

Problem Statement

- The opioid crisis is the primary cause of intoxication-related fatalities in the project site's community, located in a large metropolitan region, accounting for 93% of such cases in 2019; the numbers continue to rise annually.
- Studies have demonstrated that administering intravenous magnesium sulfate at a dosage of 30-50 mg/kg at the onset of surgery significantly reduces intraoperative opioid requirements, providing pain relief comparable to intravenous morphine.
- The anesthesia department at a project site does not use the non-opioid-sparing adjuvant magnesium sulfate during complex orthopedic procedures where intravenous opioids are frequently administered.

Purpose & Goals

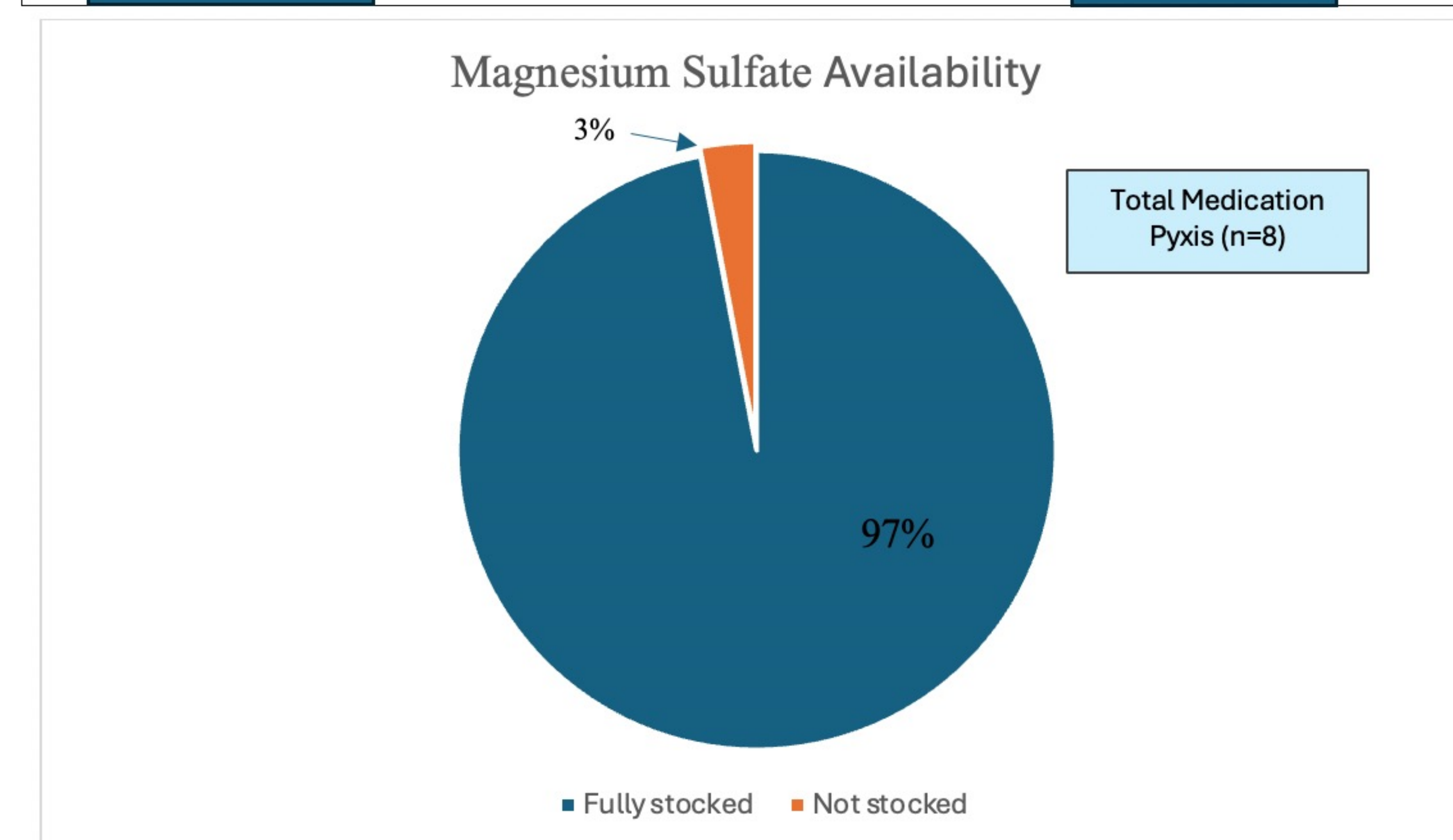
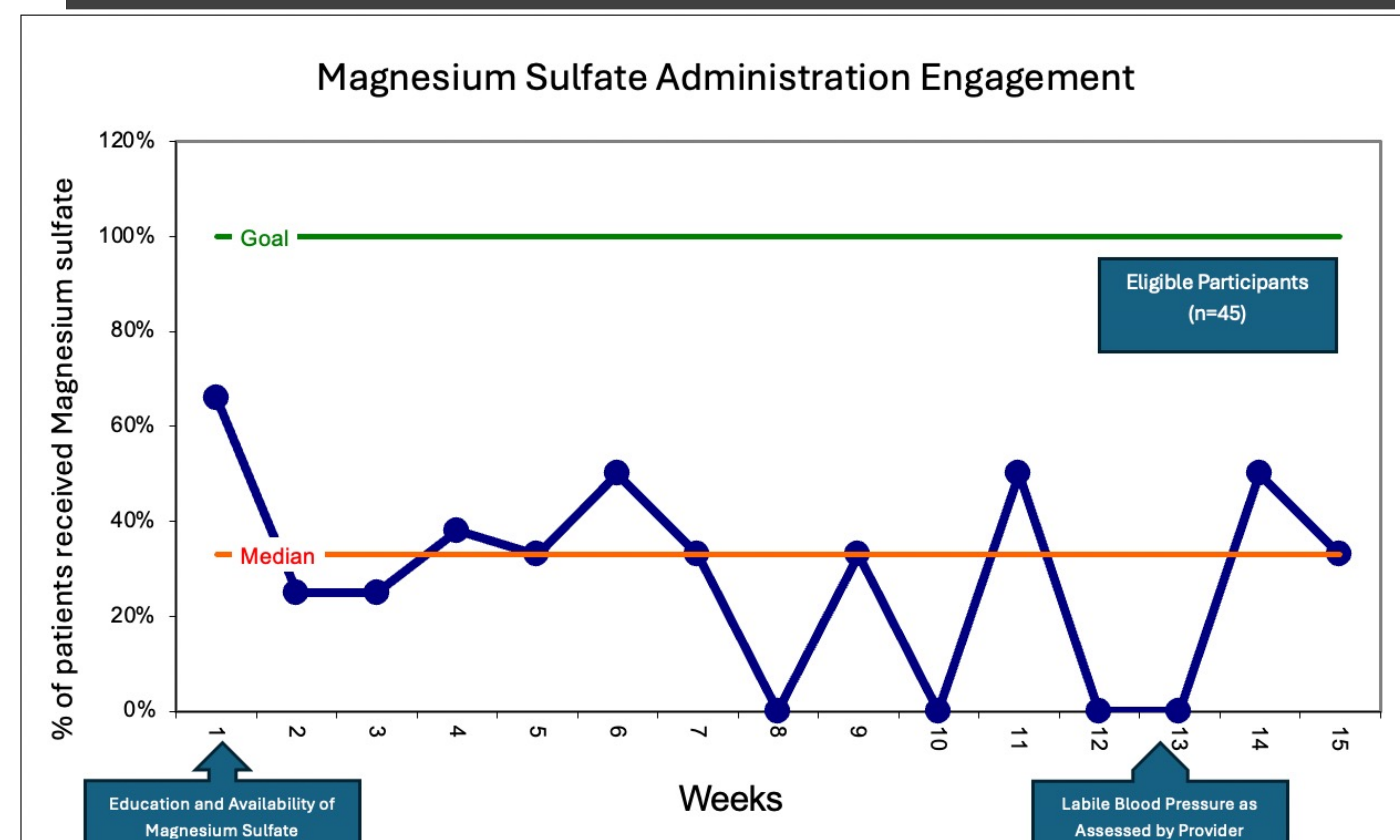
The purpose of this quality improvement project was to incorporate intravenous magnesium sulfate administration among patients undergoing complex orthopedic procedures in the anesthesia department of a large metropolitan area hospital.

- Process Goal:** 1 – 2g IV piggyback magnesium sulfate will be accessible in the central medication dispenser (Pyxis) in the preoperative unit, while individual operating rooms will have IV magnesium sulfate vials (1g / 2mL) readily available in their anesthesia medication pyxis.
- Outcome Goal:** Anesthesia providers will administer IV magnesium sulfate to 100% of patients undergoing orthopedic procedures.

Methods

- Setting:** Anesthesia department at community-based, academic medical center. Anesthesia providers: (N=18)
- Target Population:** Orthopedic patients undergoing complex orthopedic procedures such as pilon fracture repairs, total knee and hip replacements, and Open Reduction and Internal Fixations (ORIFs).
- Strategies and Interventions:**
 - Instructions on administering magnesium sulfate IV 1 – 2g IVPB and 1g / 2mL vials to be premixed in 100mL bag before administration in the operating room.
 - Required meetings with the pharmacy manager to ensure magnesium sulfate is readily available in the central medication Pyxis and in an individual operating room anesthesia Pyxis.
 - Reminder sticker in every anesthesia operating room charting monitor, and educational flyers in anesthesia work room.
- Data Collection:** Weekly chart audits of the electronic health record (EPIC) and de-identified to REDCap, a secure HIPAA compliant network.

Results



Key Outcomes

Over 15 weeks, based on data from 45 eligible patients undergoing complex orthopedic procedures, the analysis revealed an overall administration rate of **27%**.

Drug availability in anesthesia Pyxis (n=7) and pre-operative central core Pyxis (n=1), with an overall adherence rate of **97%**.

Discussion

The process goal was successfully met through the administration of magnesium sulfate IVPB, and the vials were consistently stocked and readily accessible in Pyxis medication dispenser machines.

The desired outcome goal was not achieved, which was anticipated given the inherent limitations associated with the administration of magnesium sulfate.

Limitations:

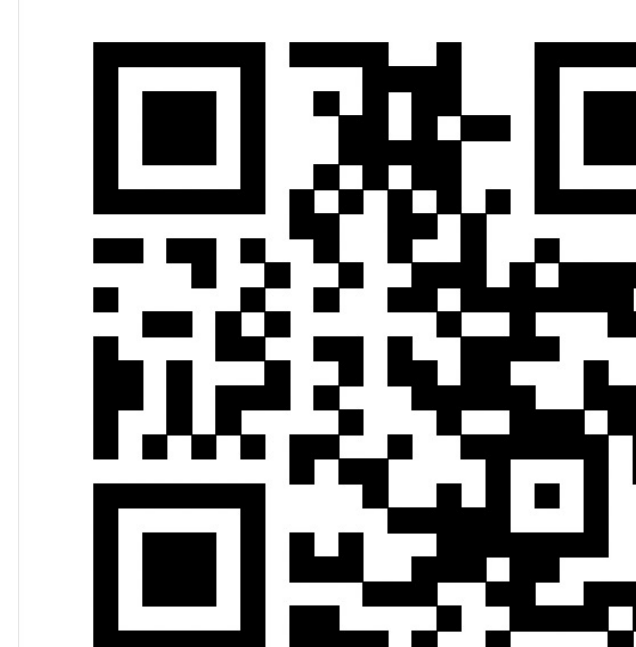
- Provider preference
- Intraoperative blood pressure management
- Motivation of anesthesia staff

Conclusion

Sustainability and Next Step :

- Interventions aimed at ensuring magnesium sulfate is stocked and readily available were successful and will continue to be maintained by the pharmacy.
- The magnesium sulfate educational flyer and reminder sticker on anesthesia computer charting monitors will remain in place
- The interdisciplinary team will implement magnesium sulfate administration prior to surgery as part of the non-opioid pain management bundle for patients undergoing complex orthopedic surgery.
- Through the initiative, magnesium sulfate is now readily available, and providers have begun to order its use. While some patients are not candidates for the medication, more could benefit with additional staff buy-in. As new providers join the anesthesia department, the use of magnesium sulfate could become a standard part of the culture for complex orthopedic procedures.
- The results align with existing literature, which indicates that while magnesium sulfate is an effective opioid-sparing adjunct, its clinical utilization is often inconsistent due to provider habits, concerns over hemodynamic instability, and a preference for traditional pain management strategies.

References



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