach. The significant degree of pain associated with many orthopedic procedures warrants the time and effort of regional anesthesia. Advanced pain management is further justified as it allows many orthopedic procedures to be performed on an ambulatory basis that would otherwise require hospitalization. Preservation of oral intake usually permits the utilization of a wide spectrum of pharmacologic agents. Regional techniques are often able to be targeted at extremity pain with minimal hemodynamic effects. Finally, certain orthopedic procedures (e.g., total hip and knee arthroplasty) are performed frequently enough to warrant the development of standardized multimodal analgesic pathways.

It is easy to appreciate that what actually constitutes "community practice" is an incredibly diverse reality. Practitioners may be solo or have any number of department members (which may include subspecialty-trained physicians, CRNAs,

J. Marino, MD (✉)
Anesthesiology, Long Island Jewish Valley Stream, Greenlawn, NY, USA

B. E. Harrington, MD
Anesthesiology, Billings Clinic Hospital, Billings, MT, USA

A. D. Kaye et al. (eds.), *Essentials of Regional Anesthesia*,
https://doi.org/10.1007/978-3-319-74838-2_8

or nurse practitioners), with practice settings varying from hospitals to ambulatory surgery centers to office-based care. It would be impossible to address the unique issues of orthopedic pain management in each community practice circumstance. The intent of this chapter is to identify the common hurdles that exist in a community practice environment and present broad concepts and directions to overcome these hurdles to achieve a common goal: creating a culture of consistent and efficient acute pain management that extends beyond the operating room.

Identifying the Challenges

Important differences exist between academic and community practice. The realities of the modern community practice setting often present obstacles to the effective delivery of regional anesthesia. For many anesthesiologists in community practice, the issue is not whether regional anesthesia can benefit patients, but whether these techniques are realistically transportable from the academic setting into the community practice arena. While practice environments vary greatly among facilities, some generalizations include the following:

Institutional Challenges

Physicians in community practice are often wedged in a culture of conformity. A general anesthetic utilizing postoperative opiate therapy is reliable and requires less technical skill and minimal organizational adaptations. Institutions lacking leadership in acute pain medicine are poorly positioned to fully utilize the many recent advances in this rapidly growing field. Furthermore, once a culture of medical practice is established, a transformation in this culture is difficult to accomplish. Implementing regional anesthesia-based acute pain protocols under these entrenched circumstances requires considerable effort and vision. If the institutional hierarchy fails to appreciate the many benefits of advanced pain management, this lack of support may make it difficult to obtain necessary staff, supplies, and equipment. This is especially true for expensive technology like ultrasound equipment.

Community practices also frequently lack accommodating facilities commonly encountered in academic environments, such as designated areas for the performance of regional blocks (block rooms) (Fig. 8.1). The optimal timing and location for regional anesthesia under these circumstances tends to be dictated by individual circumstances (nurse and anesthesia personnel staffing, room turnover times, patient flow within a facility, available equipment, etc.). In an effort to overcome these infrastructural hurdles, physicians often must either perform regional techniques in less than desirable locations or abort the prospect altogether.

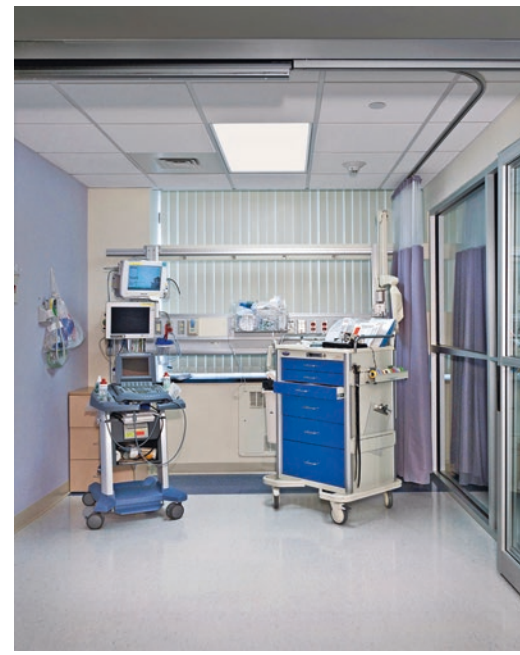

Fig. 8.1 Photo of a block area. At our hospital, epidural and peripheral nerve blockade are frequently performed in the PACU. The block area is a dedicated patient location that includes full monitoring, the regional block ultrasound unit, stimulating catheters, and a fully stocked regional anesthesia cart. It is immediately adjacent to the operating room and allows rapid turnover with minimal distraction

Time Pressures

Anesthesiologists in community hospital practice often operate in a competitive, fast-paced, high volume, fee-for-service environment. The focus of this environment is clearly on the efficient performance of surgery including operating room turnover and not the optimal management of postoperative pain. One example of the accelerated pace of community practice is the striking difference that has been noted between the median duration of surgery for private practice (1.5 h) and academic centers (2.6 h) [5]. A consequence of the high volume and accelerated pace along with the need to satisfy surgeons is the desire to avoid delays at all costs. Compounding this situation, anesthesiologists in community practice are commonly unable to be freed from a case to perform a block on their next patient. These considerations can create significant time pressures that can easily compromise the management of pain. These issues are compounded as they are set against the background of capricious insurance reimbursement and a hostile medicolegal environment familiar to all practitioners.

Surgeon Resistance

Any discussion of anesthesia choices in private practice must address the influence of surgeons, who are often considered either proponents or opponents of regional anesthesia. Just as surgical support for regional techniques can greatly facilitate their acceptance, resistance from surgical colleagues can be a significant hurdle. A 2002 survey of orthopedic surgeons found that the two principal reasons for not favoring regional anesthesia were OR delays and unpredictable success. The principal reasons for favoring regional anesthesia were less postoperative pain, decreased nausea and vomiting, and safety. If we can convince our surgical colleagues regarding the benefits of regional anesthesia, they may instead act as advocates in our mission to educate the public. These issues may be resolved with physician education, improvements in training, and organization of the regional anesthesia facility [6]. There are a myriad of opportunities for anesthesiologists to adequately position themselves in a variety of hospital settings to champion the benefits of their craft; establishing a presence in the presurgical testing is an ideal platform to set expectations and develop a collaborative analgesic plan that allows patients both to feel empowered and to be drivers of their postoperative experience.

Deficiencies in Training

Few anesthesiologists in community practice have advanced clinical training in regional anesthesia or pain management. While the training of anesthesia residents is generally adequate for spinal and epidural techniques, exposure to peripheral nerve blocks may be inadequate. Kopacz and Neal reported in 2002 that as many as 40% of anesthesiology residents in the United States may not be receiving the minimal required level of exposure to peripheral nerve blocks [7]. Given the large number of different regional techniques, anesthesiologists may complete their residency training without sufficient experience in perineural techniques to feel confident as they enter community practice. Reflecting this narrowed comfort zone, German anesthesiologists who practice in small hospitals have been shown to rely heavily on basic regional techniques, in contrast to consultants at teaching institutions [8]. The explosive growth of perineural techniques has clearly outpaced the experience of many already in practice. Given these observations, it is not surprising that anesthesiologists in community practice have been noted to perform significantly fewer peripheral nerve blocks than those who practice in teaching institutions ($p = 0.05$) [9]. Finally, those who are trained in advanced pain therapies may be *challenged* to find that many anesthesia colleagues in community practice may be uncomfortable or disinterested in providing cross-coverage for unfamiliar pain management techniques.

Personnel Issues

Many anesthesia departments in community practice settings are small or minimally staffed; assistance with blocks may be unpredictably available and involve personnel having minimal experience with regional procedures. Galvanizing the nursing staff may be the most effective alternative for anesthesiologists in community practice to cultivate a reliable first assistant with peripheral nerve blockade. During regular hours, practitioners may be largely confined to the operating room, unable to be freed from a case to perform a block on their next patient, and having limited ability to attend to the needs of hospitalized patients. In many cases, pain management coverage during odd hours may well be covered from home.

Patient Resistance

The public's fears and distorted perceptions of pain from needle passage, paralysis, and a wakeful state can also hinder the assimilation of regional techniques into daily practice. There is a serious and underappreciated risk of serious injury from parenteral opiates. The public does not understand the risks and benefits of regional anesthesia in addition to having an underappreciation of the dangers of postoperative opiates [10]. More problematic is the concept that anesthesiologists do not understand the general public's fears of regional anesthesia. This is evidenced by the finding that anesthesiologists' perceptions differed from the actual fears of interviewed patients. The anesthesiology community has not been successful in keeping the public well-informed regarding regional anesthesia. Future anesthesia-related educational programs should address the concerns of the public about anesthesia matters, particularly regional anesthesia [11].

Overcoming the Challenges

The issues presented above represent significant hurdles to the management of pain in the community practice setting and mandate a disciplined and pragmatic approach to this aspect of patient care. Successfully overcoming these hurdles requires a thoughtful and comprehensive approach.

Create a Physical Environment Conducive to Regional Anesthesia

A block room can greatly facilitate the preoperative performance of regional techniques and in one study resulted in an operating room time savings of over 20 min per case [12]. However, the economic feasibility of a dedicated block room is questionable, and a designated preoperative "block area" can be a reasonable alternative. Pressures to maintain OR flow and limit delays make the postanesthesia care unit (PACU) an excellent substitute for a block room if one does not exist. Consider isolating a single patient bay in a corner of the PACU to perform regional techniques preoperatively (Fig. 8.1). While many regional procedures can be performed with minimal assistance, each should be preceded by a "time-out." In addition to participating in the time-out, preanesthetic site verification with a signature of the involved extremity by the procedurist may help to prevent wrong-sided block errors. PACU nurses are exceptionally trained in monitoring and can serve as excellent assistants if dedicated personnel are unavailable. Furthermore, patients can be expeditiously transferred because of the PACU's close proximity to the OR. Regardless of locality, several regional anesthesia texts should be readily available wherever blocks are performed.

The efficiency of regional anesthesia is enhanced by keeping supplies together in a standardized "block cart," which has the additional advantages of being mobile and able to hold resuscitative equipment (Fig. 8.2). A sufficient supply of intralipid should be stocked wherever local anesthetics are to be used. Lipid emulsion bolus followed by infusion represents a novel resuscitation method that has demonstrated efficacy in the treatment of local anesthetic toxicity [13]. Contents of a regional anesthesia cart should now include a 500-ml vial of 20% intralipid, 60-ml syringe, and a macrodrip infusion kit. A lipid rescue algorithm (Appendix 1) should be posted on this block cart (see Fig. 8.2) to aid the

Fig. 8.2 Photo of the contents of a typical regional anesthesia cart. The cart includes catheters, stimulators, local anesthetic solutions, gowns, gloves, and prep solutions. Of importance, the cart is also stocked with resuscitative medications and intralipid solutions for emergency treatment of local anesthetic-induced cardiotoxicity

practitioner and to provide immediate visual cues in the event of an unintended intravascular injection. An educational website has been created (http://www.lipidrescue.org) and serves as an excellent instructional resource for physicians to learn about lipid emulsion therapy.

The postanesthesia care unit (PACU) serves as an important environmental "hub" in the management of acute postoperative pain. It is here that a smooth transition from surgical anesthesia to postoperative analgesia must occur. Having standardized infusion solutions for peripheral nerve blocks available in the PACU facilitates this smooth transition by greatly enhancing the ability to promptly initiate analgesic regimens. The PACU also frequently serves as the pain management communication center, where patients are identified as requiring postoperative rounds by the acute pain service. A pain management logbook or index card file (Appendix 2) usually serves this purpose.

Establish a Multidisciplinary Pain Management Team

Implementation of evidenced-based guidelines for pain management alone is inadequate to achieve advances in patient outcomes. A consistent and comprehensive approach to the management of acute pain involves the patient and every member of their care team. Success of the service is predicated on collaboration among physicians, nurses, ancillary staff, and hospital administration. The cornerstone of this interdisciplinary effort is communication. Shortcomings in the effective management of acute pain can usually be overcome through efforts to improve communication, education, and coordination of care. Integrated collaborations between the medical, nursing, and ancillary staff are needed to achieve the full benefits of an improved analgesic regimen [2, 14]. A process for inpatient postoperative follow-up is a clinical imperative. It is useful to briefly consider how anesthesiologists may effectively interact with each component of this interdisciplinary effort.

Senior Leadership

Coordination of a successful pain management program requires strong institutional support. Plans for major initiatives should be disseminated to the senior leadership at both medical and hospital board levels delineating the benefits of the service. Institutional support for pain management efforts is essential if additional staffing will be required and also necessary to obtain necessary supplies and equipment. It is of no small import in this regard that ultrasound guidance for regional anesthesia can often be viewed as an institutional revenue generator [15]. Any efforts that will look to maximize patient safety, improve patient care, enhance operating room efficiency, and decrease length of stay will certainly be embraced and highlight the efforts of the department toward developing new standards of practice and "service excellence."

Anesthesia Department

Establish a Core Group Within Your Ranks

Surprisingly, the greatest resistance to the successful integration of regional techniques in community practice may come from within the department of anesthesiology itself. A lack of interest or inexperience and consequent medicolegal concerns may lead some colleagues to

oppose implementing techniques that are perceived to require greater technical skill. The collaborative effort for the success of the initiative needs to start within the department of anesthesiology and an important core group of partners is needed to support the formation of the regional anesthesia service. Establish a minimum level of proficiency within the department by creating opportunities to mentor partners with less experience with both didactic and practical instruction. Establishing a single primary location for block placement (such as the PACU) facilitates the education of other anesthesia team members, where members can gather together, learn each other's techniques, and share information. Creating a core group of partners promotes an infrastructure of technical support making these analgesic techniques available to all patients as well as allowing the burden of work to be shared. There is encouraging evidence that motivated practitioners can successfully utilize even the most complex regional techniques in the community practice setting, as was demonstrated for ambulatory continuous interscalene blocks [16].

Appoint a Leader/Physician Champion

The challenge to overcome obstacles to regional anesthesia will tend to fall on the shoulders of one individual within the anesthesia department. Ideally, one member of the anesthesia staff will assume the role of "physician champion" for the acute pain service. While this individual may or may not be uniquely qualified by virtue of training or experience, it is essential that they possess a genuine interest in acute pain medicine as well as good communication and problem-solving skills. Let there be no mistake; the passion and persistence of one individual to persevere through the initial resistance of surgical, nursing, and anesthesia ranks is critical to the initiative! This individual must shoulder the responsibility of staff education, standardization, documentation *and advocacy.* Recognition of this individual within the institution and the department of anesthesiology as the leader in acute pain management will assure program quality and continuity.

Physician Organization

Surgeons

Surgeon acceptance of the use of regional anesthesia is critical. The fact that advanced anesthesia-based pain control methods can result in superior pain control is generally insufficient in itself to justify the additional time and effort required to generate genuine surgical support. Successful implementation of a multimodal approach to pain management is grounded in a close collaboration with surgical colleagues. Surgeons must be involved in the development of pain management protocols for their patients and, ultimately, endorse the chosen plan. Assuming responsibility for postoperative analgesia orders by the anesthesia-based acute pain service avoids the duplication of efforts by both departments as well as mitigates the presumed "burden" of managing pain from the surgical specialty. This approach also strengthens our desired perception as involved participants in patient care.

Surgeons can be the greatest advocates for the routine use of regional anesthesia and are the drivers of patient acceptance; an effective platform for this advocacy can be the creation of a standing multidisciplinary grand rounds format with representation and attendance by both anesthesia and orthopedic colleagues [17]. As noted above, patients will tend to be more receptive to regional techniques if they are introduced to the possibility by their surgeons. Identifying which surgeons are supportive of the initiative before implementing the service to the entire department will ensure acceptance of the techniques and increase success. The survey mentioned above regarding resistance to regional anesthesia among orthopedic surgeons provides some valuable insight into the rationale involved [6]. Although surgeons reported predictable concerns with regional anesthesia regarding operating room delays and unpredictable success, when data were reanalyzed, investigators found that these perceptions of delays or success rate were surprisingly not predictive of their preferences for regional anesthesia [18]. Instead, they found that a surgeon's preference for peripheral nerve

blocks for his or her own surgery strongly predicted their preference for his or her patients. Importantly, a significant number of surgeons would want peripheral nerve blocks for some surgical procedures but not others, probably based on perceptions of how painful a surgery may be. These data serve to emphasize the value of discussing procedure-specific anesthesia choices with surgeons, focusing on what they would want for their anesthetic if they were the patient and why. Finally, distribution of educational pamphlets delineating analgesic options in addition to highlighting the multidisciplinary collaboration between the two disciplines is an effective way to demonstrate our ownership of success in this initiative.

Nonsurgeon Physicians

Primary care physicians are intimately involved in the care of many sicker patients postoperatively and also commonly deal with acutely painful but nonsurgical conditions. Education of these practitioners can, through a clearer understanding of the benefits and limitations of anesthesia-based pain management modalities, generate appropriate referrals and improve the quality of care. Presentation at medical grand rounds is an effective means of efficiently educating these providers.

An often overlooked area of pain management in hospitals is the emergency room. There is ample evidence that pain continues to be inadequately managed in the ER setting and could be improved upon [19]. The early performance of a fascia iliaca block for patients with hip fractures, for example, is a safe and simple intervention that can control pain and minimize opioid use in a frail, elderly population [20]. Anesthesiologist attendance at an emergency room departmental meeting can be one means of educating emergency physicians and help expand the service beyond the operating room. Creation of a "code hip" process where the admission of a hip fracture triggers a contemporaneous anesthesia consult for both expedient operative intervention in addition to evaluation of pain management modalities is an example of this multidisciplinary collaboration.

Nursing Staff

Optimal analgesia requires careful therapeutic fine-tuning to maximize the benefits and minimize the risks and side effects of therapy, necessitating an organized service beyond the operating room [21]. Nursing staff support is an implicit prerequisite to the viability of an anesthesia-based acute pain management service. While physician leadership is required to champion the goals of the service in a physician-directed nurse-delivered model, the nursing staff is empowered to assess, manage, and ultimately treat the patient. Regardless of the diversity that exists in the variety of anesthesia staffing models, this arrangement creates an infrastructure of support resulting in close patient surveillance preventing the occurrence of any analgesic gaps. Establishing this link allows advanced regional techniques to be safely utilized in any institutional setting.

Analgesic protocols and order forms serve as an extension of the physician (Appendices 3–5). The nursing staff utilizes these guidelines as an instrument for the ongoing care of the patient. Implementing a nursing assessment flow sheet has been a valuable tool to allow our nursing staff to both monitor as well as intervene along an algorithmic decision tree to facilitate care (Appendix 6). Although certain institutions have found optimal function with the addition of a clinical nurse specialists specially trained in pain management, our experience has demonstrated that floor nurses can accomplish our goals of continuous monitoring and adjustment of therapy without the need for additional personnel.

It is important that the degree of insight by nurses into acute pain management modalities extends deeper than the physician orders. While written orders should clearly delineate nursing responsibilities, nurses should also understand the rationale for pain management choices and appreciate the nuances of each. Direct involvement by the department of anesthesiology in nursing education is one means of effectively preparing hospital staff for full participation in the management of acute pain. The didactic instruction should include a comprehensive description of the normal side effects and complications from regional anesthesia techniques,

simulation of a collaborative team approach to the expedient treatment of local anesthetic systemic toxicity (LAST), care for/troubleshoot catheters and infusion pumps, and the delineation of discharge instructions to patients (Appendix 7). A system for follow-up with outpatients must also be established (with a phone call from nursing generally being sufficient). A formal process of continuing education where the nursing staff is credited with continuing education units (CEUs) maintains the integrity of the service and ensures optimal nursing assessment and management skills.

Given the large number of nurses required to fill all shifts and the inevitable turnover of staff, institutions should plan for continuous training in pain management protocols. A video presentation, even as simple as a recording of an inservice provided by anesthesia staff, can be an effective tool for ongoing nursing education. The hospital newsletter can also be an effective vehicle to communicate certain pain control issues to nursing as well as all hospital staffs.

Ancillary Staff

The department of physical therapy plays a crucial role in the transition from the acute postoperative period to eventual functional outcome. Better management of pain facilitates more aggressive physiotherapy regimens, which may improve outcomes and decrease hospital length of stays [22]. Physical therapists need to be educated regarding the potential for motor blockade with lower extremity regional techniques and how this may impact ambulation. Inpatient falls with consequent injury are viewed by our regulatory bodies as hospital-acquired conditions reflecting poor quality with the possible consequence of financial penalties for the institution. Advances and innovations in the field of regional anesthesia (i.e., adductor canal blocks vs. femoral nerve block, periarticular infiltration of local anesthetic) continue to address the association between quadriceps blockade and fall risk while driving equianalgesic outcomes launched on a platform of perineural blockade and multimodal analgesia [23].

While pharmacists are often viewed as being somewhat removed from direct patient care, their involvement is essential to a smoothly operating acute pain management system. Standardizing the volume and concentration of analgesic infusion solutions can help reduce the risk of medication error. Stocking supplies of premixed standardized infusion agents in a convenient location (e.g., the PACU) is more efficient than an on-demand system for pharmacy and also helps to ensure the timely availability of solutions. Using appropriate sterile procedures, pharmacists may also be able to fractionate certain agents into clinically useful amounts (e.g., 1 mg preservative-free clonidine into 100 μg single-dose volumes).

Due to the variability in staffing models that exist in a variety of community practice settings, assistance with blocks may be unpredictable. Ancillary personnel have become an integral part of preanesthetic site verification to prevent wrong-sided block errors. With specialty training in monitoring and respiratory function, the recruitment of recovery room personnel and respiratory therapists can effectively accomplish many goals; they can become critical components of the preprocedure "time-out," monitor patients during and after block placement, and provide effective support during emergency situations.

Multimodal anesthetic techniques can improve discharge predictability and accelerate discharge eligibility. If social services are not involved early in the patients' perioperative course, these advantages can go essentially unrecognized. Preoperative patient education sessions describing the perioperative course may help to overcome common social delays in discharge (nursing home placement, patient transportation, lack of home readiness by family members, patient concerns resulting in requests for extended hospital stay), facilitating early discharge planning. Engaging the social service department in a comprehensive patient care plan at the beginning of hospital admission allows for the timely discharge of patients [24].

The Public

Informed patients, through more accurate perceptions and realistic expectations, enable the successful management of their own acute postoperative pain. Due to the limited opportunity for anesthesiologists to establish rapport in the rapid operating room environment, early preoperative patient education is desirable. Patients who are first informed of pain management techniques by their surgeon (e.g., interscalene block for shoulder surgery, adductor canal/femoral block for knee surgery) are more likely to be readily accepting of anesthesiology-based pain management pathways.

Despite limited personal contact, there are a variety of approaches through which anesthesiologists may preoperatively educate the public: procedure-specific pain management literature can be made available in surgeons' offices, anesthesiologists can contribute to or attend "joint replacement classes," and patients may be directed to appropriate sources of information. Websites sponsored by the American Society of Anesthesiologists (http://www.asahq.org) and American Society of Regional Anesthesia and Pain Medicine (http://www.asra.com) have useful areas dedicated to patient education.

Finally, it is essential that anesthesiologists rapidly and clearly communicate acute pain management plans during the preoperative visit. The general public has many misconceptions regarding anesthesia and pain management that are often best discussed in a one-on-one manner [10].

Formulate and Implement an Acute Pain Management Plan

The community practice environment mandates a pragmatic, team approach to pain management. This will maximize the likelihood of satisfactory analgesia while minimizing risks to patients or compromise the smooth delivery of care. Ideally, a well-formulated plan will prove to be sufficient from the outset and not require further intervention. Important concepts in this regard include:

Multimodal Analgesia

Since the pathophysiology of pain is a complex of interrelated systems, one method of analgesia alone is usually not sufficient to provide optimal pain relief. Simultaneously utilizing several approaches for analgesia takes advantage of additive and synergistic effects of different pharmacologic drug classes and has the potential to provide superior pain control, avoid analgesic gaps, and minimize adverse effects (notably those associated with opioids). Available evidence, although limited, strongly supports this concept of multimodal analgesia. The American Society of Anesthesiologists Task Force on Postoperative Pain Management, which included members from a spectrum of practice environments, concluded in its practice guidelines for acute pain management in the perioperative setting:

> Whenever possible, anesthesiologists should employ multimodal pain management therapy. Unless contraindicated, all patients should receive an around-the-clock regimen of NSAIDs, COXIBs, or acetaminophen. In addition, regional blockade with local anesthetics should be considered. Dosing regimens should be administered to optimize efficacy while minimizing the risk of adverse events. The choice of medication, dose, route, and duration of therapy should be individualized [4].

These evidence-based recommendations serve to reinforce several points. First, overreliance on opioid analgesia in the postoperative period is to be avoided. Second, simple nonopioid measures like acetaminophen and NSAIDS/COXIBS should not be overlooked [25]. Third, whether employed for surgical anesthesia or not, regional blocks are an essential component in the optimal postoperative management of pain. Finally, any analgesic plan, including established clinical pathways, must be tailored to each individual patient.

Finally, while regional anesthesia is a high profile component of multimodal analgesia, anesthesiologists must not lose sight of the potential benefits of multimodal therapy even in the absence of regional techniques. Several important aspects of acute pain management, generally outside of the direct administration by

anesthesiologists, should be mentioned. These include infiltration of the wound with local anesthetic (as a one-time procedure or continuously administered [26], which may allow for patient-controlled boluses) and intra-articular agents (e.g., intra-articular morphine) [27]. Another consideration is the preoperative administration of analgesics (usually orally) whose duration would be anticipated to extend into the postoperative period, such as extended-release opiates (e.g., extended-release oxycodone) or anti-inflammatories (e.g., celecoxib). Other less well-established adjunctive modalities such as ketamine, gabapentin, and clonidine are being actively investigated and may assume greater importance in the future. As recently demonstrated for pregabalin, there may also be significant promise for these and other agents in the prevention of chronic postoperative pain [28].

Clinical Pathways

Surgical procedures that entail complex perioperative processes have long been identified as fertile ground for improving the quality and coordination of medical care. There is evidence that procedure-specific "clinical pathways," which delineate a standardized multimodal, multidisciplinary care process, can improve efficiency and quality while preserving patient satisfaction. Many orthopedic procedures, especially total joint arthroplasties (e.g., hip and knee), are extremely well-suited for such management.

Anesthesiologists in community practice are encouraged to standardize their contributions to care in a procedure-specific fashion where, for example, every knee replacement procedure receives a perineural approach to the femoral nerve (adductor canal/femoral block) and every shoulder replacement receives a perineural approach to the brachial plexus (interscalene block) utilizing identical equipment, supplies, and labeled syringes on each patient. Starting the discussion of perioperative routines in the surgeons' office and later confirming these options during the preanesthetic visit begins to establish a habitual course of action where the pathway is familiar to patients and caregivers. With variability minimized, standardization of the service instills familiarity and reliability in the process, which saves time and reduces the risk of iatrogenic errors.

Usually, multimodal pathways for orthopedic surgeries prominently feature regional anesthesia. Optimal management of pain, largely accomplished through the addition of regional techniques, can help minimize complications while facilitating aggressive physiotherapy, which can result in improved functional outcomes and decreased hospital length of stays [29]. Rather than assume a lead role in the design of standardized protocols, physicians in community practice are encouraged to investigate the current practice at academic centers. Many leaders in the development orthopedic care maps have published their experiences (e.g., the Mayo Clinic) [30]. Analyzing and adapting such protocols from academic centers, which have been used successfully on a large scale, is likely to prove safe and effective in the community hospital environment [31] (Appendix 8). Recent updated evidence-based recommendations are also available for several common orthopedic procedures on the PROSPECT website (http://www.postoppain.org) and published in recent review articles [13, 32].

Judicious Use of Regional Blocks

While it may be possible to perform a regional technique that may be useful for virtually any orthopedic procedure, anesthesiologists in community practice are encouraged to exercise appropriate judgment and restraint (particularly in settings where regional anesthesia is not routine). This means that practitioners must carefully pick their battles and often limit regional blocks to what would be considered to be "essential" and ideally require minimal time and effort.

Situations where basic blocks result in obvious patient benefits (the "low-hanging fruit") should be considered to be the foundation for regional acceptance within an institution. It is easy, for example, to generate a consensus of support for a perineural approach to the femoral nerve (adductor canal/femoral block) after total knee arthroplasty. Momentum generated through

a single routine can then be used to further promote regional techniques for other indications.

In the community practice environment, management should be streamlined whenever possible. While combinations of peripheral blocks may be necessary to provide complete pain relief following certain surgeries, single block approaches are generally more practical. The lack of functional improvement with the addition of sciatic block following total knee arthroplasty, for example, makes the perineural approach to the femoral nerve (adductor canal approaches/femoral block) alone an attractive choice in community practice [33]. The addition of periarticular infiltration of local anesthetic has been demonstrated to further reduce opioid requirements and reduce pain scores and may have a place as another ingredient in the multimodal recipe for joint replacement pain [34]. Likewise, although catheter techniques can provide superior long-term pain relief, single-shot blocks are generally preferred unless severe pain is expected to extend for several days.

Conceptually, the approach to regional blocks in a community practice setting is often starkly pragmatic when compared to an academic environment. Practitioners should thoughtfully consider specific regional blocks in light of the following three "ideal" attributes: a single-injection site, short needle (50 mm or less), and supine positioning. Blocks that have high success rates with single injections are clearly preferable to blocks that rely on delivery of local anesthetic to multiple locations. Supra- and infraclavicular blocks are thereby able to be performed more expeditiously than multiple-stimulation axillary block. Efficacy can also be improved through knowledge of optimal target responses for successful block with single-injection sites (i.e., posterior cord stimulation with infraclavicular block [35] and tibial nerve stimulation for popliteal block [36]). Blocks that can be done using short needles are able to be more quickly performed and tend to be associated with fewer needle passes, less patient discomfort, and possibly lower complication rates. The ability to maintain the supine position generally allows for patient care to proceed along a usual flow, despite sometimes necessitating the use of longer needles (e.g., lateral popliteal block [36] or anterior sciatic block [37]).

Keys to Success with Regional Anesthesia in Community Practice

Given the realities presented above, it is apparent that the successful performance of regional techniques is critical to an anesthesia-based acute pain service. Yet the modern community practice environment can often make these techniques seem impractical, if not impossible, to put into practice. Successfully performing and expanding the use of regional anesthesia under such circumstances requires a pragmatic approach, which can be summarized as follows:

Operate Within the "Comfort Zone"

Start slowly. Each institution has its own "comfort zone," which, while capable of being expanded, should not be violated. The overzealous forcing of change is rarely sustainable, as lasting change will only take hold through popular support. The evolution of acute pain management, with the integration of new modalities, usually necessitates an incremental culture change. This progression must be accompanied by appropriate communication and education.

In general, and especially with new approaches to acute pain, it is ideal that these modalities require minimal attention outside of the operating room and normal working hours. The availability of concomitant intravenous patient-controlled analgesia (IV PCA), in particular, is a major consolation when initiating more advanced nonopioid pain management modalities (i.e., single-injection or continuous nerve blocks). The patient-titrated nature of IV PCA has the advantage of minimizing nursing care while being capable of independently providing adequate postoperative analgesia. The extent of IV PCA use (or more accurately, the extent to which it was not used) also to some degree reflects the efficacy of nonopioid techniques being simultaneously utilized.

Once a "comfort zone" for the concomitant use of postoperative opioids is established, a transition to extended-release oral opiates as seen in published analgesic care maps can obviate the need for parenteral use and its consequent side effects (Appendix 8).

Operating within the comfort zone also means that practitioners should strive to gain sufficient experience with single-injection options before taking on continuous techniques and develop familiarity with pain management innovations in inpatients before extending their use to ambulatory patients.

Learn in a Logical Progression

Given the large number of different regional techniques, it is apparent that few anesthesiologists will have sufficient experience during residency with peripheral nerve blocks to feel broadly confident as they enter community practice. Considered in its proper perspective, regional anesthesia training must be viewed as an introduction to a lifelong commitment to further learning. Just as an anesthesiologist must acquire experience when a new inhalational agent is marketed, they should approach overcoming deficiencies in regional anesthesia training with the same intellectual curiosity. Effectively removing surgical pain from the equation along with the unpleasant side effects of opioids is where regional anesthesia has evolved. The explosive growth that orthopedic anesthesia has witnessed should not mandate specialty training for regional techniques to be implemented in community practice. Just as we have not created a subspecialty for the placement of arterial lines or administration of total intravenous anesthesia (TIVA), we do not need specialty training for perioperative blocks. Every anesthesia provider should be able to perform these techniques if they are willing to choose so.

It is easy to appreciate that some regional procedures (e.g., spinal anesthesia) are more readily mastered than others. All anesthesiologists possess some regional skills and should therefore strive to expand their regional anesthesia practice in a stepwise manner. They should take care not to violate institutional or their own personal comfort zones, but rather seek to reasonably expand these zones. With this concept in mind, regional procedures have been classified into basic, intermediate, and advanced categories [38]. An awareness of this stratification can help practitioners develop competence and confidence with regional techniques in a logical progression. Proficiency with manual skills is developed through practice, and skills learned with one block will generally build confidence with all regional procedures. Anesthesiologists should liberally utilize regional techniques in appropriate clinical situations, not just when it is crucial that they work.

In any practice setting, regional anesthesia is heavily dependent upon appropriate patient selection as well as a working knowledge of the relevant anatomy and block risks and benefits. A brief review of anatomy, block technique, side effects, and potential complications should precede every regional block as practitioners strive to solidify their knowledge base. Initially, a reasonable goal is to become proficient in three or four blocks, knowing that skills learned in one technique will have a crossover to others. Continuous techniques are always more advanced than single-shot blocks and should be reserved until comfort is attained with more basic procedures. Continuous femoral nerve block deserves special mention, as it is the most commonly performed continuous technique and is particularly appropriate for pain management following total knee arthroplasty. Novices should consider continuous femoral block as the ideal "training ground" to develop comfort and familiarity with all continuous perineural techniques.

Incorporate Ultrasound into Your Practice

Anatomical diversity in patients coupled with a challenging body habitus has led some practitioners with marginal regional experience to navigate through an attempt at regional blockade with trepidation in a "poke and hope" approach.

Unpredictable block success, patient discomfort, and technical delays will negatively reinforce future attempts at perineural techniques.

Advances in the science of regional anesthesia have seen the technique of nerve location progress from utilizing paresthesias to nerve stimulation to ultrasound guidance. Ultrasound guidance of regional anesthesia is currently an area of intense interest and has created the potential of simplifying peripheral nerve blockade. The prediction of Dr. Alon Winnie many years ago was: "Sooner or later someone will make a sufficiently close examination of the anatomy involved, so that exact techniques will be developed" [39]. While it is not yet viewed as the gold standard, the literature suggests that this technology may be capable of improving the efficiency and efficacy of regional blocks [40]. Compared to nerve stimulation techniques, ultrasound-guided blocks are performed more quickly, using less local anesthetic, with fewer needle passes as well as a reduced incidence of vascular puncture [41]. The increase in current thresholds caused by the injection of conducting solutions hampers the ability to instantly reinject local anesthetic after a failed block. By confirming local anesthetic spread around the target nerve or perivascular anatomy, ultrasound can overcome this phenomenon of electrical interference and offers practitioners a powerful tool for block rescue and the potential for increased block success. Furthermore, ultrasound guidance provides the practitioner with a renewed opportunity to perform interventions on patients difficult to stimulate with the peripheral nerve stimulator (i.e., diabetic patients).

Visualizing the relationships between nerves and other structures in "real time" is an appealing aspect of ultrasound-guided regional anesthesia as we can finally see the anatomy of our target nerves. This visual feedback gives the practitioner the ability to assess the anatomic variations in a particular patient's individual anatomy. This improved visual model has the potential to empower and energize practitioners to expand the use of regional techniques in community practice. Despite the fact that the vast majority of anesthesiologists in community practice are untrained in ultrasound use, proficiency may be quickly attained through one of many hands-on courses currently offered by recognized experts easily accessed through the ASA/ASRA websites.

Keep Regional Blocks in Proper Perspective

While studies published from academic centers often compare regional to general anesthesia, in reality there is no need to compare or contrast these complementary techniques. Intraoperatively, regional block is usually best viewed as a supplement to general anesthesia and an integral component of a balanced anesthetic. Even in situations where regional anesthesia could conceivably serve as a sole anesthetic, a planned light general will compensate for delays in onset and occasional block failure. This perspective eliminates the problem of blocks that are not necessarily failures but may be inadequate to stand alone as a sole analgesic.

In the community practice arena, regional anesthesia is usually best thought of as being primarily used for postoperative analgesia. This approach accelerates the start of surgery and reduces the need for postoperative opiates, facilitating a more rapid discharge. This is consistent with the recommendations of the ASA Task Force on Acute Pain Management, which advocate consideration of regional blockade "whenever possible." Once this advantage is recognized, the surgical staff welcomes the slightly longer start times used to implement regional techniques as their prolonged analgesic effects translate into reduced phone calls for analgesic intervention.

Dealing with Block Failures

Plans for regional anesthesia often suffer from a failure to consider reasonable alternatives in a timely manner. Visualizing success with regional anesthesia is in many ways similar to management of the airway. If plan A (laryngoscopy) does not meet with success, then plan B (LMA) and

even C (fiber-optic bronchoscopy, etc.) should be pursued. Likewise, if certain regional techniques are not proceeding smoothly, they can be appropriately followed by "plan B" blocks. Difficulties with infraclavicular or femoral blocks can be expeditiously addressed by performing axillary and fascia iliaca blocks, respectively. Wound infiltration with local anesthetic by the surgeon is usually a reasonable plan C option.

Practitioners must also have a realistic perspective on abandoning frustrating unsuccessful efforts at regional block in a timely manner. Although beneficial in many respects, regional techniques are rarely essential for patient care, and stubbornly persisting with attempts at regional anesthesia in difficult situations is seldom in the best interests of the patient. Acknowledging acceptance of an alternative plan is often a sign of sound clinical judgment and the mark of a mature practitioner.

In the event of a true block failure that becomes evident in the postanesthesia care unit (PACU), reattempting the same block is usually not considered prudent. However, incomplete pain relief in some anatomic regions may be adequately covered by similar techniques. Failure of interscalene and femoral blocks, for example, can be safely and effectively followed by suprascapular [42] and fascia iliaca blocks [20], respectively. More selective distal blocks are often ideal following the failure of a more proximal block (e.g., ulnar, median, or radial blocks at the elbow after failed brachial plexus blocks).

Be Cost-Conscious

Anesthesiologists must be knowledgeable regarding the hospital cost of supplies and consistently choose cost-efficient means of providing pain control. Incorporating considerations for cost awareness is a subcompetency of one of our core competencies: systems-based practice. While few supplies are essential, practitioners are faced with a number of important choices whenever regional techniques are contemplated. Opponents of ultrasound will claim that the initial investment in machinery is prohibitively expensive. Increased block success and a reduction in complications that accompanies visualization of the needle shaft and tip can more than overcompensate for the initial cost of the machine. The addition of local anesthetic adjuvants may obviate the need for continuous catheter techniques further reducing the cost of supplies. Costs may also be reduced through the use of a prep sponge and sterile towel pack instead of a commercially manufactured block tray, choosing bupivacaine over ropivacaine as circumstances permit, and utilizing reusable pumps as opposed to disposable infusion devices.

In this era of cost containment, the conscious and purposeful choice of supplies can help to justify the more frequent use of regional techniques. Furthermore, the economical use of equipment may also make practitioners less hesitant to appropriately abandon a difficult (i.e., time-consuming and possibly futile) block procedure.

Avoid Delays (Even the Perception of Delays)

The production pressures mentioned above require that practitioners ensure that regional techniques not be perceived as a cause of delays. On the contrary, a systematic multimodal approach to acute pain management, which includes regional analgesia, should be viewed as the ideal strategy to improve efficiency through "fast-tracking" (bypass of phase 1 recovery) and speeding discharge readiness [43].

Regional techniques must be performed expeditiously. When performing regional blocks, anesthesiologists should develop a reasonable degree of "clock consciousness" and may find it a useful exercise to occasionally time themselves. As a general rule, single-injection techniques should be able to be completed within 10 min and continuous techniques within 15 min. Practitioners who are unable to perform regional techniques within these parameters should strive to improve their skills when extra time can be easily afforded, such as before the first case of the day or postoperatively in the PACU. The first case of the day generally presents an ideal opportunity to perform

blocks in a preoperative area. Preoperative performance also allows for greater "soak time" and evaluation of block effects.

In an effort to avoid delays, anesthesiologists in community practice may elect to perform regional anesthesia in anesthetized or heavily sedated patients. Practice has been noted to vary widely in this regard. While performing regional anesthesia on insensate patients may ensure guaranteed cooperation and maximize flexibility in the timing of these procedures, it may also expose the patient and practitioner to unnecessary risk. Anesthesiologists should be aware of the recent practice advisory on this subject [44]. In this advisory, the authors acknowledge that the decision to perform regional anesthesia under these circumstances is "controversial, complicated, and must be made in the absence of traditional forms of evidence-based medicine." Notably, interscalene block is the only regional technique explicitly contraindicated in anesthetized or heavily sedated patients.

Documentation

In order to create an environment conducive to the optimal management of pain, anesthesiologists must effectively take ownership of the task. The department of anesthesia should generate any orders necessary for pain management and be intimately involved in any modification of hospital policies and nursing duties in this regard. The ultimate goal should be to raise the profile of anesthesiology such that any pain management issues within the institution are naturally directed to the department.

Proper documentation is an essential component of modern medical care. Documentation of pain management techniques primarily serves as a basic communication tool between anesthesiologists and all other members of the care team. However, the ramifications of accurate descriptions of interventions performed for the management of pain extend well beyond the clinical setting and are of obvious importance as legal records and to satisfy billing and regulatory requirements.

Most institutions require that patients provide written informed consent for anesthesia care, which is separate from surgical care. Practitioners may wish to obtain additional consent for pain management procedures, which can be considered apart from surgical anesthesia care. Procedures performed for postoperative pain are considered separate from the anesthesia care provided for surgery. As such, these procedures should be documented on a form separate from the anesthesia record. The key elements to a standardized peripheral nerve block procedure note form have been described and analyzed [45]. Dedicated procedure notes have been developed for both peripheral nerve blockade [45] and neuraxial techniques [46], which can be readily combined into a single form (Appendix 9). These forms can be transcribed into the electronic medical record if computerized physician order entry is used in a particular institution.

Finally, the importance of documentation in the context of reimbursement cannot be overstated. Several aspects of the procedure note are specifically included to address reimbursement issues. Namely, the form should specifically state that the procedure was performed for the purpose of postoperative analgesia (not surgical anesthesia), the indication for pain control (i.e., the location of pain being treated rather than the surgical procedure performed), and that anesthesia-based pain management has been requested by the attending surgeon (some have advocated obtaining the surgeon's signature on this form to more fully document this request). While the issue of reimbursement for pain management services involves a multitude of variables and is beyond the scope of this discussion, it is fair to state that proper reimbursement begins with proper documentation.

Following Through on an Acute Pain Management Course

Proper follow-through is a duty of ownership and critical to the long-term success of any patient care program. Efforts by anesthesiologists which clearly extend to the conclusion of care are

necessary to maximize benefits and minimize risks associated with acute pain management and will ensure the highest levels of satisfaction from both patients and surgeons.

Follow-Through for Outpatients

Adequate analgesia is an obvious prerequisite for ambulatory surgery, where inadequate pain control has been shown to be a common reason for prolonged postoperative stays and unanticipated admissions. Furthermore, it is essential to anticipate pain-related issues that may become evident following discharge in ambulatory patients as inadequate pain management has been shown to be a leading and preventable cause for readmissions [47]. In ambulatory surgery, regional techniques including single-injection and continuous perineural catheters provide improved analgesia, less opioid-related side effects, and the potential for earlier discharge [48].

Successfully caring for patients on an ambulatory basis requires that an individualized plan be devised for the ongoing multimodal management of pain. Outpatients should be provided with written instructions concerning further out-of-hospital management of their pain (e.g., oral analgesics), precautions regarding the care of an insensate limb (if they have had regional blocks), and a 24-h telephone contact number should they have any problems or concerns (Appendix 10). Patients discharged with continuous perineural infusions must have explicit instructions regarding the care of an indwelling catheter and should be capable of discontinuing the catheter at home without necessarily returning for personal medical attention.

Each institution must establish a system for follow-up with outpatients. As alluded to above, a brief telephone call 24–72 h postoperatively, usually by a nurse, is generally sufficient. General questions regarding patient satisfaction with intraoperative anesthesia and postoperative analgesia should be asked and any degree of patient dissatisfaction promptly passed on to the department of anesthesiology through established channels. The essence of these follow-up efforts should be documented and maintained by the department of quality management for a reasonable period of time (but does not necessarily need to be placed in the patient's permanent medical record) (Appendix 10). If efforts by telephone are unsuccessful, a card may be sent by mail to the patient explaining that reasonable attempts were made to establish routine postoperative follow-up by telephone and encouraging the patient to provide feedback regarding their perioperative experience either by telephone or in writing.

Follow-Up for Inpatients

Hospitalized patients, by virtue of their higher acuity of illness and injury, may stand to benefit the most from the effective management of pain through minimizing complications and possibly preventing chronic pain. Following up on inpatients is a primary function of an acute pain service. It has been repeatedly acknowledged that there is no consensus regarding the optimal structure or function of an acute pain service [49]. In the diverse reality of community practice, an acute pain service may take many forms but must at least consist of involved physician (e.g., anesthesia) and nursing personnel.

Nurses are at the core of inpatient follow-up and are empowered to assume the leading role in assessing and treating postoperative pain. Regular assessment of pain, commonly every 4 h utilizing a 0–10 pain rating scale, is noted on pain assessment flow sheets which serve to track the "5th vital sign" (i.e., pain) over time and record responses to treatment (see Appendix 6), although such documentation is now often computerized. Multimodal treatment of pain based on scores >4 is usually included in standing pain management orders. This approach has been used successfully in many practice settings and shown to result in improved pain control and patient satisfaction, but can also be associated with an increased incidence of opioid-induced oversedation [50]. This oversedation is usually preceded by a gradual decrease in the patient's level of consciousness, which underscores the critical importance of frequent clinical assessment by nursing.

Written/computerized entry orders are necessary to enable nurses to assume the leading hands-on role in the treatment of acute postoperative pain. Orders should be devised for each of the three basic anesthesia-based modalities: intravenous PCA, central neuraxial techniques (subarachnoid and epidural), and peripheral nerve/plexus blocking techniques (see Appendices 3–5, 7). Dedicated orders are recommended for each approach as this provides the clearest direction to nursing staff and serves to emphasize important difference between central and peripheral techniques, such as anticoagulation issues and the addition of other analgesics. Orders should allow for prudent adjustments of each of the primary modalities as well as provide direction for the addition of supplemental or adjunctive measures preventing any analgesic gaps. The coordination of postoperative pain management orders with the department of surgery avoids the duplication of services preventing overdosage and adverse drug interactions.

With the exception of patients receiving IV PCA, all patients enrolled in the acute pain service must be seen by anesthesia staff on a daily basis. This visit serves as a single-time assessment of pain management as well as an important opportunity to interact with nursing staff. Support of and collaboration with nursing staff can be the tipping point of success in a community-based regional anesthesia practice. A proactive effort to address any nursing-related concerns regarding pain management at this time can alleviate a number of night and cross-coverage issues. Anesthesiologists should also use postoperative visits as a means of extracting the greatest amount of experience from each pain management intervention (e.g., the efficacy and duration of single-injection blocks). Documentation of daily pain management follow-up should be placed in the patient's chart as well as submitted for billing purposes. One successful approach to the various documentation requirements has been the development of a carbon copy peel-and-stick form, where the procedure with billing codes is documented at the top, a self-adhesive daily "SOAP" format note can be placed in the progress notes, and the carbon copy submitted for billing purposes (Appendix 11). Adaptations of this note may be transposed into an electronic format to blend the needs of computerized order entry and patient follow-up. Alternatively, using an index card system, notes may be *recorded* directly in the patient's chart and, at the conclusion of pain service involvement, the updated index card submitted for billing of daily pain management.

Although the acute pain service in many community practice settings is not a formal, distinct entity, prompt 24-h coverage is essential. Instructions for appropriate contact of anesthesia personnel should be included in all pain management orders. An acute pain service beeper can help maintain continuity of communication within a system. If in-house anesthesia coverage is available, then an on-call physician manages overnight pain-related issues. If in-house overnight coverage is not available, then a mechanism that provides for off-hour patient evaluation needs to be devised. One solution is to specifically train selected night shift nursing personnel to evaluate and troubleshoot common issues concerning acute pain management (for continuous infusions, e.g., this would include occlusion alarms, catheter disconnections, and evaluation of skin entry sites).

Management of Complications

The ideal management of complications begins with the tacit acknowledgment that complications are inevitable. Having realistic preoperative discussions with patients regarding potential complications, obtaining meaningful written informed consent, and keeping accurate records comprise the foundations of appropriately dealing with adverse events. The traditional model of anesthesia care involved the placement of regional techniques with the "occasional" participation in postoperative pain management. The surgeons' office was frequently used as the "middle man" to manage block-related complications. Unhappy patients coupled with a lack of knowledge regarding block-related sequelae created an adversarial relationship between the two working disciplines. Adopting a "patient-centric"

approach where the anesthesiologist collaborates closely with the surgical staff on any postoperative block-related issues creates a cooperative approach to the management of complications. Furthermore, taking ownership of our interventions will certainly result in a more vigilant approach improving procedural efficacy.

One goal of any anesthesia-based acute pain service should be to promptly and directly deal with any adverse outcomes potentially related to pain management. Certain complications should be anticipated and managed proactively. Making contact with patients, either personally or by telephone, into a routine part of postoperative care will help to ensure the consistent and early discovery of any complications. If any potential complications of acute pain management are first encountered by nursing personnel, they should be reported without delay to designated anesthesia personnel (as well as to the surgeon's office).

Human beings make mistakes, distractions are ubiquitous, and memory fails during stressful situations. Medication errors, wrong-sided nerve blocks, and misconnected continuous infusions are examples of errors that can result in patient harm and threaten the viability of a regional anesthesia service. The above examples are all preventable errors which are problems in search of system solutions; therefore, an annual review of the system process by the physician leader is warranted in order to maintain the integrity of the service and promote a culture of safety.

A detailed discussion of the multitude of possible complications associated with acute pain management is beyond the scope of this chapter. Since appropriate management of complications will depend on individual circumstances, it is critical that each be personally evaluated. Fortunately, most potential adverse events are rare and/or self-limited. In the unlikely event of a serious complication, cultivating a professional relationship with a department of neurology can help to facilitate prompt consultations and referrals.

To a degree that would be considered appropriate, anesthesiologists are encouraged to stay involved in the care of any patients suffering adverse outcomes secondary to pain management efforts. It should be emphasized that taking an active interest in potential complications does not imply fault or negligence by anesthesiologists, but reinforces the commitment to quality health care and serves to legitimize the pain service in the eyes of other medical professionals. Continued personal communication with the patient helps to reinforce the desired message of genuine concern.

The complete management of complications secondary to pain management requires that all occurrences be compulsively included in quality improvement efforts.

Quality Improvement

A process for quality improvement (QI), also commonly referred to as quality management (QM), is a fundamental requirement of all healthcare organizations. Although QI for the department of anesthesiology largely concerns the operative period, in the case of an anesthesiology-based acute pain service, it must extend through the entire duration of management. Quality improvement efforts allow for clinically significant data concerning pain management to be collected and monitored with the goal of improving performance and enhancing patient safety. The American Society of Anesthesiologists website is an excellent resource regarding quality improvement (http://www.asahq.org). The Quality Management Template found at the ASA website, developed by ASA committees and provided without charge, serves as an indispensable guide to implementing a quality improvement program in any practice setting [51].

The ready availability of occurrence reporting forms is a key element in the consistent self-reporting of adverse events. For cases in the operating room, reporting forms are often attached to the anesthesia record. Similarly, anesthesia-specific incident reporting forms should be immediately at hand as nurses and anesthesiologists are engaged in following through on an acute pain management plan. While occurrence forms are usually completed manually, if large amounts of data will require analysis, it is advisable that these forms be capable of being scanned.

A number of computer-ready process improvement tracking tools are commercially available, with several examples provided in ASA's Quality Management Template. Although self-reporting of adverse outcomes has inherent weaknesses, it has been shown to be more reliable than medical chart review or incident reports and tends to be successful in environments where it is perceived that participation may result in improved patient care [52].

Finally, it is essential that one member of the department of anesthesiology assumes the leadership role regarding quality improvement. This individual is responsible for assuring the consistent reporting of sentinel events (a significant limitation of self-reporting), managing the appropriate analysis of data (usually consisting of at least some type of peer review), and overseeing the adoption of appropriate measures to improve performance and safety.

Conclusion

Anesthesiologists currently have the knowledge as well as the pharmacologic and technological tools necessary to successfully control postoperative orthopedic surgery pain; however, inadequate analgesia continues to be a prominent medical issue. Meeting the challenges of acute pain management in modern community practice requires a comprehensive appreciation of the entire process, physician leadership, and an organizational commitment. Incorporating regional techniques into community practice offers anesthesiologists an opportunity to extend themselves beyond the OR into all patient care areas. Primarily through the coordinated efforts of our surgical colleagues, anesthesiology and nursing staff, a culture of consistent and efficient pain management can be established in any practice setting in a physician-directed nurse-delivered model.

Clinical Pearls

- Appoint a physician leader.
- Establish a core group within the partnership.
- Identify which surgeons are supportive of the initiative.
- Empower the nursing staff.
- Create a mobile block cart and utilize the PACU as a block room.
- Think "complementary."
- Operate within your comfort zone.
- Learn in a logical progression.
- Develop "clock consciousness" and avoid delays.
- *Incorporate ultrasound into your practice*.
- Manage complications directly.

Ultrasound Pearls

- After attending a workshop, practice probe ergonomics and visualization of the anatomy on staff members on a daily basis in order to gain proficiency with ultrasound use.
- Reinforce knowledge of the anatomy by didactic review in a color atlas with ultrasound practice on live models to develop an understanding of the target structures.
- Start with simple blocks located near easily identifiable structures (i.e., femoral, interscalene).
- Learn your machine; master knobology, etc. Become familiar with the technical adjustments of the ultrasound machine. Know how to set the optimum balance of frequency, contrast, and depth.
- Using the in-plane approach where the needle shaft is visualized maximizes the chance of seeing the tip of the needle as you navigate toward the intended structure minimizing the risk of complication.

Review Questions

1. All of the following are examples of interventions used in a standard multimodal analgesic pathway except:
   (a) Acetaminophen
   (b) NSAIDs

(c) Periarticular local anesthetic infiltration of soft tissues
(d) Spinal anesthetic with continuous femoral block
(e) General anesthetic with rapid sequence induction

2. The two principal reasons for not favoring regional anesthesia when surveying orthopedic surgeons are:
   (a) Operating room delay and excessive motor block
   (b) Operating room delay and high injection pressures
   (c) Unpredictable success and medicolegal complications
   (d) Unpredictable success and operating room delay
   (e) Medicolegal complications and operating room delay
3. Success of a regional anesthesia service is predicated on:
   (a) Collaboration with ancillary staff
   (b) Implementation of evidenced-based guidelines for pain management
   (c) Minimizing wrong-sided blocks with the performance of a "time-out"
   (d) Avoiding operating room delays
   (e) All of the above
4. Contents of a standardized regional anesthesia block cart should include all of the following except:
   (a) Resuscitative medications
   (b) Endotracheal tubes
   (c) Intralipid
   (d) EMLA cream
   (e) Ester local anesthetics
5. Contents necessary for a successful resuscitation with lipid rescue include all of the following except:
   (a) 20% intralipid
   (b) Macrodrip infusion kit
   (c) 60 cc syringe
   (d) Propofol
6. Regional techniques for ambulatory surgery result in all of the following except:
   (a) Improved analgesia
   (b) Less opioid-related side effects
   (c) Potential to bypass the postanesthesia care unit
   (d) Increase use of antiemetics
   (e) Reduced incidence of readmission
7. Coordination of a successful pain management program requires strong institutional support. Didactic instruction by the department of anesthesiology in nursing education should consist of:
   (a) Care for/troubleshoot catheters and infusion pumps
   (b) Expecting quadriceps weakness as a normal component of a femoral block
   (c) How to administer intralipid for resuscitation of local anesthetic toxicity
   (d) Delineation of discharge instructions
   (e) All of the above
8. All of the following factors may explain why anesthesiologists in community practice perform fewer peripheral nerve blocks as compared to practitioners in academic institutions except:
   (a) Lack of an accommodating infrastructure
   (b) Deficient exposure during residency training
   (c) Time pressures
   (d) Patient request
   (e) Lack of assistance
9. Regional anesthetic techniques can improve discharge predictability and accelerate discharge eligibility. Social service involvement early in the patients' perioperative course can:
   (a) Overcome delays in nursing home placement
   (b) Arrange for patient transportation
   (c) Anticipate lack of home readiness by family members facilitating timely discharge

(d) Addressing patient concerns resulting in requests for extended hospital stay
(e) All of the above

10. Useful approaches when dealing with block-related complications include:
    (a) Having realistic preoperative discussions with patients regarding potential complications
    (b) Obtaining meaningful written informed consent
    (c) Keeping accurate records
    (d) All of the above

Answers:

1. e
2. d
3. e
4. d
5. d
6. d
7. e
8. d
9. e
10. d

Appendix 1: Lipid Rescue Algorithm (Fig. 8.3)

LipidRescue™

TREATMENT FOR LOCAL ANESTHETIC-INDUCED CARDIAC ARREST

PLEASE KEEP THIS PROTOCOL ATTACHED TO THE INTRALIPID BAG

In the event of local anesthetic-induced cardiac arrest that is unresponsive to standard therapy, in addition to standard cardio-pulmonary resuscitation, Intralipid 20% should be given i.v. in the following dose regime:

- Intralipid 20% 1.5 mL/kg over 1 minute
- Follow immediately with an infusion at a rate of 0.25 mL/kg/min,
- Continue chest compressions (lipid must circulate)
- Repeat bolus every 3-5 minutes up to 3 mL/kg total dose until circulation is restored
- Continue infusion until hemodynamic stability is restored. Increase the rate to 0.5 mL/kg/min if BP declines
- A maximum total dose of 8 mL/kg is recommended

In practice, in resuscitating an adult weighing 70kg:

- *Take a 500ml bag of Intralipid 20% and a 50ml syringe.*
- *Draw up 50ml and give stat i.v., X2*
- *Then attach the Intralipid bag to an iv administration set (macrodrip) and run it .i.v over the next 15 minutes*
- *Repeat the initial bolus up to twice more – if spontaneous circulation has not returned.*

If you use Intralipid to treat a case of local anaesthetic toxicity, please report it at www.lipidrescue.org. Remember to restock the lipid. Ver7/06

Appendix 2: Pain Management Log Book (Fig. 8.4)

Anesthesiology Postoperative Pain Management Procedure Record

Postoperative pain management specifically requested by_____

Medical indication (e.g. pain location) _____

"Time Out" immediately before starting procedure @ _____ correct patient ID using 2 identifiers ( )

Team members present:_____ Correct side and site ( )

Approach	Patient Condition	Skin Prep
☐ Midline ☐ Right ☐ Paramedian ☐ Left	☐ Awake ☐ Sedated ☐ Anesthetized	☐ Alcohol ☐ Chlorhexidine
	Patient Position ☐ RLD ☐ Supine ☐ Sitting	☐ Povidone-Iodine ☐ Iodophor/isopropyl
☐ Ultrasound-assisted	☐ LLD ☐ Prone	

Needle:_____ Gauge/Length_____mm ☐ Quincke ☐ Pencil-point

☐ Insulated ☐ Tuohy ☐ Short-bevel ☐ Other:_____

Single-Injection Techniques

Peripheral Nerve Blockade	Neuraxial Blockade
Block performed: _____	Technique: ☐ Subarachnoid ☐ Epidural
Technique: ☐ Infiltration ☐ Paresthesia	Approximate interspace: _____
☐ Nerve stimulation: _____mA	Epidural loss-of resistance: ☐ Air ☐ Saline
Comments:	Epidural depth: _____cm
	Comments:

Continuous Techniques

Peripheral Nerve Blockade	Neuraxial Blockade (Epidural)
Block Performed: _____	Approximate interspace: _____
Nerve stimulation: _____mA at _____depth (cm)	Epidural loss-of resistance: ☐ Air ☐ Saline
Catheter secured at skin:_____cm	Depths: Epidural _____cm Catheter_____ cm
Comments:	Comments:

Injectate			Narrative	
Local Anesthetic	[%]	Volume (ml)	☐ Blood aspirated	☐ Unanticipated CSF
			☐ Pain on injection	☐ Unanticipated paresthesia
Adjunct(s):			☐ (+) Test dose of IV / subarachnoid placement	
Epinephrine:			Comments/actions:	
☐ Incremental injection ☐ (--) Epinephrine test dose				

Performed by: _____ _____ _____ _____

Name Signature Date Time

Billings Clinic

Patient Identification

Appendix 3: Pain Management Order Sheet (Fig. 8.5)

Name:
DOB: Age: Sex:
Acct#: Religion:
MR#:
Attending MD:
Admitted on:

North Shore LIJ Huntington Hospital
North Shore-Long Island Jewish Health System

PAIN MANAGEMENT ORDER SHEET
INTRAVENOUS PCA

(Recommended for patients over 40 kg)

Allergies: _____ Height: _____ Weight: _____lb _____ kg ☐ Actual ☐ Estimated
Pregnant: ☐ Yes ☐ No Breast Feeding: ☐ Yes ☐ No

DATE: _____ TIME: _____

1. SELECT drug therapy (ONE DRUG ONLY): if questions, please contact prescriber

☐ MORPHINE 5 mg/mL	☐ HYDROMORPHONE 1 mg/mL	☐ FENTANYL 50mcg/mL
Loading dose (2-5mg) _____mg	Loading dose (0.3-0.5mg) _____mg	Loading dose (25-75mcg) _____mcg
☐ One dose only	☐ One dose only	☐ One dose only
☐ Repeat X ___, ____ minutes apart	☐ Repeat X ____ , ____ minutes apart	☐ Repeat X ____ , ____ minutes apart
PCA dose (1-2mg) _____mg	PCA dose (0.2-0.4mg) _____mg	PCA dose (10-25mcg) _____mcg
Lockout interval (5-15 min) _____minutes	Lockout interval (5-15 min) _____minutes	Lockout interval (5-15 min) _____minutes
Continuous rate (1-2mg/hr) _____mg/hr	Continuous rate (0.2-0.4mg/hr) ____mg/hr	Continuous rate (10-25mcg/hr) ____mcg/hr
Total dose _____mg in 4 hrs (50 mg maximum)	Total dose _____mg in 4 hrs (10 mg maximum)	Total dose _____mcg in 4 hrs (500 mcg maximum)

2. SUPPORTIVE therapy medication(s) while on PCA.
   For itching: Naloxone (Narcan®) 0.1mg SC q 2h PRN

   For nausea: Ondansetron (Zofran®) 4mg IVP q 6h PRN
   If ineffective after 20 minutes call anesthesiologist/prescriber

   ☐ Oxygen via nasal cannula at _____ L/min

3. While on PCA NO sedatives, opioids or other respiratory depressants are to be given, except by order of an anesthesiologist.

4. MONITOR vital signs (BP, HR, RR), sedation level, pain level and pump settings and document:
   a. q 1 hour X 2, then q 4 hours
   b. q 4 hours for duration of PCA.
   c. q 1 hour X 2 after any change, then q 4 hours

5. RESCUE: If respiratory rate falls below 6 per minute with changes in level of sedation:
   a. Stop PCA infusion pump
   b. Give naloxone (Narcan®) 0.2 mg IVP, may repeat X 1 in 5 minutes if RR remains below 6 per minute.
   c. Call prescriber immediately.

6. OTHER instructions: _____
   _____

Signature: _____ # _____ Beeper # _____

Orders verified by: _____ RN _____ RN

1PO

Rev. 4/07 #1-369

Appendix 4: Pain Management Order Sheet (Fig. 8.6)

North Shore LIJ Huntington Hospital
North Shore-Long Island Jewish Health System

PAIN MANAGEMENT ORDER SHEET
CONTINUOUS REGIONAL ANALGESIA

Name:
DOB: Age: Sex:
Acct#: Religion:
MR#:
Attending MD:
Admitted on:

Allergies: _____

Height: _____

Weight: _____lb _____ kg ☐ Actual ☐ Estimated

Pregnant: ☐ Yes ☐ No Breast Feeding: ☐ Yes ☐ No

Date: _____ Time: _____

1. Catheter site:
   - ☐ Axillary
   - ☐ Infraclavicular
   - ☐ Interscalene
   - ☐ Fascia iliac
   - ☐ Femoral
   - ☐ Popliteal
   - ☐ Psoas
   - ☐ Other (specify): _____

2. ENSURE that catheter site, infusion and tubing (no ports) are clearly labeled.
   Catheter positioned at _____ cm at skin.
   DO NOT MANIPULATE catheter.

3. DRUG:
   - ☐ Ropivacaine (Naropin®) 0.2% (2mg/mL)
   - ☐ Other: _____

4. DOSING:
   - ☐ Manual Loading (by anesthesiologist only): Dose _____ mL
   - ☐ Continuous Infusion via pump: Rate _____ mL/hr (Max. 25mL/hr).
   - ☐ Titrate: _____
   - ☐ Other: _____

5. MAINTAIN IV access during drug administration (Saline lock).

6. MONITOR and document data as per Pain Management Flowsheet q 4 hours.

7. Additional pain management:
   - ☐ PCA (see PCA order sheet).
   - Other: _____

8. CALL anesthesiologist if patient has:
   a. Inadequate pain relief.
   b. Signs of toxicity (e.g. ringing in the ears, perioral numbness or tingling, change in sedation level or mental changes).
   c. SBP above _____ or below _____; sustained heart rate above _____ bpm or below _____ bpm.
   d. Kinking or dislodgment of catheter.
   e. Catheter site problems (e.g. leaking, edema, erythema and/or signs of infection).
   f. Lower Extremity Motor Block; score of 2 or above on the 0-3 Bromage scale.

9. CONTACT anesthesiologist on call, for any problems (Ext. 2491 or 2353) if primary anesthesiologist is unavailable (after 8 pm, on weekends & holidays).

10. AMBULATE Patient may ambulate only under the following circumstances:
    a. Have a physician's order to ambulate.
    b. Registered nurse assesses the patient and verifies absence of residual weakness or motor block.
    c. Patient is able to stand without assistance.
    d. Patient must be assisted by RN, LPN or P.T. while ambulating.

Signature: _____ # _____ Telephone # _____ Beeper # _____

Orders verified by: _____ RN _____ RN

1PO

#1-370 Rev, 4/07

Appendix 5: Pain Management Order Sheet (Fig. 8.7)

North Shore LIJ Huntington Hospital
North Shore-Long Island Jewish Health System

Name:
DOB: 00 / 00 / 00 Age: Sex:
Acct#: 0000000 Religion:
MR#: 0000000
Attending MD:
Admitted on: 00 / 00 / 00

PAIN MANAGEMENT ORDER SHEET
EPIDURAL INFUSION

Allergies:_____

Height: _____ Weight: _____kg Pregnant: ☐Yes ☐No Breast Feeding: ☐Yes ☐No

The patient has an epidural catheter in place, which is to be handled by an anesthesiologist only. Patient has received:
Drug(s):_____ Time: _____ Date: _____

Do NOT administer dalteparin (Fragmin®) to any patient with an indwelling epidural catheter.
Do NOT administer dalteparin (Fragmin®) until 4h after epidural catheter is discontinued.
Please notify anesthesiologist BEFORE IV or SC heparin therapy is started.
Please notify anesthesiologist if warfarin (Coumadin®) is ordered.
Epidural catheter must be removed prior to 2nd dose of warfarin (Coumadin®).

CHECK appropriate box: ☐ Discontinue OR ☐ Continue
☐ Alprazolam ☐ Lorazepam ☐ Diazepam ☐ Zolpidem ☐ Morphine ☐ Hydromorphone ☐ Oxycodone
Other:_____

SELECT drug therapy (ONE preservative free drug ONLY) and initiate via Epidural Infusion Pump

Morphine 50 mcg/ML + bupivacaine 0.04%	**Hydromorphone 10 mcg/ML+** bupivacaine 0.04%	**Fentany 4 mcg/ML +** bupivacaine 0.04%
Continuous Rate: _____ mL/hr	Continuous Rate: _____ mL/hr	Continuous Rate: _____ mL/hr
Demand Dose (PCEA):	**Demand** Dose (PCEA):	**Demand** Dose (PCEA):
☐ 3mL every 10 minutes	☐ 3mL every 10 minutes	☐ 3mL every 10 minutes
☐ 5mL every 10 minutes	☐ 5mL every 10 minutes	☐ 5mL every 10 minutes
☐ 5mL every 15 minutes	☐ 5mL every 15 minutes	☐ 5mL every 15 minutes
☐_____ mL every _____ minutes	☐ _____ mL every _____ minutes	☐ _____ mL every _____ minutes

SUPPORTIVE THERAPY medication(s) while on epidural
For itching: Naloxone (Narcan®) 0.1 mg SC q 2h PRN
For nausea: Ondansetron (Zofrn®) 4 mg IVP q 6 h PRN. if ineffective after 20 minutes call anesthesiologist.
☐ Oxygen via nasal cannula at _____L/min

MAINTAIN IV saline lock for duration of epidural infusion.

RESCUE If Respiratory Rate (RR) falls below 8/min with changes in sedation level.
a. Stop infusion pump
b. Give naloxone (Narcan®) 0.2 mg IVP, may repeat X 1, in 5 minutes if RR remains below 8/min
c. Call anesthesiologist immediately

MONITOR BP, IIR, RR, sedation level, pain level and pump settings. Document on PMFS q15min x1h, then q2h for duration of infusion

CALL anesthesiologist if patient has:
a. Change in level of sedation, lethargy, increased somnolence.
b. Systolic BP less than 90
c. Evidence of airway obstruction, change in respiratory pattern, decrease in respiratory effort, respiratory rate less than 10/min.
d. Complains of weakness or numbness in lower extremities, pain, urinary retention, severe itching, severe nausea or vomiting.

CHECK and document ability to maintain motor function in lower extremities. May ambulate only under the following circumstances:
a. Have a surgical order to ambulate.
b. Registered nurse assesses the patient and verifies absence of residual weakness or motor block.
c. Patient is able to stand without assistance
d. Patient must be assisted by RN or LPN while ambulating

CONTACT anesthesiologist on call if primary anesthesiologist is unavailable (after 8 pm, on weekends & holidays).

FILL a NEW Pain Management Order Sheet **EPIDURAL INFUSION** for any change in order.

Date: _____ Time: _____

Signature: _____ # _____ Beeper #: _____

Orders verified by: _____ RN _____ RN

1PO

#1-371 Rev. 4/07; 10/07; 3/08
8/09

Appendix 6: Nursing Assessment Flow Sheet (Fig. 8.8)

Route of Infusion # 1: ______________________
Drug: ____________________________________
Concentration: ______________/mL

Initiated:

Date	Time	INIT	INIT

Discontinued:

Date	Time	Waste	INIT	INIT

Route of Infusion # 2: ______________________
Drug: ____________________________________
Concentration: ______________/mL

Initiated:

Date	Time	INIT	INIT

Discontinued:

Date	Time	Waste	INIT	INIT

ONLY PATIENTS ARE ALLOWED TO PUSH BUTTON

DATE	TIME	Loading or Bolus Dose			Continuous (basal) Infusion Dose			Demand Dose (PCA or PCEA)			INITIAL	2nd INITIAL (Witness)
		CRA	Epidural	IV	CRA	Epidural	IV	PCA or PCEA Dose	Lockout Interval	Total Delivered		

Appendix 7: Patient Instruction Sheet for Outpatients Receiving Regional Blocks (Fig. 8.9)

North Shore LIJ Huntington Hospital
North Shore-Long Island Jewish Health System

Pain Management Flow Sheet (PMFS)

Name:
DOB: Age: Sex:
Acct#: Religion:
MR#:
Attending MD:
Admitted on:

Signature/Title	Initial	Signature/Title	Initial

Allergies: _____

Patient comfort/goal level (0 to 10): _____

Date	Time	Sedation Scale	Pain Level / Scale Used	Pain Location	Characteristic	Clinical Signs	BP**	Heart Rate**	Resp. Rate	Bromage Scale	O_2 Sat***	Cardiac Monitor	Catheter Dressing	Intervention	Initial	Outcomes**** Pain Level / Scale Used	Outcomes**** Time	Outcomes**** Initial

Sedation Scale
1 Alert (Arousable by minimal stimuli)
2 Lethargic (Arousable by increased stimuli)
3 Stuporous (Arousable by vigorous stimuli)
4 Comatose (Unarousable)

Bromage Scale
0 Full flexion of knees and feet.
1 Able to flex knees full flexion of feet.
2 Unable to flex knees still flexion of feet.
3 Unable to move legs or feet.

Pain level Scale
0 – 10

Pain Rating Scale
N Numerical
W Wong/Baker faces
F FLACC

Location
A Abdominal
B Back
C Chest
E Extremity
H Head
I Incisional
P Perineal
***O** Other

Characterisitics
SP Sharp Pain
DP Dull Pain
TP Throbbing Pain
AP Aching Pain
B Burning
***O** Other

Interventions
D Drug (see MAR)
E Education/Support
I Ice Pack
H Heat Pack
M Massage
P Position Change
S Sitz Bath
***O** Other

Clinical Signs
A Anxiety
C Calm
D Diaphoresis
M Myoclonus
N Nausea
P Pruritus
R Restlessness
V Vomiting
WS Without Sign
***O** Other

Cardiac Monitor
N = No
Y = Yes

Catheter Dressing
(Epidural or CRA)
I Intact/occlusive
B Bloody
L Leaking
P Purulent
S Soiled
***O** Other

* Other document on IPN
** BP & HR q 2h for epidural
q 4h for PCA (after initial 1st 2 hours)
Once a shift for all other analgesics.
*** O_2 Saturation if applicable
**** Outcome Pain Level/Scale used: 1 hour after PO, IM, SQ, IV, change in IV PCA and all other non pharmacologic interventions

3PMF

#1-341 Rev 4/07

Appendix 8: Post-op Multimodal Pain Management Orders (Fig. 8.10)

Patient Instruction Sheet for Outpatients Receiving Regional Blocks

Your anesthesiologist is treating your postoperative pain, in part, with a regional block. Regional blocks use local anesthetics (like 'xylocaine' and 'novacaine') to make part of your body numb instead of painful. Depending on a number of factors, especially the particular local anesthetic agent used, you may experience numbness for many hours (not uncommonly up to 36 hours). In addition to numbness ("sensory block"), you may also experience significant weakness ("motor block") in the affected area.

It is important that you protect your numb limb. If your block involves the upper extremities (shoulders and arms), you should wear a sling if one has been provided and avoid sleeping on the affected side. If your block involves the lower extremities (legs), you should not try to bear weight, walk without assistance, or drive a car until all numbness has worn off.

It is normal after regional blocks to experience:

* Tenderness, mild swelling, or bruising at the site of injection
* A "pins and needles" sensation as the block wears off

And in the case of regional block performed for shoulder surgery:

* Temporary hoarseness, a droopy eyelid, and difficulty swallowing

It is usual to use other medications in combination with regional blocks to fully control postoperative pain. You should take all pain medications prescribed to you by your surgeon as directed. To avoid unnecessary discomfort, pain medications should be started before your block has fully worn off.

You should contact the on-call anesthesiologist 24 hours a day at the numbers shown below for any of the following:

* Enlarging redness or drainage at the site of injection
* Numbness lasting longer than 48 hours
* Shooting or burning pain that seems more related to the block than your surgery
* Any urgent concerns regarding your regional block

Contact numbers: Tell the hospital operator that you need to speak with the on-call anesthesiologist.

Local XXX-XXXX

Long Distance (Toll Free) 1-800-XXX-XXXX

Appendix 9: Anesthesiology Postoperative Pain Management Procedure Record (Fig. 8.11)

North Shore LIJ Huntington Hospital
North Shore-Long Island Jewish Health System

POST-OP
MULTIMODAL PAIN MANAGEMENT ORDERS

Name:
DOB: Age: Sex:
Acct#: Religion:
MR#:
Attending MD:
Admitted on:

Allergies:_____

Height:_____ Weight:_____ kg

Pregnant: - Yes No Breast Feeding:- Yes No

In conjunction with CRA (see CRA order form)

KNEE Arthroplasty
<75 YEARS OLD
Celecoxib (Celebrex®) 200 mg PO daily x 72h
Acetaminophen (Tylenol®) 650 mg PO q6h x 72h
Oxycodone SR (Oxycontin®) 20 mg PO q12h x 72h. Hold HR≤50, sedation scale ≥3
Breakthrough pain: Oxycodone 10 mg PO q6h prn mild pain (1 – 4) x 72h Oxycodone 20 mg PO q6h prn moderate pain (5 – 6) x 72h Hydromorphone (Dilaudid®) 1 mg SC q3h prn severe pain (7 – 10) x 72h
≥75 YEARS OLD
Celecoxib (Celebrex®) 200 mg PO daily x 72h
Acetaminophen (Tylenol®) 650 mg PO q6h x72h
Oxycodone SR (Oxycontin®) 10 mg PO q12h x 72h Hold HR≤50, sedation scale ≥3
Breakthrough pain: Oxycodone 5 mg PO q6h prn mild pain (1 – 4) x 72h Oxycodone 10 mg PO q6h prn moderate pain (5 – 6) x 72h Hydromorphone (Dilaudid®) 1 mg SC q3h prn severe pain (7 – 10) x 72h
HIP Arthroplasty
<75 YEARS OLD
Celecoxib (Celebrex®) 200 mg PO daily x 72h
Acetaminophen (Tylenol®) 650 mg PO q6h x 72h
Oxycodone SR (Oxycontin®) 10 mg PO q12h x 72h Hold HR≤50, sedation scale ≥3
Breakthrough pain: Oxycodone 10 mg PO q6h prn mild pain (1 – 4) x 72h Oxycodone 20 mg PO q6h prn moderate pain (5 – 6) x 72h Hydromorphone (Dilaudid®) 0.5 mg SC q3h prn sever pain (7 – 10) x 72h
≥75 YEARS OLD
Celecoxib (Celebrex®) 200 mg PO daily x 72h
Acetaminophen (Tylenol®) 650 mg PO q6h x 72h
Oxycodone SR (Oxycontin®) 10 mg PO x1 as soon as patient gets to the floor then q AM x 72h Hold HR≤50, sedation scale ≥3
Breakthrough pain: Oxycodone 5 mg PO q6h prn mild pain (1 – 4) x 72h Oxycodone 10 mg PO q6h prn mild pain (5 – 6) x 72h Hydromorphone (Dilaudid®) 0.5 mg SC q3h prn severe pain (7 – 10) x 72h
Additional Orders for Opioid Tolerant Paitents (as determined by Anesthesiologist)
Gabapentin 100 mg PO q8h
Clonidine (Catapres- TTS® -2) 0.2 mg/24h apply once weekly

Date: _____ Time: _____ Signature _____ LIP # _____

* 1 P O *

* 1 P O *

Appendix 10: Outpatient Postoperative Contact Form (Fig. 8.12)

Billings Clinic

Patient Identification

Anesthesiology Postoperative Pain Management Procedure Record

Postoperative pain management specifically requested by _____

Medical indication (e.g. pain location) _____

Proper side confirmed: ☐	Patient Condition ☐ Awake ☐ Sedated ☐ Anesthetized	Skin Prep ☐ Alcohol ☐ Chlorhexidine ☐ Povidone-iodine ☐ Iodophor/isopropyl
Approach ☐ Midline ☐ Right ☐ Paramedian ☐ Left ☐ Ultrasound-assisted	Patient Position ☐ RLD ☐ Supine ☐ Sitting ☐ LLD ☐ Prone	☐ Sterile ☐ Aseptic

Needle: _____ Gauge / Length _____ mm ☐ Quincke ☐ Pencil-point

☐ Insulated ☐ Tuohy ☐ Short-bevel ☐ Other: _____

Single-Injection Techniques

Peripheral Nerve Blockade	Neuraxial Blockade
Block performed: _____	**Technique**: ☐ Subarachnoid ☐ Epidural
Technique: ☐ Infiltration ☐ Paresthesia ☐ Nerve stimulation: _____ mA Comments:	Approximate interspace: _____ Epidural loss-of-resistance: ☐ Air ☐ Saline Epidural depth: _____ cm Comments:

Continuous Techniques

Peripheral Nerve Blockade	Neuraxial Blockade (**Epidural**)
Block Performed: _____	Approximate interspace: _____
Nerve stimulation: _____ mA at _____ depth (cm)	Epidural loss-of-resistance to: ☐ Air ☐ Saline
Catheter secured at skin: _____ cm	Depths: Epidural _____ cm Catheter _____ cm
Comments:	Comments:

Injectate		Narrative
Local Anesthetic	[%] Volume (ml)	☐ Blood aspirated ☐ Unanticipated CSF
		☐ Pain on injection ☐ Unanticipated paresthesia
		☐ (+) Test dose for IV/subarachnoid placement
Adjunct(s):		Comments/actions:
Epinephrine:		
☐ Incremental injection ☐ (-) Epinephrine test dose		

Performed by: _____ _____ _____ _____

Name Signature Date Time

Appendix 11: Peel-and-Stick Form (Figs. 8.13 and 8.14)

Billings Clinic.

Patient Identification

Outpatient Postoperative Contact Form

Patient Information (to be completed upon entry into Outpatient Surgery)	
Date: _____	Address: _____
Procedure: _____	Telephone: _____
Anethesiologist: _____	Parents: _____

Telephone Interview

Date/Time of Callback: _____

Did you have any problems after leaving the hospital?
(i.e. pain control, nausea/vomiting, incision site drainage/bleeding, fever, bowel/bladder etc.)

_____

_____

_____

Did you meet and talk with your anesthesiologist before surgery?

_____

Do you have any other questions, comments, or suggestions?

_____

_____

_____

_____

Actions

Actions taken by RN:

_____

_____

_____

_____

_____

☐ Unable to contact by telephone. Card sent to address above on _____ (date)

RN: Signature _____ Printed Name _____

HUNTINGTON HOSPITAL
ACUTE PAIN MANAGEMENT SERVICE

_____ PCA
_____ EPI
_____ CRA

Surgeon: _____ Diagnosis code:
Anesthesiologist: _____ _____
Operation: _____ ROOM NO.
Date of service: _____

HUNTINGTON HOSPITAL ACUTE PAIN MANAGEMENT SERVICE: THERAPY INITIATION

CHECK ONE:

☐ I. V. PCA	☐ EPIDURAL/NEURAXIAL	☐ PERIPHERAL NERVE BLOCK
CPT: 01997 **INITIAL SETTINGS:** ☐ Morphine ☐ Hydromorphone Continuous Rate: _____ mg./hr. Demand Dose _____ mg. Lockout Interval _____ Min. 4 Hr. Dose Limit _____	CPT ☐ Thoracic 62318 + 99231 ☐ Lumbar 62319 + 99231 ☐ Postop Pain Rx only (Daily Mgmt.) 01996 ☐ Postop Visit (Single Shot) 99231 ☐ Blood Patch 62273 **INITIAL SETTINGS:** ☐ Continuous Rate: ___ml./hr./Titrate ____ to ___ Bupivacaine: _____ % Ropivacaine _____% + Fentanyl ___ mcg./ml., Hydromorphone___mcg./ml. or Preserv. Free Morphine ____mcg./ml. ☐ PCEA Dose _____ ml. Delay _____ Min. Other: _____	Brachial Plexus ☐ Single shot 64415 ☐-59 ☐ Continuous 64416 ☐-22 Sciatic ☐ Single shot 64445 ☐ Continuous 64446 Femoral ☐ Single shot 64447 ☐ Continuous 64448 Psoas ☐ Continuous 64449 Bolus _____ ml. Continuous Rate: _____ ml./hr. Ropivacaine _____ % Other _____ During Placement: ☐ Yes ☐ No Home ☐ Yes ☐ No Paresthesia ☐ Yes ☐ No Pain on Injection ☐ Yes ☐ No Low Resistance to Inj. PCRA Dose _____ ml. Delay _____ Min.

☐ Procedure Explained to Patient including Risks/Benefits/Alternatives. Patient Consents to Procedure.

POSTOP DAY #___

HUNTINGTON HOSPITAL · ACUTE PAIN MANAGEMENT SERVICE

SUBJECTIVE: _____

Date: _____ **OBJECTIVE:** Pain Score: _____ /10
☐ PCA ☐ Epidural ☐ Peripheral nerve block ☐ Single shot neuraxial
Time: _____ ☐ Vital signs stable ☐ Alert & oriented ☐ No motor/sensory block ☐ Nausea ☐ Pruritus ☐ Headache
☐ Bromage Score _____
ASSESSMENT/PLAN: ☐ Continue current Rx ☐ Catheter removed, tip intact ☐ Further pain Rx plan _____
Provider Signature: _____ **COMMENTS:** _____

POSTOP DAY #___

HUNTINGTON HOSPITAL · ACUTE PAIN MANAGEMENT SERVICE

SUBJECTIVE: _____

Date: _____ **OBJECTIVE:** Pain Score: _____ /10
☐ PCA ☐ Epidural ☐ Peripheral nerve block
Time: _____ ☐ Vital signs stable ☐ Alert & oriented ☐ No motor/sensory block ☐ Nausea ☐ Pruritus ☐ Headache
☐ Bromage Score _____
ASSESSMENT/PLAN: ☐ Continue current Rx ☐ Catheter removed, tip intact ☐ Further pain Rx plan _____
Provider Signature: _____ **COMMENTS:** _____

POSTOP DAY #___

HUNTINGTON HOSPITAL · ACUTE PAIN MANAGEMENT SERVICE

SUBJECTIVE: _____

Date: _____ **OBJECTIVE:** Pain Score: _____ /10
☐ PCA ☐ Epidural ☐ Peripheral nerve block
Time: _____ ☐ Vital signs stable ☐ Alert & oriented ☐ No motor/sensory block ☐ Nausea ☐ Pruritus ☐ Headache
☐ Bromage Score _____
ASSESSMENT/PLAN: ☐ Continue current Rx ☐ Catheter removed, tip intact ☐ Further pain Rx plan _____
Provider Signature: _____ **COMMENTS:** _____

FORM 1-324 (REV. 11/05)

References

1. Hanna MN, Murphy JD, Kumar K, et al. Regional techniques and outcome: what is the evidence? Curr Opin Anaesthesiol. 2009;22:672–7.
2. Apfelbaum JL, Chen C, Mehta SS, et al. Postoperative pain experience: results from a national survey suggest postoperative pain continues to be undermanaged. Anesth Analg. 2003;97:534–40.
3. McGrath B, Elgendy H, Chung F, et al. Thirty percent of patients have moderate to severe pain 24 hr after ambulatory surgery: a survey of 5,703 patients. Can J Anesth. 2004;51:886–91.
4. American Society of Anesthesiologists Task Force on Acute Pain Management. Practice guidelines for acute pain management in the perioperative setting. An updated report by the American Society of Anesthesiologists Task Force on Acute Pain Management. Anesthesiology. 2004;100:1573–81.
5. Abouleish AE, Prough DS, Whitten CW, et al. Comparing clinical productivity of anesthesiology groups. Anesthesiology. 2002;97:608–15.
6. Oldman M, McCartney CJL, Leung A, et al. A survey of orthopedic surgeons' attitudes and knowledge regarding regional anesthesia. Anesth Analg. 2004;98:1486–90.
7. Kopacz DJ, Neal JM. Regional anesthesia and pain medicine: residency training – the year 2000. Reg Anesth Pain Med. 2002;27:9–14.
8. Heid F, Jage B, Jage J. Current practice in regional anaesthesia in Germany. Eur J Anaesthesiol. 2006; 23:346–50.
9. Gaba DM, Howard SK, Jump B. Production pressure in the work environment. California anesthesiologists' attitudes and experiences. Anesthesiology. 1994;81:488–500.
10. Weinger MB. Dangers of postoperative opioids. Anesthesia Patient Safety Foundation Newslett. 2007;21:61–8.
11. Matthey PW, Finegan BA, Finucane BT. The public's fears about and perceptions of regional anesthesia. Reg Anesth Pain Med. 2004;29:96–101.
12. Armstrong KPJ, Cherry RA. Brachial plexus anesthesia compared to general anesthesia when a block room is available. Can J Anesth. 2004;51:41–4.
13. Leskiw U, Weinberg GL. Lipid rescue for local anesthetic toxicity: is it really lifesaving? Curr Opin Anaesthesiol. 2009;22:667–71.
14. White PF, Kehlet H. Improving postoperative pain management. What are the unresolved issues? Anesthesiology. 2010;112:220–5.
15. Liu SS, John RS. Modeling cost of ultrasound versus nerve stimulator guidance for nerve blocks with sensitivity analysis. Reg Anesth Pain Med. 2010;35: 57–63.
16. Frederickson M, et al. Successful continuous interscalene analgesia for ambulatory shoulder surgery in a private practice setting. Reg Anesth Pain Med. 2008;33:122–8.
17. Kahn RL, Nelson DA. Regional anesthesia group practice in multihospital private practice settings and in orthopedic specialty hospitals. Int Anesthesiol Clin. 2005;43:15–24.
18. Masursky D, et al. Predicting orthopedic surgeons' preference for peripheral nerve blocks for their patients. Anesth Analg. 2008;106:561–7.
19. Rupp T, Delaney KA. Inadequate analgesia in emergency medicine. Ann Emerg Med. 2004;43:494–503.
20. Foss NB, Kristensen BB, Bundgaard M, et al. Fascia iliaca compartment blockade for acute pain control in hip fracture patients: a randomized, placebo-controlled trial. Anesthesiology. 2007;106:773–8.
21. Viscusi ER, Rehanna J, Warshawsky D. An acute pain management service with regional anesthesia: how to make it work. Tech Reg Anesth Pain Manage. 2002;6:40–9.
22. Sharma V, Morgan PM, Cheng EY. Factors influencing early rehabilitation after THA. A systematic review. Clin Orthop Relat Res. 2009;467:1400–11.
23. Kwofie MK, Shastri UD, Gadsden JC, Sinha SK, Abrams JH, Xu D, Salviz EA. The effects of ultrasound-guided adductor canal block *versus* femoral nerve block on quadriceps strength and fall risk: a blinded, randomized trial of volunteers. Reg Anesth Pain Med. 2013;38:321–5.
24. Hebl JR, Dilger JA, Byer DE, et al. A pre-emptive multimodal pathway featuring peripheral nerve block improves postoperative outcomes after major orthopedic surgery. Reg Anesth Pain Med. 2008;33:510–7.
25. Schug SA, Manopas A. Update on the role of non-opioids for postoperative pain treatment. Best Pract Res Clin Anaesthesiol. 2007;21:15–30.
26. Liu SS, Richman JM, Thirlby RC, et al. Efficacy of continuous wound catheters delivering local anesthetic for postoperative analgesia: a quantitative and qualitative systematic review of randomized controlled trials. J Am Coll Surg. 2006;203:914–32.
27. Gupta A, Bodin L, Holmstrom B, et al. A systematic review of the peripheral analgesic effects of intraarticular morphine. Anesth Analg. 2001;93:761–70.
28. Buvanendran A, Kroin JS, Della Valle CJ, et al. Perioperative oral pregabalin reduces chronic pain after total knee arthroplasty: a prospective, randomized, controlled trial. Anesth Analg. 2010;110:199–207.
29. Barbieri A, Vanhaect K, Van Herck P, et al. Effects of clinical pathways in the joint replacement: a meta-analysis. BMC Med. 2009;7:32.
30. Lennon RL, Horlocker TT. Mayo Clinic analgesic pathway: peripheral nerve blockade for major orthopedic surgery. Florence, KY: Taylor and Francis Group; 2006.
31. Walter FL, Bass N, Bock G, et al. Success of clinical pathways for total joint arthroplasty in a clinical hospital. Clin Orthop Relat Res. 2006;457:133–7.
32. Fisher HB, Simanski CJ, Sharp C, et al. A procedure-specific systematic review and consensus recommendations for postoperative analgesia following total knee arthroplasty. Anaesthesia. 2008;63:1105–23.

33. Pham Dang C, Gautheron E, Guilley J, et al. The value of adding sciatic block to continuous femoral block for analgesia after total knee replacement. Reg Anesth Pain Med. 2005;30:128–33.
34. Toftdahl K, Nikolajsen L, Haraldsted V, Madsen F, Tonnesen EK, Soballe K. Comparison of peri- and intraarticular analgesia with femoral nerve block after total knee arthroplasty: a randomized clinical trial. Acta Orthop. 2007;78:172–9.
35. Lecamwasam H, Mayfield J, Rosow L, et al. Stimulation of the posterior cord predicts successful infraclavicular block. Anesth Analg. 2006;102:1564–8.
36. Arcioni R, Palmisani S, Della Valle CJ, et al. Lateral popliteal sciatic nerve block: a single injection targeting the tibial branch of the sciatic nerve is as effective as a double-injection technique. Acta Anaesthesiol Scand. 2007;51:115–21.
37. Wiegel M, Reske A, Hennebach R, et al. Anterior sciatic nerve block – new landmarks and clinical experience. Acta Anaesthesiol Scand. 2005;49:522–7.
38. Hargett MJ, Beckman JD, Ligouri GA, et al. Guidelines for regional anesthesia fellowship training. Reg Anesth Pain Med. 2005;30:218–25.
39. Kapral S, Marhofer P, Grau T. Ultrasound in local anesthesia. Part 1: technical developments and background. Anaesthetist. 2002;51:931–7.
40. Griffin J, Nicholls B. Ultrasound in regional anesthesia. Anaesthesia. 2010;65(Suppl 1):1–12.
41. Neal JM, Brull R, VWS C, et al. The ASRA evidence-based medicine assessment of ultrasound-guided regional anesthesia and pain medicine. Executive summary. Reg Anesth Pain Med. 2010;35:S1–9.
42. Singelyn FJ, Lhotel L, Fabre B. Pain relief after arthroscopic shoulder surgery: a comparison of intraarticular analgesia, suprascapular nerve block, and interscalene brachial plexus block. Anesth Analg. 2004;99:589–92.
43. White PF, Kehlet H, Neal JM, et al. The role of the anesthesiologist in fast-track surgery: from multimodal analgesia to perioperative medical care. Anesth Analg. 2007;104:1380–96.
44. Bernards CM, Hadzic A, Suresh S, et al. Regional anesthesia in anesthetized of heavily sedated patients. Reg Anesth Pain Med. 2008;33:449–60.
45. Gerancher JC, Viscusi ER, Liguori GA, et al. Development of a standardized peripheral nerve block procedure note form. Reg Anesth Pain Med. 2005;30:67–71.
46. Viscusi ER, Gerancher JC, Weller R, et al. Not documented? Not done! A proposed procedure note for neuraxial blockade. American Society of Regional Anesthesia and Pain Medicine 30th Annual Spring Meeting and Workshops. Abstract 68, April 21–24, 2005.
47. Coley KC, Williams BA, DaPos SV, et al. Retrospective evaluation of unanticipated admissions and readmissions after same day surgery and associated costs. J Clin Anesth. 2002;14:349–53.
48. O'Donnell BD, Iohom G. Regional anesthesia techniques for ambulatory orthopedic surgery. Curr Opin Anaesthesiol. 2008;21:723–8.
49. Rawal N. Organization, function, and implementation of acute pain service. Anesthesiol Clin North Am. 2005;23:211–25.
50. Vila H, Smith RA, Augustyniak MJ, et al. The efficacy and safety of pain management before and after implementation of hospital-wide pain management standards. Anesth Analg. 2005;101:474–80.
51. Committee on Performance and Outcomes Measurement (CPOM), Committee on Quality Management and Departmental Administration (QMDA): Quality Management Template, http://www.asahq.org/quality/qmtemplate013105.pdf.2004.
52. Katz RI, Lagasse RS. Factors influencing the reporting of adverse perioperative outcomes to a quality management program. Anesth Analg. 2000;90:344–50.