Utilization Patterns of Opioids and Multimodal Analgesia

Leveraging MPOG Data

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Team Effort

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Anesthesia and Perioperative Care

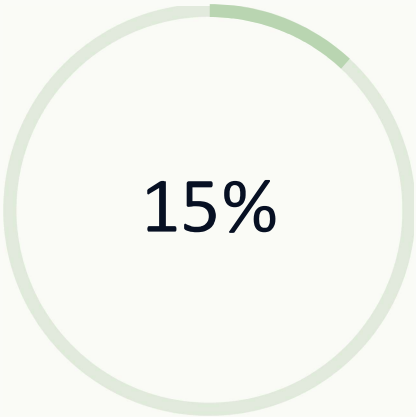
AMPOG MULTICENTER PERIOPERATIVE OUTCOMES GROUP

Multicenter Perioperative Outcomes Group

Objectives

- Explore patterns of pain medication administration in the perioperative period for surgical patients.

125 Million Opioid Prescriptions



US Population Filled an Opioid Rx

Prescribed by a Surgeon

51M+ Americans undergo surgery annually

Majority expose to opioids perioperatively

Guidelines recommend multimodal analgesic approaches

“utilizing a combination of different analgesic medications and techniques, including non-opioid pain relievers like **acetaminophen** and **NSAIDs**, along with **regional anesthesia** techniques”

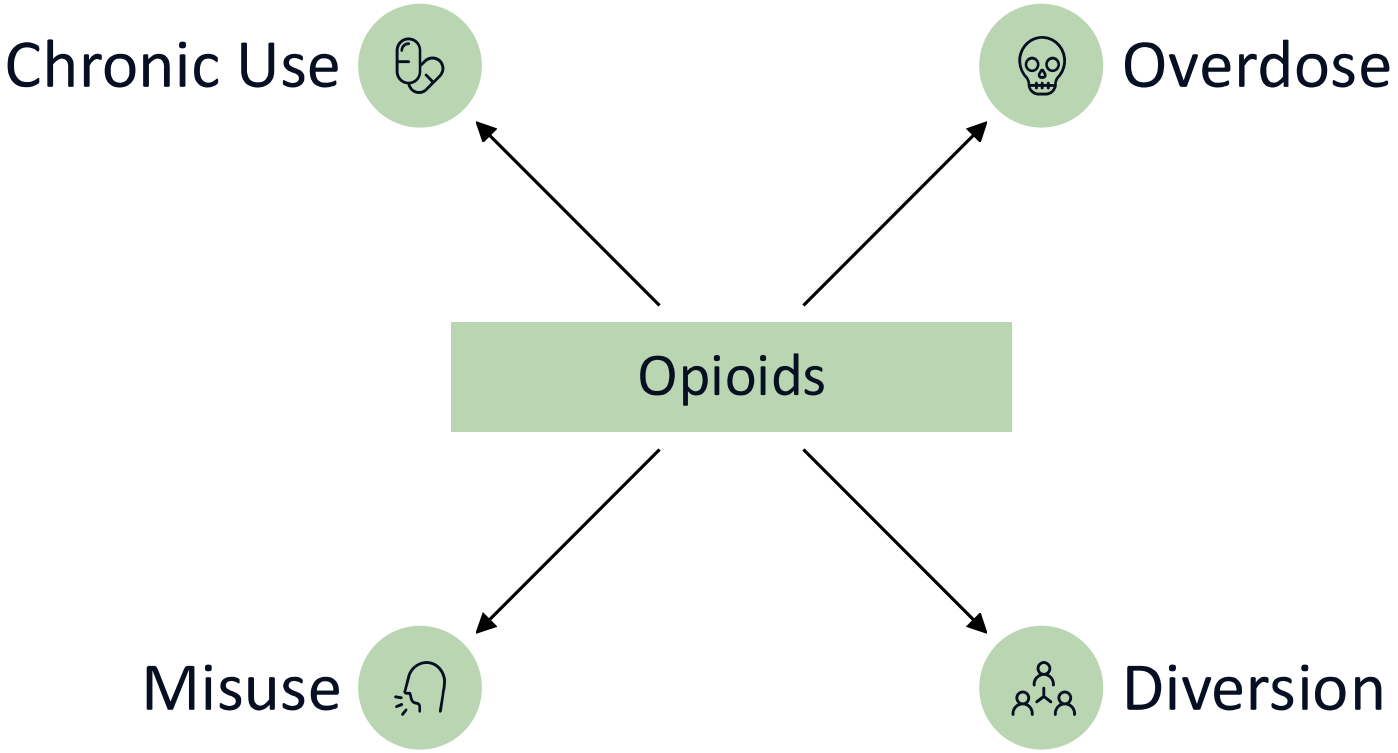
ASA GUIDELINES

Perioperative Benefits of Multimodal Approach

Improves pain control

Reduces opioid related side effects

Reduces length of stay


Chronic Use
Overdose
Opioids
Misuse
Diversion

What Remains Unknown?

What pain medications are surgical patients receiving perioperatively?

What variation exists?

AIMS

Identify types of pain medications used for common surgeries

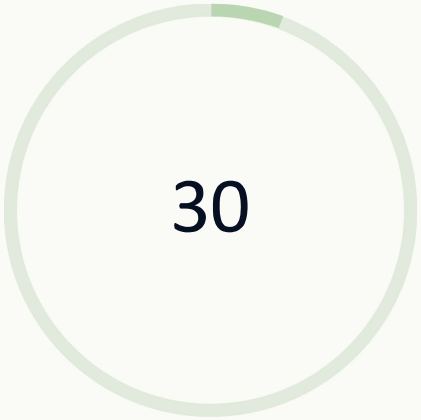
Investigate factors associated with multimodal utilization

Data Source

- Standardized Data File
- 2019-2022

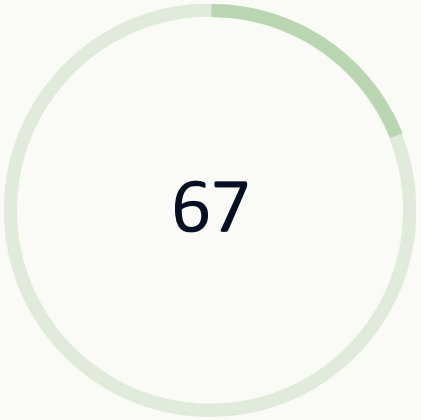
MPOG Institutions

MPOG

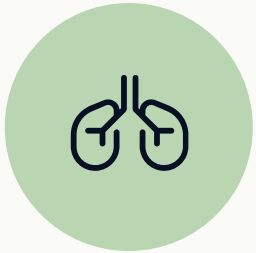


Million Cases

Million Medication Records



67 Billion Physiologic Observations



Physiological Data

Lab and Diagnostic

Billing Data

Clinical Case

Preoperative

Intraoperative

Postoperative

Inclusion Criteria

- Age ≥ 18
- Underwent select surgical procedures

Laparoscopic Appendectomy

Laparoscopic Cholecystectomy

Laparoscopic Inguinal Hernia

Cesarean

Simple Mastectomy

Total Knee Arthroplasty

Total Hip Arthropasty

Common Surgeries

Predictable
Postoperative Pain

Multimodal Approach is
Standard of Care

Exclusion Criteria

- Emergent, night, and weekend cases
- ASA 5 and 6
- Low case count

Primary Outcome

- Administration of non-opioid analgesics in the perioperative period.

Non-opioid Analgesics

- Acetaminophen
- NSAIDs
- Ketamine
- Dexmedetomidine
- Magnesium
- Nerve Blocks
- Gabapentinoids
- Dexamethasone

202,146 Cases

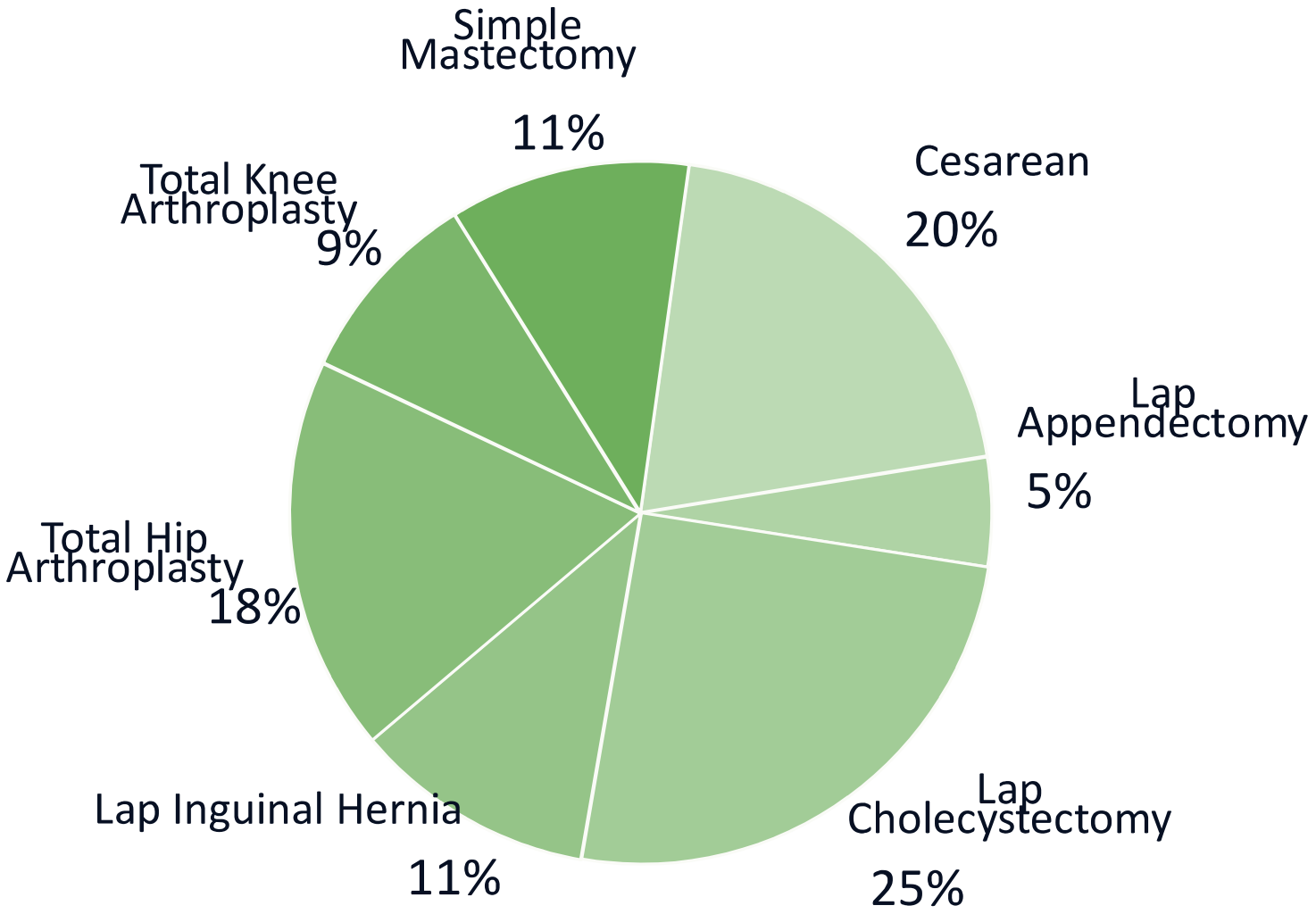
194,361 Patients

61 institutions

61 institutions

77% Affiliated with Medical School

67% Hospital Bed Size > 500

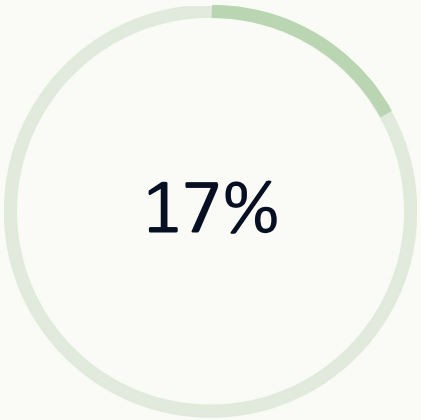

Simple Mastectomy
11%
Cesarean
20%
Lap Appendectomy
5%
Lap Cholecystectomy
25%
Lap Inguinal Hernia
11%
Total Hip Arthroplasty
18%
Total Knee Arthroplasty
9%

52 years

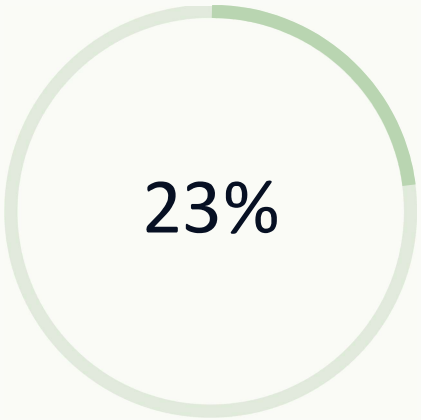
68% Female

62% ASA 1 or 2

Provider Level Metrics



Attending Only



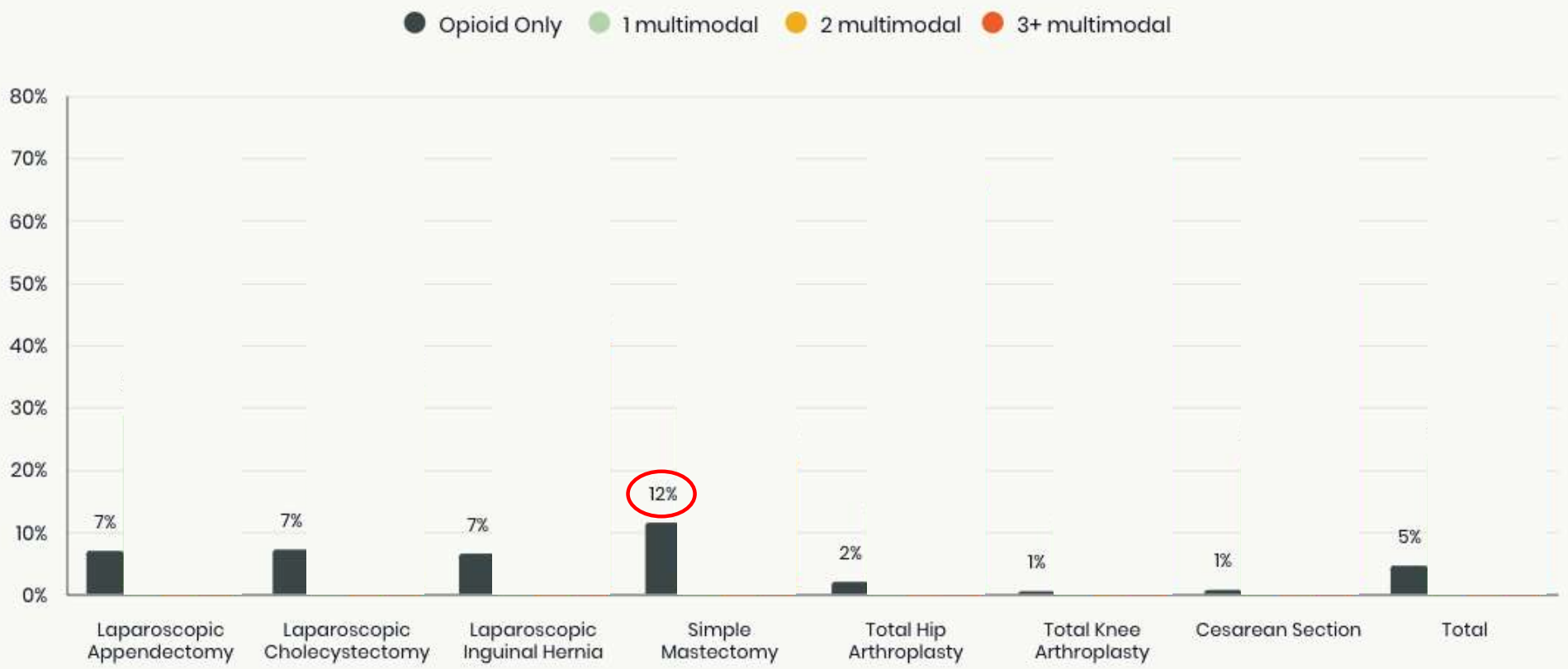
Resident

CRNA

Pain Medications Administered in the Perioperative Period

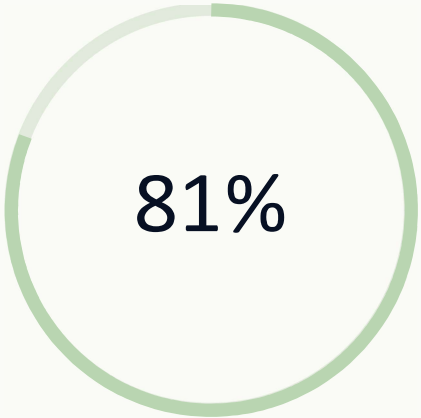
Opioid Use by Procedure

Multimodal Administration by Procedure



Regional or Neuraxial Block

Total Knee Arthroplasty

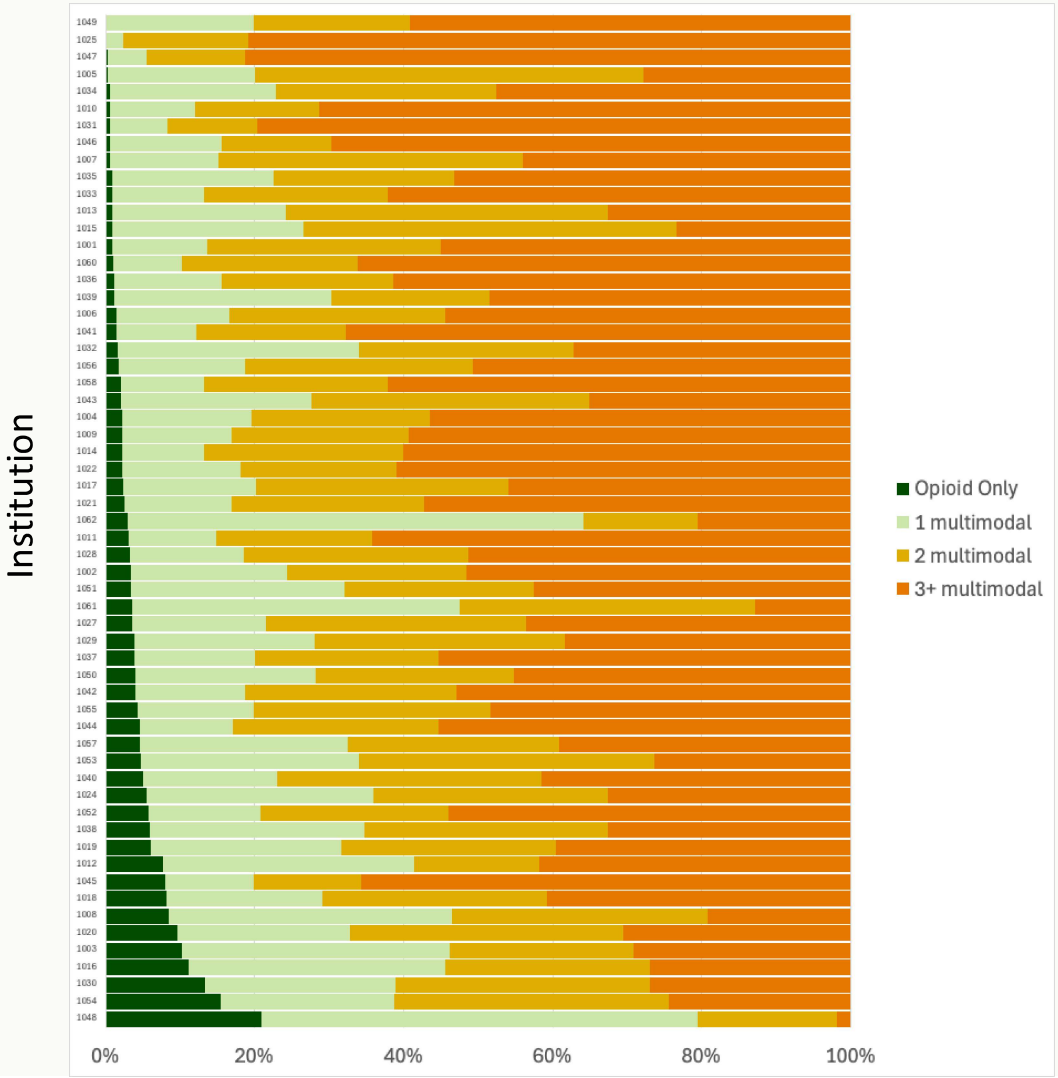


Total Hip Arthroplasty

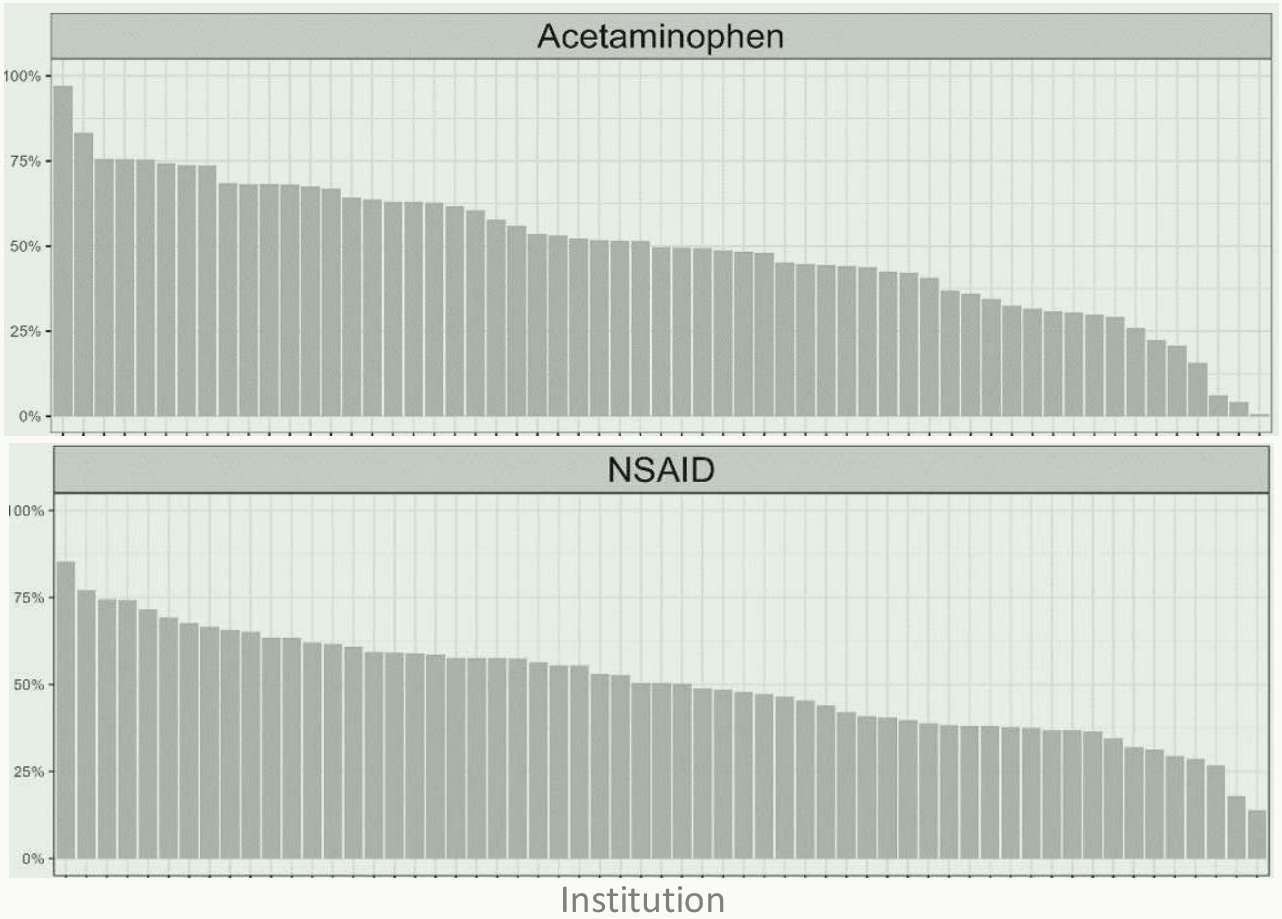
Cesarean

Institutional Trends

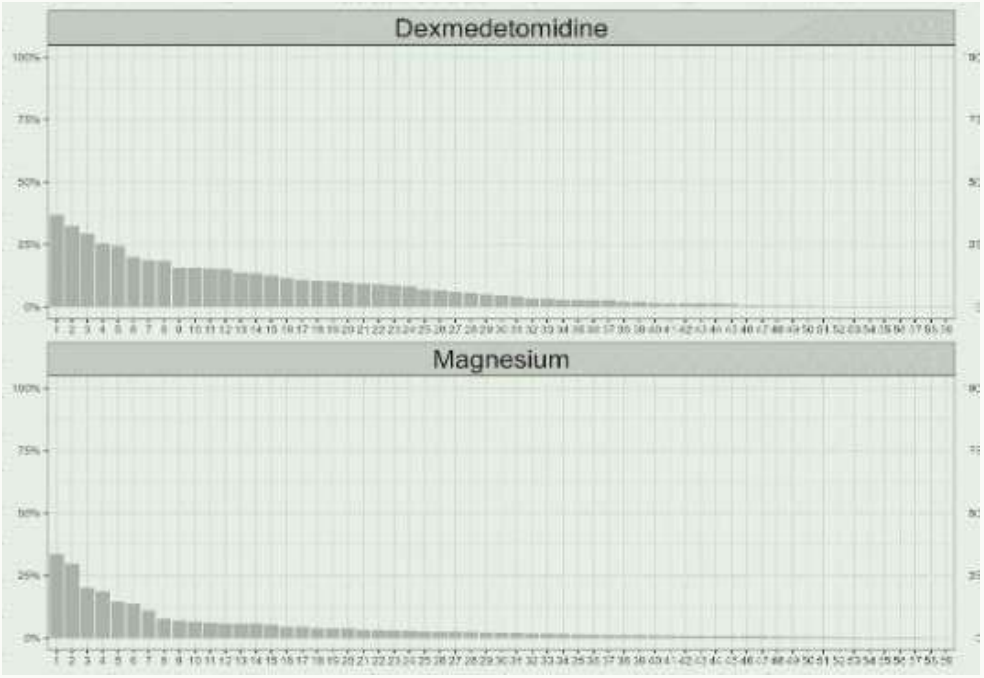
Multimodal Administration by Institution



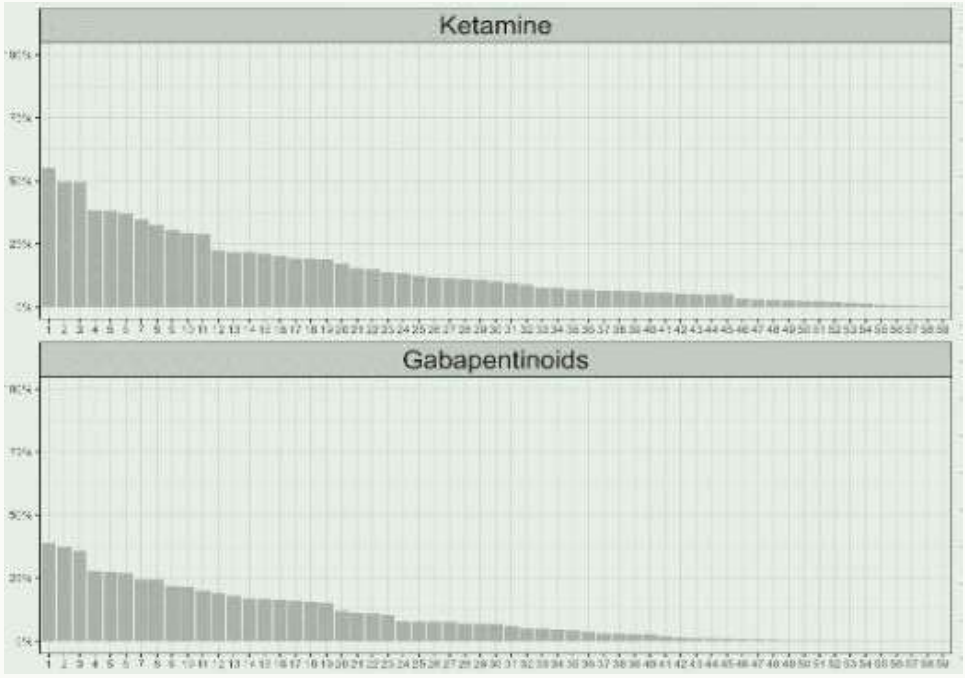
Medication Administration by Institution



Medication Administration by Institution



Institution



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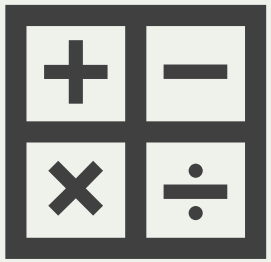


- We used a **mixed effects model** to account for institutional-level variation in multimodal analgesia.
  - Essential when data are nested into groups, such as institutions.

Key Findings

Patient-Level Factors

All comorbidities (Liver Disease, CKD, DM, CHF, CAD, Chronic Pulmonary Disease, Cardiac Arrhythmia) were significantly associated with **increased odds of opioid-only use**.

ASA Class 4: Strongest patient level predictor of opioid-only use (OR 2.74 [2.25–3.34])

Procedure-Level Factors

Simple mastectomy: Increased odds of opioid-only (OR 16.54 [95% CI 14.30–19.14])

Total knee arthroplasty: highest odds of 3+ multimodal (OR 6.27 [95% CI 5.93–6.62])

Provider Team Factors

Attending + resident or fellow: Lower odds of opioid-only (0.91 (95% CI 0.84–0.99)); higher odds of 3+ multimodal (1.22 (95% CI 1.17–1.27))

Attending + CRNA: Lower odds of opioid-only (OR 0.88 (95% CI 0.82–0.95)); higher odds of 3+ multimodal (OR 1.16 (95% CI 1.12–1.21))

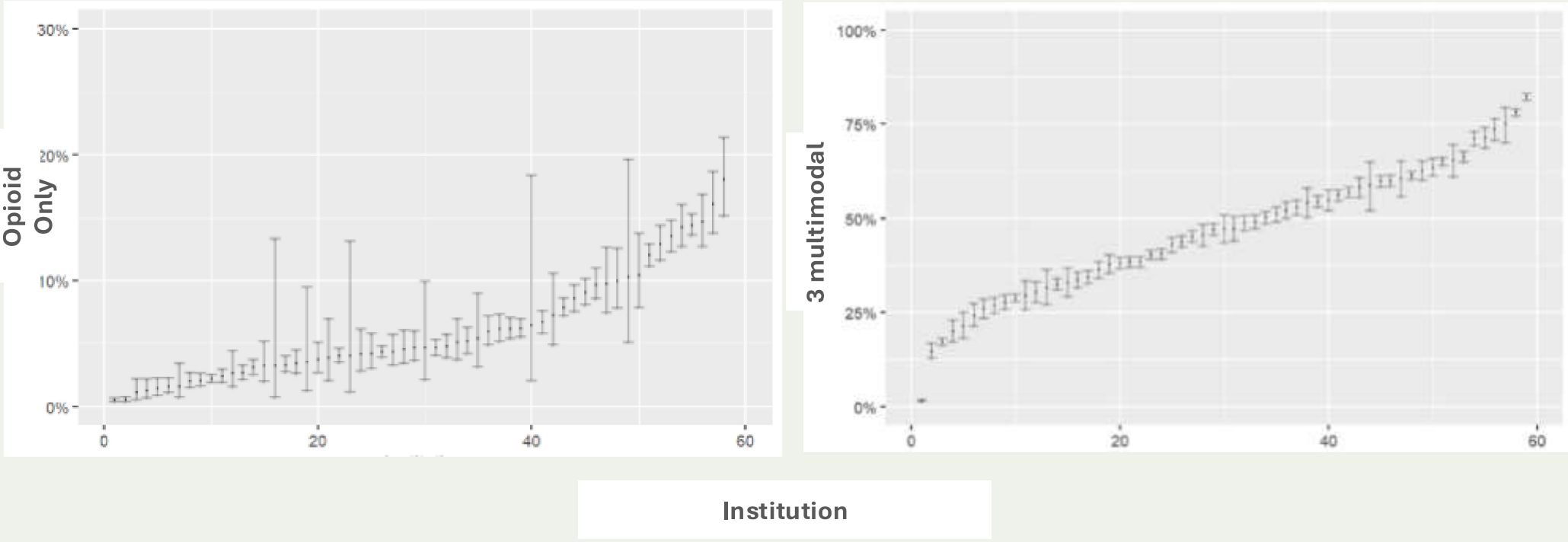
Temporal Trends

By **2022**, the odds of opioid-only use was significantly lower compared to 2019 (OR 0.56, 95% CI 0.52–0.60).

3+ multimodal analgesia use shows a **marked increase over time**, with each year demonstrating progressively higher odds compared to 2019.

Even after adjusting for these variables, **institutional variation in multimodal utilization remained.**

Institutional Variation in Analgesia Use (Adjusted Model)



Mechanisms for Variation

- Provider Preference and Training
- Institutional Protocols and Guidelines
- Access to Medications
- Perceived Efficacy and Safety Concerns
- Institutional Cultural Factors
- Time and Workflow Constraints

Strengths and Limitations of Institutional MPOG Data

Data Source

Robust, EHR >80 institutions

Data Granularity

High data granularity, limited to perioperative time-period

Generalizability

High, multiple hospital settings

Ease of Access

IRB approval, PCRC application process, ~6 months

Ideal Use Case

Very broad, retrospective, prospective.

Data Accuracy

High, data extraction process, MPOG constantly collaborates to improve quality.

Final Thoughts

- **Variability exists in perioperative multimodal analgesia practices.**

- **Opportunities exist for improvement:**
  - Assessment of multimodal protocol adoption
  - Investigate high and low utilizing institutions
  - Institutional benchmarking