

Multimodal Pain Management for Surgical Inpatients

By

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Abstract

Introduction

Multimodal pain management has been recognized as the most effective modality and the gold standard for pain management for more than a decade. However, these protocols remain poorly utilized and are applied inconsistently. This has led to inferior pain management, poor outcomes, and an increased risk of opioid dependence or addiction. In this project, I sought to address the utilization of multimodal pain management in an inpatient surgical service. A ten-day review of patient care revealed that pain management provided to patients on our service was inadequate and might be improved by adopting and implementing more consistent and systematic protocols for drug administration. This change might lead to fewer unscheduled (i.e., *pro re nata* [PRN]) drug doses, reduced narcotic use, more rapid recovery, and improved patient outcomes.

Methods

I began by reviewing the cases of 29 patients who had received routine pain management on our service. Of these, 17 patient cases were comparable to another 21 patients who had undergone treatment during the implementation of multimodal pain management. I compared the average number of PRN IV/narcotic doses used by patients in each of these two groups each day (i.e., 24 hrs) during their hospital stays.

Results

The results of my analysis revealed that the 17 patients in the control group used an average of 2.1 doses of PRN IV/narcotic medications per day throughout the length of their hospital stays. By contrast, the 21 patients who were treated with the multimodal

pain management strategy required only an average of 1.43 doses of PRN IV/narcotic medications per day. This difference represents a 32% decrease in PRN IV/narcotic use while in the hospital. The patients treated with the multimodal pain management strategy also required fewer prescriptions for narcotic medications at the time of hospital discharge.

Discussion

My findings suggest that a consistent protocol for multimodal pain management would likely benefit a large population of patients requiring hospital care. Future discussions with the hospital administration may lead to the implementation of a pain-management protocol designed to build on the patient-care benefits identified here.

Introduction

There is typically a 17-year delay on average between the first reports of evidence-based practice and the full implementation of the findings throughout the

health care system (Morris, Wooding, & Grant, 2011). To assess day-to-day pain management on a general and trauma surgical service at Las Palmas Medical Center, I generated a ten-day practice assessment log (PAL). A PICOT (Population, Intervention, Comparison, Outcome, Time) question was then developed to guide the project. I intended to use this information as a starting point that would help me to determine how the quality of care provided to the patients on our service might be improved. While I identified many areas of patient care that might be improved, I focused on problems that could be tangibly addressed. I noted that while most of our patients needed pain medications, many were not treated with a best-practice pain management protocol based on multimodal-type therapy. After discussing several other possibilities, multimodal pain management was selected as the best option for my Quality Improvement project.

This selection was also influenced by the vast amount of available knowledge that addresses this subject. There were many ways to implement pain management, including several specific protocols, for example, Enhanced Recovery After Surgery (ERAS) (Simpson, Bao, & Agarwala, 2019). The evidence provided in the literature focuses on improved outcomes for patients and provided strong support for this project. The outcome of my review led to a greater understanding of the various pain management strategies and provided more options for patients under my service.

While my review of the current literature revealed the many different methods that might be used to control pain, multimodal pain management was a consistent theme throughout. Multimodal pain management strategies are the gold standard for any attempts to minimize the use of narcotics and other sedating drugs that can lead to

slower recovery and other post-surgical complications. Opioid-sparing techniques usually include a stepwise approach with foundational drugs that include non-opioid adjuvants followed by weak opioids such as tramadol before administering opioid analgesics. This method can be adapted for each patient. Because pain is perceived differently by individual patients, this type of therapy can be customized while maintaining the multimodal structure and pathways leading to its relief. For example, Belcaid and Eipe (2019) examined pain relief in morbidly obese patients and highlighted the increased risk of developing common complications such as apnea, Pickwickian syndrome, and increased distribution of lipophilic drugs. Likewise, patients who are more aware of their pain may identify complications earlier during recovery before they become complicated and potentially more critical.

This review of the evidence in the published literature suggested that my practice might adjust its current pain medication strategies to include a more consistent multimodal pain management protocol. Results from several studies revealed that patients report less pain, spend fewer days in the hospital, use less narcotic medication (thereby also avoiding the costly side effects associated with their use), and experience overall superior outcomes. These studies also discuss the impact of multimodal pain management on reducing the risk of complications in different patient populations.

In this project, I will evaluate opioid use in each 24-hr period in a series of post-operative patients on our service. If our results are consistent with those presented in the literature, the patients should require fewer opioids while in the hospital and at the time of discharge, will report better pain control at follow-up, and will experience an improved recovery with fewer adverse events.

Methods

The goal of this project was to determine whether the implementation of multimodal therapy was feasible and beneficial to our inpatient population. As a first step, I obtained an objective baseline assessment of the number of PRN doses of narcotics used by each patient every 24 hours of an inpatient stay. I then focused on ensuring that all patients on our service had standing orders in place for appropriate multimodal pain management and evaluated the outcomes of this change. A PICOT question was developed as follows: How would the 18–99-year-old patients (i.e., the [p]opulation) on our surgical service who are receiving narcotics for pain respond to a treatment (i)ntervention based on the ERAS protocol (c)urrent practice receiving routine irregular PRN orders in a Practice Improvement Plan designed to improve pain control with and (o)utcome of decreased IV/narcotic pain medication used q24 hours. (T)ime fram was over 14-day inpatient stay or while inpatient. This PICOT question guided the overall goals of the project, showing the effectiveness of evidence based practice. An approach based on Lewin's Force Field Theory was used to support changes in pain management.

Seventeen of the initial 29 patient cases reviewed in my PAL met criteria that matched those of the test group and were used as controls for this study. The test group included 21 patients who were managed with a multimodal pain protocol based on the ERAS.

The study cohort included both male and female patients that were between 18–99 years of age who were followed by our service either as consultants or admitting providers. All patients included in the test group who reported pain and were not treated

with appropriate stepwise multimodal acetaminophen or tramadol were then excluded from the test group of this study.

At the beginning of the study, all patients on our service who reported pain were provided with scheduled doses of acetaminophen and gabapentin; IV narcotics were administered during the 24 hours immediately after admission and again after surgery. A stepwise approach to PRN medications was implemented. A typical PRN protocol would include ibuprofen 400 mg per os (PO) every four hours as a first-line medication for pain scores of 1–10. This would be followed by tramadol 50 mg PO and then oxycodone 5 mg PO every six hours for pain scores of 3–10. These orders were adjusted based on patient comorbidities, allergies, and clinical status. Lidocaine patches were also used if the pain could be localized. Diclofenac and/or Bengay® ointments were also used when appropriate. Patches or ointments were scheduled and provided daily (i.e., not PRN) unless contraindicated or avoided due to patient preference.

Once this protocol became part of the standard order set and was implemented consistently, we observed an overall improvement in pain management. Of note, an initial attempt to implement this practice change was voided because the nurses did not follow the stepwise approach. Likewise, better outcomes were achieved with scheduled (rather than PRN) acetaminophen and gabapentin. Patient preference also influenced these choices, leading to the administration of requested medications. These were helpful insights that might lead to improved patient outcomes, although they were not among the goals of the study.

This protocol was easily implemented and could be customized to different patients based on its use as an outline. A personal order set was available that could be

implemented on electronic health records (EHRs) that facilitated the introduction of multimodal pain therapy. While this had been identified as a goal, many physicians failed to place appropriate orders, and thus incomplete pain coverage was commonplace. Many factors contributed to this problem, including prolonged periods during which the patients remained NPO (i.e., could take nothing in by mouth) and few updates to medications ordered by different providers because physicians did not want to intervene in another's care protocol. Medications were typically given orally unless this was contraindicated before surgery which provided us with better options for medication choices. Following evidence-based guidelines, the use of the ERAS protocol resulted in a noticeable decrease in PRN narcotic use over each 24-hr period. This was observed in response to the appropriate implementation of multimodal pain therapy and a stepwise PRN approach, for example, introducing acetaminophen for pain management before tramadol, and use of both before introducing morphine. The ERAS protocol also provided effective and highly-detailed expectations that were specifically adapted to each procedure. Thus, the patients experienced less of the stress typically associated with the unknown. Similarly, if common discomforts or symptoms occur, they are not perceived as abnormal or of critical concern. Explaining what the patients might expect to experience also greatly reduces stress and perception of pain (Hemmerling, 2018). Topical agents were also used, including lidocaine patches as well as Bengay® and/or diclofenac. Results from previous work indicate that reducing stress and maintaining pain below a threshold level reduced catabolism and the risk of developing insulin resistance. This leads to improved outcomes, including the rapid return of bowel function as well as normalization of fluid status, movement, function, and glucose

control (Mitra et al., 2018). Multimodal therapy also encompasses a variety of non-pharmacotherapeutic modalities, including physiotherapy and psychotherapy.

There was a notable decrease in PRN opioid use among the test patients enrolled in our study. Patients managed with a multimodal pain protocol required fewer narcotic doses per 24-hr period during their inpatient stay. My observations suggest that the patients felt more empowered simply by being more informed. The patients appeared to be pleased that they were provided with options for pain relief other than opioids. They also appeared to require fewer narcotics at the time of discharge and participated in therapy with greater awareness. There were no complications secondary to atelectasis, although I recognize that the sample size was small and the patients were followed for only a brief period. Reducing the risk of error by not following the stepwise approach but instead scheduling acetaminophen and gabapentin doses also appeared to have a positive impact on opioid use. Because of these observations, it was difficult to formulate direct objective comparisons. However, in this project, changes in opioid use were evaluated objectively by determining the number of PRN narcotic doses required in each 24-hr period during an inpatient stay. The overall outcomes associated with the implemented changes were improved recovery rates, better pain control, and fewer complications.

Among the ethical considerations, we needed to address and discuss issues regarding pain management with obese patients. This is frequently a sensitive subject. Many obese patients perceive the extra caution required with respect to opioid dosing as a disservice that might hinder adequate pain control. Advanced age may also be perceived in a similar fashion. The need to use these medications sparingly in older

patients with slower metabolic rates may be viewed as delaying or even withholding medication. Patients may also prefer to skip the stepwise approach and opt immediately for more sedating medications. In these cases, multimodal pain management may also be viewed as an unnecessary delay. Education is a critical feature of this protocol, as it is important to provide patients with the underlying rationale in order to optimize the delivery and outcome of pain relief.

Results

A quantitative assessment of the 17 patient cases in the original control group revealed an average intake of 2.1 doses of PRN IV/narcotic medication per 24-hr period throughout their hospitalizations. This can be compared to an average of 1.43 doses of PRN IV/narcotic medication used by the 21 patients enrolled in the study group who were treated with a multimodal pain management protocol, representing a 32% decrease in PRN IV/narcotic medication use per day (Table 1).

Table 1: IV/narcotic use by patients treated with the ERAS protocol compared to routine PRN pain management.

	Number of patients	Number of IV/narcotic doses per 24-	Percent reduction	
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		hr period (average)		
Control group	17	2.1		
Test group	21	1.43	32%	

Discussion

My practice as a nurse practitioner is part of a general and trauma surgery service at Las Palmas Medical Center. The service also includes one additional nurse practitioner and three surgeons who rotate on taking call during the month. The service provides care for inpatients only with no outpatient office patients. On a typical day, we provide care for approximately 10–15 patients, although this number can vary.

The results of my study revealed good outcomes from multimodal pain management following the ERAS protocol (Simpson, Bao, & Agarwala, 2019). None of the study patients experienced a narcotic overdose, and very few required opioids at the time of discharge compared to those in the control group. The patients managed with multimodal pain control also rated their pain as less severe. Success with administering medications in the appropriate stepwise fashion also improved once initial pain control was scheduled instead of provided as needed. This also most likely contributed to reductions in severe breakthrough pain and thus reduced opioid use.

One critical limiting factor in this study was time. If provided with additional time, I would have been able to evaluate pain at follow-up and recruit a larger sample size. Another limiting factor was that the orders were not always implemented consistently,

particularly when I was not present on the service. Orders may have been changed in response to a specific patient request or nursing judgment. Finally, allergies were recognized as a potential limitation, although this problem was not frequently encountered.

Implementing this change as a pain management protocol together with periodic re-education provided by skills and unit meetings that encourage staff to follow the orders under protocol would yield great benefits. This change would impose little if any increased costs on the hospital. Ideally, the implementation of multimodal pain management protocols would reduce the length of hospital stays and improve outcomes, which typically translate to greater overall efficiency. These changes would undoubtedly be associated with benefits that would far exceed the costs in resources needed for their implementation.

In summary, the results of my study suggest that this change in pain management strategy was worthwhile and will likely continue during my time at this practice. I am looking forward to the opportunity to communicate with the hospital administration regarding the possibility of developing an order set with options that would permit rapid “one-click” selection of the medications needed for the multimodal pain protocol.

Other Information

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