

Abstract

Each year there are millions of abdominal surgical procedures performed in the United States that require the development of a pain management regimen. Pain management may rely on opioid-heavy regimens, or it may use adjuncts such as magnesium sulfate. Magnesium sulfate antagonizes the N-methyl-D-aspartate (NMDA) receptor and inhibits the L-type calcium channels (Na et al., 2011). This project is guided by the PICO question: (P) In patients undergoing general anesthesia for abdominal surgery, (I) does the addition of 2g of magnesium sulfate in the multimodal pain regimen (C) compared to a pain regimen without 2g of magnesium sulfate IV (O) lower postoperative opioid use? A pre-educational intervention survey was distributed to anesthesia staff. Following the dissemination of the survey, an educational intervention was conducted with redistribution of the pre-educational survey. Results from the pre-education survey showed that 31.6% (n=6) of anesthesia providers observed a reduction in opioid usage postoperatively while 46.2% (n=6) observed a reduction in the post-education survey.

Introduction

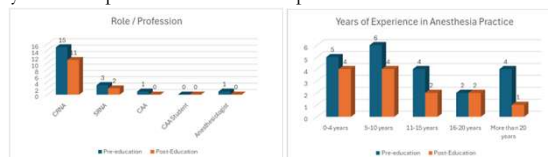
- Approximately four million surgical abdominal procedures are performed yearly throughout the United States (American College of Surgeons, 2022).
- Approximately 75% of patients experience moderate to high intensity of pain following surgery (Horn et al., 2024).
- While opioids are frequently utilized for acute postoperative pain management, their administration is associated with adverse effects.
- Adjuncts such as magnesium sulfate can aid in pain management while mitigating the adverse effects of opioids
- Magnesium functions as an NMDA receptor antagonist and blocks calcium influx into the cell via the L-type calcium channels (Na et al., 2011).
- Administration of magnesium sulfate offers benefits beyond pain control including potentiating muscle relaxation, bronchodilator effects, promotes cardiac stability, and vasodilation (Dahake et al., 2024).

Methods

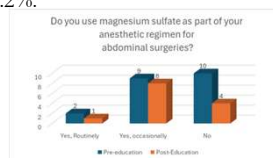
- A pre-educational intervention survey was administered to anesthesia staff over a 7-day period.
- After collecting the initial survey responses, an educational flyer was distributed at an educational in-service.
- The survey was redistributed, post-educational intervention, over a 7-day period

Results

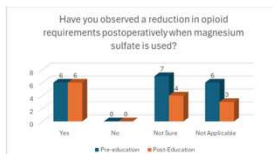
- The pre-education survey yielded 21 responses, whereas the post-education survey received 13 responses. Demographics were obtained to determine anesthesia provider role / profession and years of experience in anesthesia practice.



- The pre-education survey found that 52.4% of anesthesia providers used magnesium sulfate intraoperatively for abdominal surgeries, while the post-education survey found that usage increased to 69.2%.



- Postoperative opioid reduction was observed by 31.6% of anesthesia providers pre-education, compared to 46.2% post-education.



Discussion

The proportion of anesthesia providers administering magnesium sulfate increased from 52.4% before the educational intervention to 69.2% afterward, reflecting greater acceptance of its role as an adjunct in multimodal pain management. Provider perceptions related to postoperative opioid reduction became more favorable, increasing from 31.6% pre-intervention to 46.2% post-intervention. The number of providers uncertain about the impact of magnesium sulfate on opioid consumption declined, and notably, no respondents indicated they observed no postoperative opioid reduction following magnesium sulfate administration. These results imply a broader awareness among providers regarding the analgesic efficacy of magnesium sulfate

Conclusions

- Magnesium sulfate became more accepted as an adjunct for pain management
- More providers recognized the analgesic benefits of magnesium sulfate
- Administration of magnesium sulfate was associated with decreased opioid consumption postoperatively

References

- American College of Surgeons. (2022, April 7). New machine learning models can predict adverse outcomes following abdominal hernia surgery with high accuracy. ACS. <https://www.facs.org/media-center/press-releases/2022/machine-learning-and-patient-outcomes/>
- Dahake, J. S., Verma, N., & Bawiskar, D. (2024, March 17). *Magnesium sulfate and its versatility in anesthesia: A comprehensive review*. Cureus. <https://pmc.ncbi.nlm.nih.gov/articles/PMC11021848/>
- Horn, R., Hendix, J., & Kramer, J. (2024, January 30). Postoperative pain control. StatPearls. <https://www.ncbi.nlm.nih.gov/books/NBK544298/>
- Na, H.-S., Ryu, J.-H., & Do, S.-H. (2011). The role of magnesium in pain. Magnesium in the Central Nervous System. <https://www.ncbi.nlm.nih.gov/books/NBK507245/>