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Considering the Cost-Effective Utilization of Exparel in Lieu of Patient-Controlled Analgesia

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Abstract

Patient-controlled anesthesia (PCA) is utilized to treat acute, chronic, labor, and postoperative pain in patients. The administration of PCA intravenously (IV), through an epidural or peripheral nerve catheter, or transdermally each allow the patient to have autonomy over their pain control. Although beneficial in regard to patient care and outcomes, the current regimen of PCA is not cost-effective. Unused medication, cost of Anesthesia team consults, equipment, and the price of frequently used PCA medications contribute a substantial cost to hospital systems. Moreover, patient outcomes with PCA have been shown to be equivalent to those with traditional pain medication dosing. As such, we investigated two anesthetic routines in post-operative cardiothoracic patients. In the novel group, we started to utilize Exparel™ (liposomal bupivacaine), which was instilled into the intercostal space at the conclusion of the surgical procedure. This Exparel™ receiving cohort did not receive PCA, and were instead managed as needed with narcotics in the post-operative period. Our prospective study with 10 patients, each undergoing a lobectomy, or surgical removal of a lobe of the lung, compared the outcomes in pain control and cost between Exparel™ and narcotic management and PCA. Our outcomes showed that the pain control was the same when controlling for the receiving arm. However, the cost of the PCA-receiving arm was substantially more. Given the pain control of the Exparel™ receiving arm is non-inferior, it should be considered an acceptable post-operative pain control option to PCA, given its decreased cost.

1. Introduction

PCA (patient-controlled anesthesia) is utilized and given to patients for acute, chronic, labor, and postoperative pain control. PCA encompasses a method of delivery in which medication doses are calculated based on patient metrics, such as weight, and can be administered directly to patients intravenously every ten minutes. Although this approach does allow patients to have

more autonomy over their pain control, as well as improved mobility, alertness, and sense of control during recovery periods [1-3], there is still a fair amount of cost with this approach. In addition to the cost of the IV line and the medications utilized, there is often a fair amount of unused medication, the cost of the Anesthesia consult, which is responsible for the management of PCA, and other additional costs that need to be considered.

Hospital analysis studies have revealed that PCA contributes a substantial cost to hospital systems. A study analyzed the specific economic cost-breakdown of PCA in patients who had received a total knee arthroplasty (TKA), total hip arthroplasty (THA), or abdominal surgery. Palmer et al. [4] reported that morphine and hydromorphone "were the most [consistently] utilized PCA medications, with a mean cost per 30 cc syringe of $16 (30 mg) and $21 (6 mg), respectively. The mean number of syringes used for morphine and hydromorphone in the first 48 hrs were 1.9 and 3.2 (TKA), 2.0 and 4.2(THA), and 2.5 and3.9 (abdominal surgery), respectively. Average costs of PCA pump, intravenous tubing set, and medicine" reached an estimated cost of $47, $21, and $40, respectively. Costs for pumps, tubing, and saline for maintenance of intravenous catheter summed to an estimated cost of $37 to $44 for a 48-hour period. Supplemental non-PCA opioid use was still prevalent in THA and abdominal surgery cases, adding additional costs. Palmer et al. found that "total costs, including adverse events, complications, and intravenous PCA errors, ranged from $647 to $694" [4].

In addition, studies have shown that PCA is less cost-effective than traditional anesthetic dosing and does not statistically alter the average length of hospital stay in post-operative patients [5]. In fact, PCA had been shown to result in greater opioid consumption compared to traditional pain control, although no significant differences in opioid-related side effects was shown [5].

Despite these findings, consistent trends have been reported suggesting that PCA-associated care does not necessarily yield the most optimal patient and financial outcomes. Despite the increased involvement of patients in their care and recovery, this does not ensure appropriate patient use of analgesia nor use to pain satisfaction. The methodology of "one-size-fits-all" cannot be successfully applied to pain management, in addition to other therapeutic fields [6]. Physicians should rather alter opioid medication, administration method, and dose to individual patients' requirements and needs, as well as respond appropriately to any alterations that need to be made to these factors of pain control as care progresses [6]. Given the high-risk indicated with opioid prescription, a more conservative approach is more appropriate when considering patient safety [6]. These considerations must be kept in mind by physicians when creating PCA doses, and less necessarily so when manually administering pain control medications.

2. Case Report

We conducted a prospective study with 10 patients, each undergoing a lobectomy of a lung (removal of lobe of the lung). We wanted to see if there was a difference in pain control in patients with PCA and patients with Exparel™ pain control. PCA patients followed the traditional standards of post-operative care. Exparel™ (liposomal bupivacaine) was instilled into the intercostal space at the site of the incision at the conclusion of the procedure. No PCA was given to the Exparel™-treated group, and these patients were managed as needed with narcotics in the post operative periods.

According to its developmental company, Pacira, Exparel™ is available in 133 mg (10 mL) doses for $214.75 and 266 mg (20 mL) doses for $365.16 [6]. The 133 mg (10 mL) and 266 mg (20 mL) doses of Exparel™ are available in cartons of 4 and 10 vials [7].

Although these doses show less variability, physician utilization and administration of Exparel™ allows for more nuanced control and dosage given to patients. Dosages of Exparel™ according to its guidelines are based on the size of the surgical incision site, with a maximum dose being 266 mg [8-10]. Given that a minimally invasive approach, video-assisted thoracoscopic surgery (VATS) is now more commonly, if not routinely, utilized for lobectomy, surgical incision sites are quite small [11,12]. As such, even with the maximum dose cost consider, there is a significant difference in the estimated cost of $647 to $694 per patient using PCA [8-9, 11,12].

Our patient outcomes showed that the pain control in either group was the same, but the cost of the PCA group of patients was substantially more. Given the pain control of the Exparel™ arm is noninferior, it should be considered an acceptable post operative pain control option given its decreased cost.

3. Discussion

Compared with scheduled intramuscular dosing of Exparel™, PCA was more costly and did not have clinical advantages for pain management after lung lobectomy. Because of the comparable outcomes, the general use of PCA in similar patients should be questioned. Our data support a trend towards provider alteration to anesthetic and analgesic pain control in patient populations.

Although our case study focused on cardiothoracic patients who were recovering from a lung lobectomy, our findings are not limited to one specific specialty or surgical procedure. A prospective study found that intravenous PCA and regularly timed intramuscular injections of morphine yielded comparable analgesia outcomes in patients who underwent abdominal hysterectomy, with no significant differences in side effects incidence nor patient satisfaction. The data also supported that PCA did not result in shorter recovery periods, based on times to ambulance, return to liquid and solid diets, passage of bowel contents and gas, and hospital discharge [13,14]. With these comparable outcomes, the same cohort study found that PCA was more expensive than the alternative morphine analgesia routine, even without the addition of pump costs [14].

PCA has also shown the same pattern of increased costs with comparable pain control with alternative analgesics in the emergency department (ED) setting. Although rare in its utilization compared to other clinical environments, PCA use in the ED has been investigated [15]. Patients with pain attributed to traumatic injury or non-traumatic abdominal pain were treated with either PCA or standard practice of care for patient pain - the cost-effectiveness of the treatments indicated that overall costs with higher with PCA than standard care on both patient pain categories [15]. Specific cost increases were noted to be an additional $23.10 per 12 hours for traumatic injury and an additional $25.09 per hours for non-traumatic abdominal pain for patients on PCA compared to standard ED care practices [15].

PCA can be a very effective, yet safe method of individualized pain relief. However, it is not a “one-size-fits-all” therapy, and original prescriptions and dosages may need to be adjusted to ensure maximal benefit is given to all patients [6,16]. Efficacy and safety can also be better managed if increased attention to paid towards patient pain and analgesic use. Thus, the success or dismissal of PCA lies in how well it is used [16]. Effective pain relief requires flexibility in dosages, ease in dose delivery, such as PCA, regular monitoring of any drug-related side effects, and the use of these parameters to individualize treatment- PCA devices simply just facilitate this process [16]. If similar caution and heedfulness can be applied to other methods of opioid administration, conventional physician- administered anesthesia could be as effective, if not more effective, as PCA in many patients.

4. Acknowledgements

4.1 Guarantor statement

VS had full access to the data in the study and take full responsibility for the integrity of the data and the accuracy of the data analysis.

4.2 Author contributions

VS had full access to the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. VS contributed substantially to the study design, interpretation, and KR contributed substantially to the writing of the manuscript. VS substantially to the study design and statistical analyses.

4.3 Financial/nonfinancial disclosures

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REFERENCES

1. Patient-Controlled Analgesia Pumps. Johns Hopkins Medicine, 22 Mar. 2024.
2. Pain Management: Patient-Controlled Analgesia (PCA) Pump. MyHealth.Alberta.ca Government of Alberta Personal Health Portal, 9 Nov. 2022.
3. Patient Controlled Analgesia. Stritch Luc Edu., Accessed 3 Jan 2024.
4. Palmer P, Ji X, Stephens J. Cost of opioid intravenous patient-controlled analgesia: results from a hospital database analysis and literature assessment. Clinicoecon Outcomes Res. 2014;6:311-8.
5. Pastino A. Patient-Controlled Analgesia. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, USA; 2024.
6. Diana Stewart, PharmD Palliative Care Clinical Pharmacist MedStar Washington Hospital Center Washington. Pearls and Pitfalls of Patient-Controlled Analgesia. U.S. Pharmacist - The Leading Journal in Pharmacy, 17 Mar. 2017.
7. Exparel Is a Cost-Effective Option for Postsurgical Pain Management in the Hospital and Ambulatory (Outpatient) Settings. EXPAREL Cost 2024 | The Price of Long-Lasting Non-Opioid EXPAREL for Pain after Surgery, www.exparel.com/hcp/value/total-hip-arthroplasty.

8. Palmer P, Ji X, Stephens J. Cost of opioid intravenous patient-controlled analgesia: results from a hospital database analysis and literature assessment. Clinicoecon Outcomes Res. 2014;6:311-8.
9. Kim NS, Lee JS, Park SY, et al. Oxycodone versus fentanyl for intravenous patient-controlled analgesia after laparoscopic supracervical hysterectomy: A prospective, randomized, double-blind study. Medicine (Baltimore). 2017;96(10):e6286.
10. Exparel: Package Insert @ Drugs.Com, Nov. 2023. www.drugs.com/pro/exparel.html#S14.2.
11. Golf M, Daniels SE, Onel E. A phase 3, randomized, placebo-controlled trial of DepoFoam® bupivacaine (extended-release bupivacaine local analgesic) in bunionectomy. Adv Ther. 2011;28(9):776-88.
12. Kim NS, Kang KS, Yoo SH, et al. A comparison of oxycodone and fentanyl in intravenous patient-controlled analgesia after laparoscopic hysterectomy. Korean J Anesthesiol. 2015;68(3):261-6.
13. Lai J, Situ D, Xie M, et al. Continuous Paravertebral Analgesia versus Continuous Epidural Analgesia after Video-Assisted Thoracoscopic Lobectomy for Lung Cancer: A Randomized Controlled Trial. Ann Thorac Cardiovasc Surg. 2021;27(5):297-303.
14. Choinière M, Rittenhouse BE, Perreault S, et al. Efficacy and costs of patient-controlled analgesia versus regularly administered intramuscular opioid therapy. Anesthesiology. 1998;89(6):1377-88.
15. Pritchard C, Smith JE, Creanor S, et al. The cost-effectiveness of patient-controlled analgesia vs. standard care in patients presenting to the Emergency Department in pain, who are subsequently admitted to hospital. Anaesthesia. 2017;72(8):953-60.
16. Macintyre PE. Safety and efficacy of patient-controlled analgesia. Br J Anaesth. 2001;87(1):36-46.