Spring 5-2018

Improving Acute Postoperative Pain Management for Opioid-Tolerant Patients: Development of a Postoperative Ketamine Infusion Protocol

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Executive Summary

Introduction of Problem

Recent data reveals 30% to 40% of the US population suffers from chronic pain (Roeckel, Le Coz, Gavériaux-Ruff, & Simonin, 2016). Costs related to chronic pain treatment account for 560 to 635 billion dollars spent on health care annually which places a major burden on the health care system (Roeckel et al., 2016). Previously, the gold standard of treatment for chronic pain has been the administration of opioids leading to numerous postsurgical complications including higher morbidity and mortality rates (Vandivelu et al., 2016). As anesthesia providers encounter a growing number of opioid-tolerant patients, strategies are needed to decrease health care costs and improve patient outcomes. The purpose of this project was to improve acute pain management for opioid-tolerant patients by creating a postoperative ketamine infusion protocol for a tertiary care center located in central Illinois.

Literature Review

Acute postoperative pain management for opioid-tolerant patients is complicated and requires deviation from standard protocols (Huxtable et al., 2011). Recently published clinical guidelines from the American Pain Society (APS) recommends the use of multimodal analgesia to target different mechanisms of action in the peripheral and/or central nervous system (Chou et al., 2016). Research has shown ketamine may be useful as an adjunct to opioids in the perioperative setting as part of a multimodal pain regimen. Ketamine is a noncompetitive antagonist at N-methyl-D-aspartate (NMDA) receptor sites capable of producing dose-dependent

analgesia, amnesia, unconsciousness, and akinesia (Vandivelu et al., 2016). Multiple research studies have demonstrated ketamine administered as a bolus dose or a continuous low-dose infusion for 24 to 48 hours postoperatively often resulted in a decrease in opioid consumption and a decrease in postoperative pain scores with few adverse side effects. Thus, anesthesia providers rethinking their traditional approach to acute postoperative pain management by incorporating ketamine as an adjunct for opioid-tolerant patients may result in improved outcomes.

Methodology

This project utilized a non-experimental design to create and introduce a postoperative ketamine infusion protocol for opioid-tolerant patients at a tertiary care center in central Illinois. The purpose of the design was to educate health care professionals and to encourage the adoption of a postoperative ketamine infusion protocol. The intent of the project was to improve acute postoperative pain management for opioid-tolerant patients through the creation of a postoperative ketamine infusion protocol which will later become available for use hospital-wide and/or system-wide.

The project was implemented at a tertiary care central in central Illinois. Several staff members attended a verbal educational presentation and completed a concise 10-question survey to evaluate the effectiveness of the presentation. Eight knowledge-based assessment questions were presented in true/false format addressing various topics such as the prevalence of chronic pain, the mechanism of action of ketamine, recent recommendations from the APS, and current drug administration practices. A five-point Likert scale was used to further evaluate staff members' support for the implementation of the suggested postoperative ketamine infusion protocol.

This project was deemed exempt from the Institutional Review Board at Southern Illinois University Edwardsville and approved by the Research Review Committee at the facility. Participation in this project was voluntary. There were minimal threats to subject welfare including loss of time and/or emotional distress.

Evaluation

Results of the study implied the verbal educational presentation increased staff knowledge regarding acute pain management for opioid-tolerant patients. All staff members (100%) identified ketamine as a noncompetitive antagonist at NMDA receptor sites. The majority (89%) of participants identified that at low doses ketamine causes a blockade of closed channels and analgesic properties are apparent while at high doses ketamine causes a blockade of open and closed channels and anesthetic properties are apparent. All participants (100%) were able to define multimodal analgesia and recognized it as the preferred approach to acute pain management. The majority (89%) of participants identified 30-40% of the US population is taking chronic pain medication. All participants (100%) recognized the number of patients taking chronic pain medications is on the rise. All participants (100%) identified numerous research studies have suggested postoperative ketamine infusions may decrease postoperative pain scores with few adverse side effects. Prior to the presentation, slightly more than half (56%) of participants indicated they were routinely administering ketamine as an adjunct to opioids for acute pain management in opioid-tolerant patients.

A five-point Likert scale was utilized to assess staff member support for the implementation of a postoperative ketamine infusion protocol. The mean score was 4.5 indicating strong staff support for the implementation of a postoperative ketamine infusion protocol.

Limitations of this project included sampling bias and a limited sample size. For the project's purpose, a convenience sample was chosen. This was due to time constraints and staff member availability. Nine staff members completed the posttest following the verbal educational presentation. The results of this posttest may not be generalizable to a larger population related to a small sample size.

Impact on Practice

The purpose of this project was to improve acute pain management for opioid-tolerant patients. The objectives of this project were to research current evidence-based literature to determine the role of ketamine in postoperative pain management for chronic opioid-tolerant patients and to develop a postoperative ketamine infusion protocol for a tertiary care center in central Illinois. Prior to this project, a limited number of anesthesia providers indicated they were routinely using ketamine as an adjunct to opioids for acute pain management in opioid-tolerant patients. Results of this study indicated the verbal educational presentation increased the anesthesia providers' knowledge of acute pain management for opioid-tolerant patients. Additionally, staff members demonstrated a strong level of support for the implementation of a postoperative ketamine infusion protocol. Multiple revisions were made to the protocol based on feedback from staff recommendations. Currently, the tertiary care center has plans for the postoperative ketamine infusion protocol to become available house-wide. There is also discussion of the postoperative ketamine infusion protocol becoming available for use system-wide.

Conclusion

Patient care outcomes may be improved by educating anesthesia providers about the use of ketamine in the perioperative period. Evidence-based research has demonstrated the use of

ketamine as either a bolus dose or continuous low dose postoperative infusion for 24 to 48 hours decreases opioid consumption and pain scores with few adverse side effects. The results of this project revealed anesthesia providers at this facility were in favor of the use of a postoperative ketamine infusion protocol. Thus, the availability of a postoperative ketamine infusion protocol may have a significant impact on anesthesia practice.

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