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Adequate Pain Control with Ofirmev to Minimize Narcotics Consumption and its Side Effects

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Introduction to the Problem

It is well documented that an untreated perioperative pain leads to stress, anxiety, insomnia, and even patient care dissatisfaction. Prolonged postoperative rehabilitation and hospital stay have also resulted from poorly managed perioperative pain. This acute surgical pain can lead to the development of chronic pain which ultimately causes a reduction in patients' quality of life (Garimella & Cellini, 2013).

The purpose behind effective intraoperative and postoperative pain management is to minimize the discomforts associated with surgery with the intention of also minimizing the adverse effects of the medications used. Typically, postoperative pain is managed with opioids, such as morphine, fentanyl, and hydromorphone, however, the excessive use of these medications has been associated with respiratory depression, excessive sedation, drowsiness, rash, nausea, vomiting, and severe constipation (Wang, Saha, Shah, Hanna, DeMuro, Calixte, & Brathwaite, 2015). As anesthesia providers strive for opioid-free anesthesia, the benefits of non-opioid analgesics like Ofirmev cannot be underestimated. However, many providers fail to utilize Ofirmev which has none of the above-mentioned side effects associated with opioids. Ofirmev is an intravenous formulation of acetaminophen. It is indicated as a monotherapy for the management of mild to moderate pain in adult patients' population and pediatric patients of 2 years and above. It can also be used in conjunction with opioid analgesics for the management of moderate to severe pain in these patients' population (Mallinckrodt, 2019).

As the United States battles opioid crisis, anesthesia providers cannot be left out of the plan to decrease opioid consumption in the country. In 2015 alone, there were about 30,000 opioid-related fatalities in the United States (American College of Surgeons 2017). In striving for opioid-free anesthesia, the American Society of Anesthesiologists Task Force on Acute Pain

Management recommends that patients should always receive non-opioid analgesics like acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs) as first-line agents so that opioids can be used as adjunctive agents to minimize opioid-related side effects, addiction, and dependence (The American Society of Anesthesiologists, 2011). Acetaminophen has multiple sites of action and a comprehensive understanding of its benefits can be helpful to pain management clinicians. Ofirmev has minimal side effects which include liver damage, headache, insomnia, and hypotension. It is contraindicated in patients with severe active liver disease. Non-steroidal anti-inflammatory drugs on the other hand are associated with gastric mucosal damage, bleeding, dyspepsia, and renal injury (Pasero, 2012).

As compared to opioids/narcotics, Ofirmev is not associated with respiratory depression, drowsiness, sedation, post-operative nausea and vomiting (PONV), paralytic ileus, constipation, and urinary retention (Benyamin, Trescot, Datta, Buenaventura, Adlaka, Sehgal, & Vallejo, 2008). Nor is it associated with, gastric mucosal damage, bleeding, dyspepsia, or renal injury seen with the use of NSAIDs (Pasero, 2012).

Many providers are adamant to incorporate Ofirmev into their pain management regimen mainly due to its cost. However, the cost of opioids combined with the cost of treating PONV, ileus, addiction/dependence plus the costs of prolonged hospital stay and prolonged wake-up time far exceed the cost of using Ofirmev.

Literature Review

Ofirmev, which is an intravenous formulation of acetaminophen has several benefits. Many studies have shown that the effective and efficient perioperative use of Ofirmev significantly decreases opioid consumption and its side effects thereby decreasing the length of

hospital stay, recovery time, and perioperative cost. In other words, perioperative Ofirmev use improves the overall patients' outcome.

Ofirmev was approved by the Food and Drug Administration (FDA) in 2010 as a monotherapy for mild-to-moderate pain and in conjunction with opioids for moderate-to-severe pain (Wang et al., 2015). As compared to opioids, Ofirmev is not associated with respiratory depression, drowsiness, sedation, PONV, paralytic ileus, constipation, and urinary retention (Benyamin et al., 2008). This makes Ofirmev an ideal pain management agent as providers strive to achieve opioid-free anesthesia.

Studies have demonstrated that Ofirmev administered to laparoscopic abdominal surgical patients were well tolerated and were also associated with statistically significant analgesic efficacy (Wininger et al., 2010). Ofirmev is highly recommended in these patient population for the avoidance of post-operative ileus, constipation, and delayed ambulation. As a matter of fact, Ofirmev has been shown to reduce the use of opioids in abdominal laparoscopic procedures by 12% especially during the first 12 hours after surgery (Nwagbologu, Sarangarm, & D'Angio, 2016).

Post-operative nausea and vomiting from excessive use of opioids and anesthetic gasses are rated on top of the list of the discomforts associated with surgery (Pierre & Whelan, 2012). For this reason, PONV is deemed the most common reason for patients' dissatisfaction after undergoing anesthesia (Pierre & Whelan, 2012). A study revealed that, patients who experienced PONV from opioids were willing to pay \$50 up to \$100 to avert this unpleasant experience (Pierre & Whelan, 2012).

Some anesthesia providers also argue that the oral and rectal acetaminophen are as effective as the intravenous (IV) form, however, studies have demonstrated that the maximum or peak serum concentration (C_{max}) of IV Tylenol is 76% and 256% greater than the PO and PR routes respectively (Pharmacy Times, 2016). In other words, Ofirmev is superior to both the oral and rectal routes formulations due to its quick onset of action, potency, and the 100% bioavailability (no first pass effect)

Methodology

This quality improvement project utilized literature reviews to ascertain evidence-based information about the perioperative use of Ofirmev and opioids. Based on the information gathered from the literature reviews, a systematic, patients focused, team-oriented, and an evidence-based protocol was developed to guide the efficient use of Ofirmev so that a measurable improvement patients' outcome can be achieved at the chosen clinical site. The initial implementation of the protocol was in the form of a PowerPoint presentation to educate the staff regarding the benefits, risks, cost, dosing, re-dosing intervals, and contraindications associated with Ofirmev use.

Pre & post-presentation surveys were distributed to all participants during implementation session. The surveys were design to assess whether the participants have gained an improved knowledge and understanding about the benefits of Ofirmev use versus sole narcotics use. The pre-survey questionnaire included questions about the frequency of perioperative Ofirmev administration by providers at the facility, the providers' knowledge about the cost of the medication to their patients, the maximum daily dose of Ofirmev, the reason why some providers fail to use it, knowledge about the side effects of excessive opioid use, and whether providers were aware of Ofirmev ability to minimize perioperative opioid consumption.

The post-survey questionnaire, on the other hand, was designed to test the providers' understanding of the benefits of incorporating Ofirmev into their pain management regimen as opposed to the sole use of opioids.

Evaluation

The results of the surveys were evaluated to determine whether participants had gained improved knowledge & understanding regarding the benefits of Ofirmev use over the sole use of opioids/narcotics. From the pre-presentation survey results, only 25% of anesthesia providers routinely administered Ofirmev to their patients who had no contraindications to receive the medication. After educating providers regarding the benefits of perioperative Ofirmev use as opposed to sole opioid use, a post-educational survey suggested that 100% of the participants were willing to use the medication (Ofirmev) provided there are no patient-specific contraindications.

Relevance/Impact on Practice

The goal of this project was to create an evidence-based protocol on the use of Ofirmev for the perioperative setting, along with the education of providers about the effective and efficient use of IV Tylenol in order to incorporate its use clinically. The appropriate use of Ofirmev will help minimize the excessive perioperative use of opioids/narcotics and its associated side effects. In other words, adequate pain control with minimum side effects from the medications used will be achieved. The perioperative use of Ofirmev will, ultimately, improve patient outcomes in the perioperative phases of care. In other words, providers who incorporate Ofirmev to their perioperative pain management regimen should be able to ultimately decrease the incidence of respiratory depression, PONV, ileus, constipation opioid-induced hyperalgesia,

cognitive dysfunction, prolonged hospital stay, prolonged recovery from surgery, addiction, and dependence

Conclusions

Even though many studies have demonstrated the effectiveness of Ofirmev in managing perioperative pain and reducing narcotic consumption, yet, many providers are adamant to use it due to its cost. The actual unit cost per vial of Ofirmev to the patient at the chosen facility was only \$150 as opposed to the presumed price of over \$500 by many providers. Therefore, the cost of opioid itself coupled with the cost of treating its side effect such as PONV, bowel obstruction, paralytic ileus, constipation, respiratory depression, addiction & dependence, prolonged hospital stays, and occasional use of naloxone far exceed the unit cost of \$150.

Acetaminophen has multiple sites of action and a comprehensive understanding of its benefits can be helpful to pain management clinicians. Ofirmev has been shown to reduce the use of narcotics like morphine, hydromorphone, and oxycodone in abdominal laparoscopic procedures by 12% especially during the first 12 hours after surgery ((Nwagbologu, et al., 2016).

Healthcare providers with advanced knowledge of how Ofirmev decreases opioids consumption in the perioperative phase of care can minimize the complications associated with excessive narcotic use.

Well-controlled pain with fewer side effects from excessive opioids/narcotics administration will minimize patients' stress, anxiety, insomnia, and increase patient care satisfaction. Hence, if not contraindicated, Ofirmev should be considered as the first-line agent so that opioids can be used as adjunctive agents in other to minimize opioid-related side effects.

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