Spring 5-8-2020

Reducing Emergence Delirium in Combat Veterans Through the Development of a Decision-Tree Utilizing Ketamine and Precedex

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Executive Summary

Introduction of the Problem

Combat veterans have a higher incidence of Post-Traumatic Stress Disorder (PTSD), which can complicate emergence from anesthesia and can increase instances of emergence delirium (ED). The research suggested that combat veterans have an emergence delirium rate of 20% per capita when compared to the adult population and can cause significant harm to the patient and staff (McGuire, 2012). The research also suggested a reduction in ED rates amongst combat veterans with the use of Ketamine and Precedex in the anesthetic plan. A screening tool, along with an evidence-based decision tree to utilize Precedex and Ketamine was developed and implemented by the anesthesia staff at a community hospital in Southern Illinois. The setting was chosen due to a high number of combat veterans who are treated.

Literature Review

Ketamine. Ketamine works by binding to the N-methyl-D-aspartate (NMDA) receptors, inhibiting activation by Glutamate, a chemical associated with PTSD (Hintzsche, 2018). Several articles determined the superiority or suggest the use both directly and indirectly of Ketamine as part of a total intravenous anesthetic (TIVA). A survey study of sixty-eight anesthesia providers who witnessed ED in combat veterans with PTSD reported that 88.6% believed it was due to the use of potent inhalation agents (Wilson, 2014). Over 90% of the same providers said ED symptoms were relieved or lessened by analgesics (Wilson, 2014). There is a correlation between the multimodal anesthetic approach of using Ketamine with other agents and its ability to provide positive outcomes (McGhee, 2008). A concentration of 1mg of ketamine to 10mg Propofol was reported to have a profound effect on reducing the rate of ED in this population (Wilson, 2013).

Precedex. Precedex is classified as a selective Alpha-2 agonist in the body. It is chemically similar to Clonidine but possesses a much higher affinity for Alpha-2 (1,620:1 vs. 200:1) over Clonidine (Omoigui, 2012). The administration of Precedex via intraoperative infusion is frequent, a single bolus dose can also be given to halt or prevent ED upon emergence (Ibache, Munoz, Brandes, & Morales, 2004). In a controlled trial, a bolus dose of 0.3mcg/kg cut the incidence of ED from 47% down to 5% without finding a higher incidence of adverse outcomes (Ibache, Munoz, Brandes, & Morales, 2004). Providing an alternative administration profile allows the provider not to be restrained by one choice when the anesthetic plan needs to be modified due to the unique considerations of each patient.

Screening Tool. Disclosure of mental health information can be difficult for the veteran population due to stigmas and perceived potential service-related consequences (Mcguire & Burkard, 2010). Using a screening tool to help identify potential cases of PTSD will allow better identification with a lack of personal reporting by the patient (Prins et al., 2016). Adding a screening tool to the pre-operative screening of combat veterans can help identify potential ED cases and alert the provider to a potential need for changes in anesthetic techniques (Prins et al., 2016).

Project Methods

The primary outcome measure of this project is the successful implementation of the decision tree and Primary Care-PTSD-Screening Tool (PC-PTSD-5). The goal of this project is to increase the knowledge base of the anesthesia providers, with a potential to decrease ED in the combat veteran population. The implementation consisted of staff education. Objectives were to increase the knowledge base of the staff. The sample population included the anesthesia staff.

An IRB was submitted to screen against any potential harm or risks identified with the implementation of the protocol. Patient health and identifying information were not collected during this project. The project was given an exempt status due to being a quality improvement (QI) project.

Evaluation

A brief, self-directed education session was scheduled for providers who took a pre-test and post-test about the information, followed by a survey ten weeks post-session. This session included a printed-out PowerPoint format that covered the salient points of the literature review. The decision-tree and evaluation tool were explained in the session, along with a question and answer session.

The actual outcomes of the project were quite positive and received support from the anesthesia staff in terms of the implementation of the project. The education session yielded a supportive and engaging question and answer session with the providers. The sustained engagement of the providers was key in the implementation, and this goal was achieved with relative ease. Most of the providers were very willing to ask questions about the current research and many had input on clinical practice situations that related to this project.

The original group did not all return the survey, but eight out of the original 18 respondents did. This sample did give the authors a large enough response group to compile results and data about the success of the project. The final survey revealed that the providers who chose to use the protocol not only used the tool as intended, they saw positive results with the use. The responses were of great use to the potential long-term use of this project as a clinical tool.

Limitations of the project were predicted to include resistance to Ketamine due to delirium risks and Precedex due to costs. Another predicted limitation was of participation. The survey did not reveal issues with Ketamine or Precedex use, and participation in the project was engaging. The providers also adopted the tool, which was a concern addressed in the formation of the project.

Limitations that were discovered after implementation was the continued use of the decision-tool and provider engagement with the survey. Due to the short duration of the project, the authors were not able to monitor continued use long-term or change the implementation as problems arose. One problem identified was a professional conflict with another provider in deploying the tool on an appropriate patient. The limitations of being available to provide additional education could have been useful. Allowing the tool to be used for an extended period would have also allowed for more data to be collected about the usefulness or identify potential instances not to use the tool.

Impact on Practice

The immediate effects on clinical practice included an increase in the provider knowledge base and immediate adoption of the tool. The providers annotated in the survey that the adoption was easy and the decision-making process was simplistic. These responses translate to the adoption of the tool and provider satisfaction scores. The long-term results are dependent on the utilization of the tool, and cannot be predicted at this time.

Patient care and outcomes can be positively impacted by this project by increasing satisfaction of anesthetic care amongst the target population and reducing instances of harm related to ED. Facility staff also can benefit by reducing ED instances due the risks of physical harm they

face in trying to keep the patient safe during an episode. Patient outcomes are also improved by avoiding longer recovery room times and operating room charges.

Conclusions

A statistically significant increase in provider education was shown on a post-test quiz. Patient outcomes were improved by the development of a working anesthetic decision-tree and screening tool. Future applications of this project could be potentially used in other patient populations with PTSD that are non-combat related.

Changes considered after implementation included offering a digital downloadable version of the tool that would give the provider the opportunity to have the tool available at all times. Another potential change was to offer a second educational session conducted on a later date to educate providers that could not attend during the initial session.

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