Students in the Field: Pain Management and Continuous Infusion Regional Anesthetic Catheters in Orthopaedics

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Abstract

My name is Ulises Pantaleon Rodriguez and I am a fourth year nursing student currently finishing my integrative practicum and final consolidation on the orthopaedic inpatient surgery floor at University Hospital in London, Ontario. I have had prior placements within this field of nursing and have been drawn towards orthopaedic placements due to my interest in sports medicine and the musculoskeletal system of the body. Through multiple orthopaedic placements I have witnessed first-hand the crippling effects of pain on patients, causing both physical and psychological distress. As a result I have witnessed a multitude of different pain management control techniques ranging from pharmacological to non-pharmacological in nature. Through my experience on the orthopaedic inpatient surgery floor, I encountered the use of continuous infusion regional anesthetic catheters, commonly known as nerve block catheters. This innovative pain management technique yielded a plethora of patient-specific results, which sparked my interest into the relevant research and literature on their use. Pain management is one of the most important aspects of nursing care and the health care field as a whole, and it is my belief that healthcare practitioners must remain knowledgeable and educated on the latest techniques.

Background

Amongst the elderly population, mobility impairments and fractures are a common occurrence, whereas athletes often deal with injuries to bones and joints. As a fourth year consolidating nursing student on the orthopaedic inpatient surgical unit at University Hospital in London, Ontario, these populations represent the vast majority of patients requiring care in the unit. The primary surgical procedures performed on the floor are focused on the hip and knee joints, with a smaller percentage of cases related to other joints such as shoulders or ankles. The vast majority of patients on the floor are of the elderly population, with the minority being athletes and young adults. Many patients undergo surgical procedures such as total joint arthroplasties in which dysfunctional or damaged joints are replaced with an orthopedic prosthesis, or open reduction and internal fixation surgeries in which fractured bones or dislocated joints may be realigned into their normal position and prosthetic equipment may be inserted to promote healing. As with any surgical procedure, one of the primary focuses of nursing care is to maintain the sterility and asepsis of the surgical incision. In contrast, many patients’ primary concern is their pain levels and management as a result of these fractures and dislocations, invasive surgical procedures, and common comorbidities such as osteoporosis or arthritis. Through my placement at this hospital, I was able to gain experience with a variety of different pain management techniques including non-pharmacological methods, pharmacological methods, patient controlled analgesia, and continuous infusion regional anesthetic catheters.

Prioritizing Pain Management

The concept of pain has changed dramatically over time, and pain has come to be understood as a multidimensional and subjective sensory experience with different individual perceptions and responses towards it. Recently in the United States, the Joint Commission on Accreditation of Healthcare Organizations declared pain management a priority for the ‘Decade of Pain Control and Research’ from 2001-2010, as their research revealed over 80% of patients listed pain as their primary concern when dealing with the primary healthcare system. In fact, the World Health Organization, alongside the International Association for the Study of Pain, propose that chronic pain should be treated as a disease in its own right due to its common lack of treatment. With this knowledge in hand, I knew that pain management would be a crucial aspect of the nursing care provided on the orthopaedic floor, as many...
of the surgeries performed in the orthopaedic unit are elective. This means that patients opt to undergo a surgical procedure at their own request for a non-life threatening, but often pain-inducing condition such as arthritis in order to alleviate their pain.

**Non-Pharmacological and Pharmacological Methods**

Pain management on the orthopaedic floor involves a number of different therapeutic approaches and medications. Nursing care approaches to pain management involve the use of hot and cold therapy through the application of warm blankets and bags of ice wrapped in pillow cases proximal or distal to the surgical incision site for varying results. If the pain is presumed to be psychological in nature, positive imagery is a technique in which the nurse calmly redirects the patient through the use of deep breathing, relaxation, and mental imagery of anything the patient can think of that makes him/her happy or release tension. With regards to medications, non-steroidal inflammatory drugs (NSAIDs) such as acetaminophen or naproxen are often prescribed every 6 hours to provide a consistent pain relief. These are moderate analgesics and anti-inflammatory medications that are often inadequate pain relief on their own, but effective in conjunction with other medications. In my experience, opioid analgesics provided the best pain relief on our floor. These are narcotic substances such as hydromorphone or oxycodone with very powerful analgesic effects and serious side effects, which must be observed for by health care practitioners. Mild side effects include drowsiness, nausea and vomiting, and constipation, whereas the more serious side effects include respiratory distress and potential for addiction. Great caution must be taken when administering these drugs in the elderly population as they metabolize them at a slower rate than young adults; it is not unusual for elderly patients to experience respiratory arrest after high doses of opioids.

**Patient Controlled Analgesia**

Patient controlled analgesia (PCA) refers to the technique of allowing a patient to administer their own pain relief medication and is associated with high levels of pain relief and patient satisfaction. An electronically controlled PCA pump by the bedside delivers narcotic analgesics intravenously for quick pain relief through the push of a button on a control given to the patient; hydromorphone or morphine are most commonly prescribed. The pump is set with a specific base line hourly dosage rate that runs without the push of a button, a specific dose given each time the patient pushes the button, and a lockout period between each push of the button that ensures that the patient does not over-sedate themselves. Nursing care plan priorities include monitoring the patient hourly for the first twenty-four hours with regards to pain relief scales, respiratory rate, oxygen saturation levels, and circulation-sensation-movement (CSM) checks distal to the surgical site when utilizing this technique.

**Continuous Infusion Regional Anesthetic Catheters**

PCA pain management is a technique I have utilized in other units in my nursing career. Through my placement on this orthopaedic floor, however, I was given the experience to work with a fairly new and innovative technique of PCA pain management known as continuous infusion regional anesthetic catheters, commonly referred to as nerve block catheters. Nerve block catheters are placed below the dermis level of the skin by anesthesiologists during patient surgery and are commonly used for operations involving the knee. Anesthesiologists often target either the femoral nerve of the thigh or the saphenous nerve of the medial aspect of the knee, which is a branch of the femoral nerve. These blocks work through the release of local anesthetics ropivacaine and bupivacaine directly to the nerve site through a PCA pump. A large, individual dose of anesthetics known as a bolus may also be prescribed for immediate therapeutic effects. Ropivacaine and bupivacaine both act by blocking the nerve fibers involved in pain transmission and are often ordered at a rate of 5 mL per button push with a maximum of 10 mL/hour. Ropivacaine is preferred as it has a slower onset and a decreased risk for central nervous system toxicity related to its lower lipid solubility and lower risk of crossing the blood brain barrier. An in-depth analysis of relevant research along with my clinical experience reveals that the benefits of nerve block catheters include: better pain control and decreased narcotic use, reduced side effects related to decreased narcotic use, earlier ambulation after surgery helping prevent skin breakdown and thrombosis development, and the fact that it is a more economical means of pain management than simply
narcotics alone. However, the drawbacks include: reports that these catheters do not block all pain (especially posterior to the knecap) thus requiring opioid use in conjunction, an increased risk for falls related to the location of the catheter, an increased risk for infection related to dislodgement of the catheter as well as nerve injury related to placement by the anesthesiologist, and the risk of anesthetic toxicity related to the patient’s tolerance and the dose of medication. In my time on the unit I have seen patients respond excellently to this method, but also patients who have unfortunately suffered nerve damage due to catheter placement. The majority of patients who have used this technique land somewhere in the middle of this continuum, reporting some pain relief but requiring NSAIDs or opioids in conjunction. The nursing staff often complains about this technique causing more problems than benefits with regards to its drawbacks. Nursing considerations for patients on this analgesic method include assessing the patient’s CSM’s for motor weakness, assessing for inadequacy of pain control, assessing catheter placement for leakage or signs of infection, being cautious with regards to ambulating patients, and assessing for symptoms of anesthetic toxicity which include drowsiness and disorientation.

Conclusion

To conclude, my time on the orthopaedic inpatient surgical floor at University Hospital has given me a wealth of experience and knowledge with regards to multiple methods of pain control. I have learned about the importance of pain control in nursing care and to patients, as it is their primary concern regarding hospitalizations and one that is often undervalued by the health care system. Through this experience, I feel confident and knowledgeable about assessing and treating my patient’s pain levels in the future in my nursing career. My experience with nerve block catheters has taught me that rather than avoiding new techniques and advancements in the healthcare field, healthcare providers must maintain an open mind, positive attitude, and desire to learn with regards to implementing new techniques in our clinical practice. This clinical placement has allowed me to appreciate pain management beyond pharmaceutical methods and to recognize patient priorities as well as nursing priorities. My experiences have assisted me in understanding that pain management is a diverse field with a multitude of techniques containing varying degrees of efficiency for each and every individual patient in any department.

References


