



# Development and implementation of a pediatric opioid-free appendectomy protocol: a quality improvement project, learning from positive outliers

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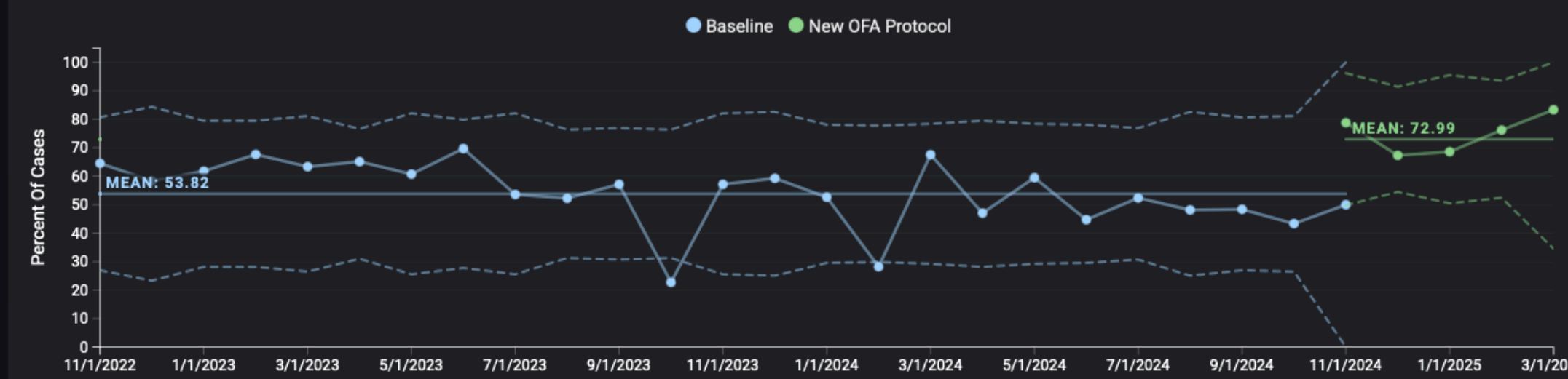
## Introduction

- Appendectomies are one of the most common emergency pediatric surgeries in the U.S.
- Perioperative analgesia practices vary, but **opioid-free anesthesia (OFA)** is gaining popularity.
- OFA aims to achieve intraoperative goals while optimizing postoperative pain control **without opioid-related side effects**.
- Seattle Children's Hospital (SCH) has developed OFA protocols for various pediatric surgeries.
- Despite an **OFA appendectomy macro** introduced in the electronic medical record (EMR) in 2017, significant clinical variation persisted in non-opioid analgesic combinations and dosages
- Goal: **Standardize practice** by developing a **data-driven OFA protocol** by using **positive outliers**

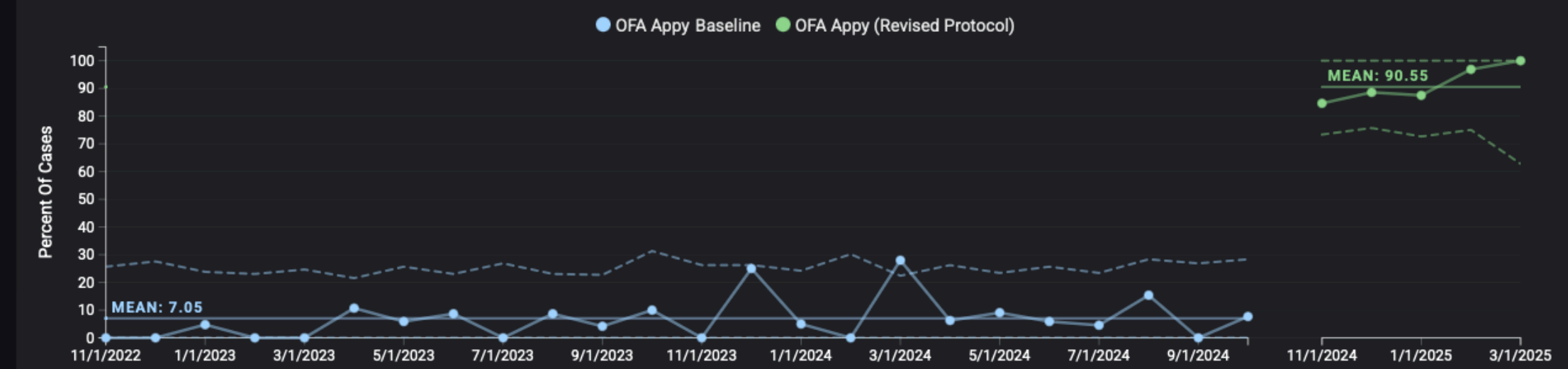
## Methods

- **Setting:** SCH, a tertiary pediatric care hospital.
- **Data Extraction & Analysis:**
  - Used **AdaptX™ OR Advisor** to analyze **deidentified EMR data**.
  - Created **statistical process control (SPC) charts** to evaluate system performance.
- **Study Design:**
  - Reviewed **495 appendectomy patients** who received OFA.
  - Used **funnel plots** to assess performance by individual anesthesiologists.
  - Identified **positive outliers** (clinicians with superior outcomes).
  - Conducted **interviews** with top-performing anesthesiologists.
  - Refined and implemented a **revised OFA protocol** based on positive outliers on **November 4, 2024**.
  - Daily email reminders sent to the on-call team; feedback collected.
  - Post-intervention **patient outcomes reviewed daily**.

1. Incidence of Opioid Free Anesthesia for Appendectomy Patients

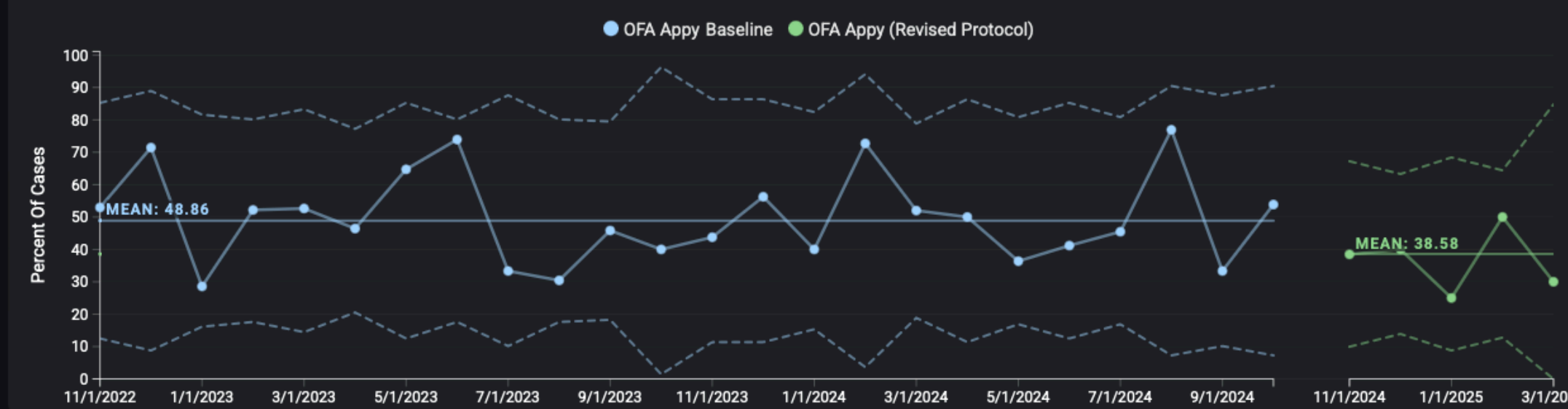


2. Incidence of Ketamine Use in OFA Appy



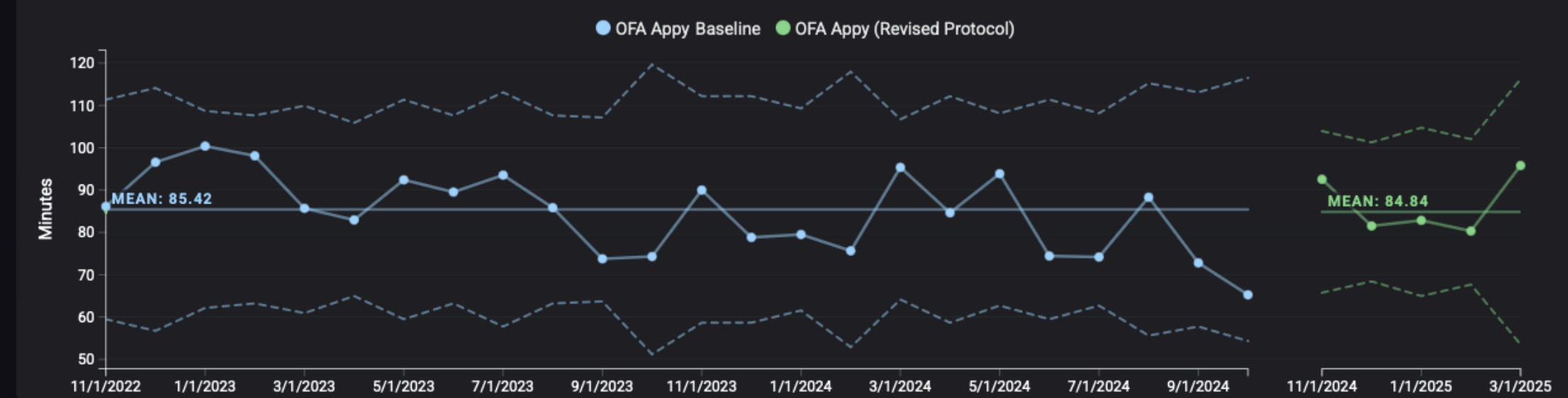
4a. IV Opioids Given in PACU Rate

11/7/2022 to Present



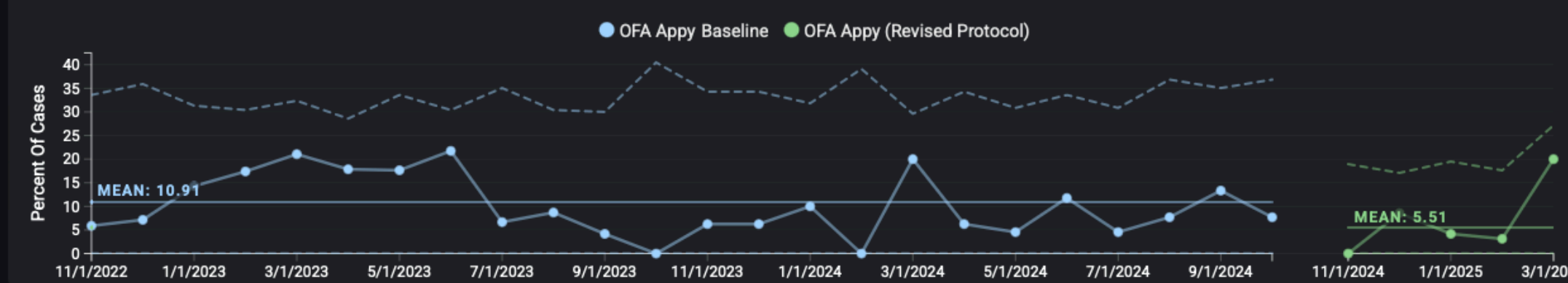
5a. Average PACU Time

11/7/2022 to Present



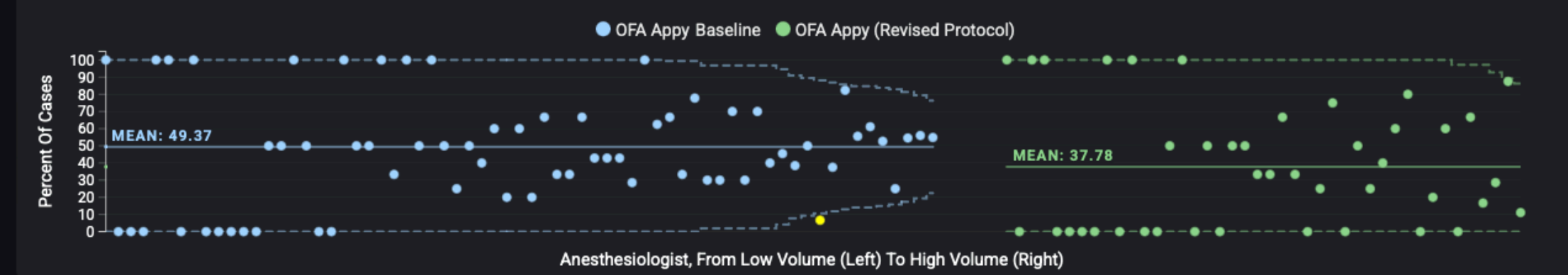
6a. Nausea Meds Given in PACU Rate

11/7/2022 to Present



4b. IV Opioids Given in PACU by Anesthesiologist

11/7/2022 to Present



## Results

- **Review period:** November 2022 to November 2024
- **Key findings post-November 4th (protocol implementation):**
  - **Increased ketamine use.**
  - **Reduced:**
    - PACU max pain scores
    - IV opioid rescue rates
    - Rescue antiemetic rates
  - **Increased PACU length of stay.**
  - **No special cause variation observed.**

## Conclusions

- Revised **OFA appendectomy macro** led to:
  - **12-fold increase** in ketamine use.
  - **Decreased** PACU max pain scores, IV opioid rescue rates, and rescue antiemetic rates.
  - **Unchanged** PACU times
- **Single PDSA cycle** can:
  - **Reduce clinical variability.**
  - **Improve quality of care.**
- Studying **positive outliers** helps drive system-wide improvements.

## References

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- Franz AM, Martin LD, Liston DE, Latham GJ, Richards MJ, Low DK. In Pursuit of an Opioid-Free Pediatric Ambulatory Surgery Center: A Quality Improvement Initiative. *Anesth Analg*. Published online 2021:788-797. doi:10.1213/ANE.0000000000004774