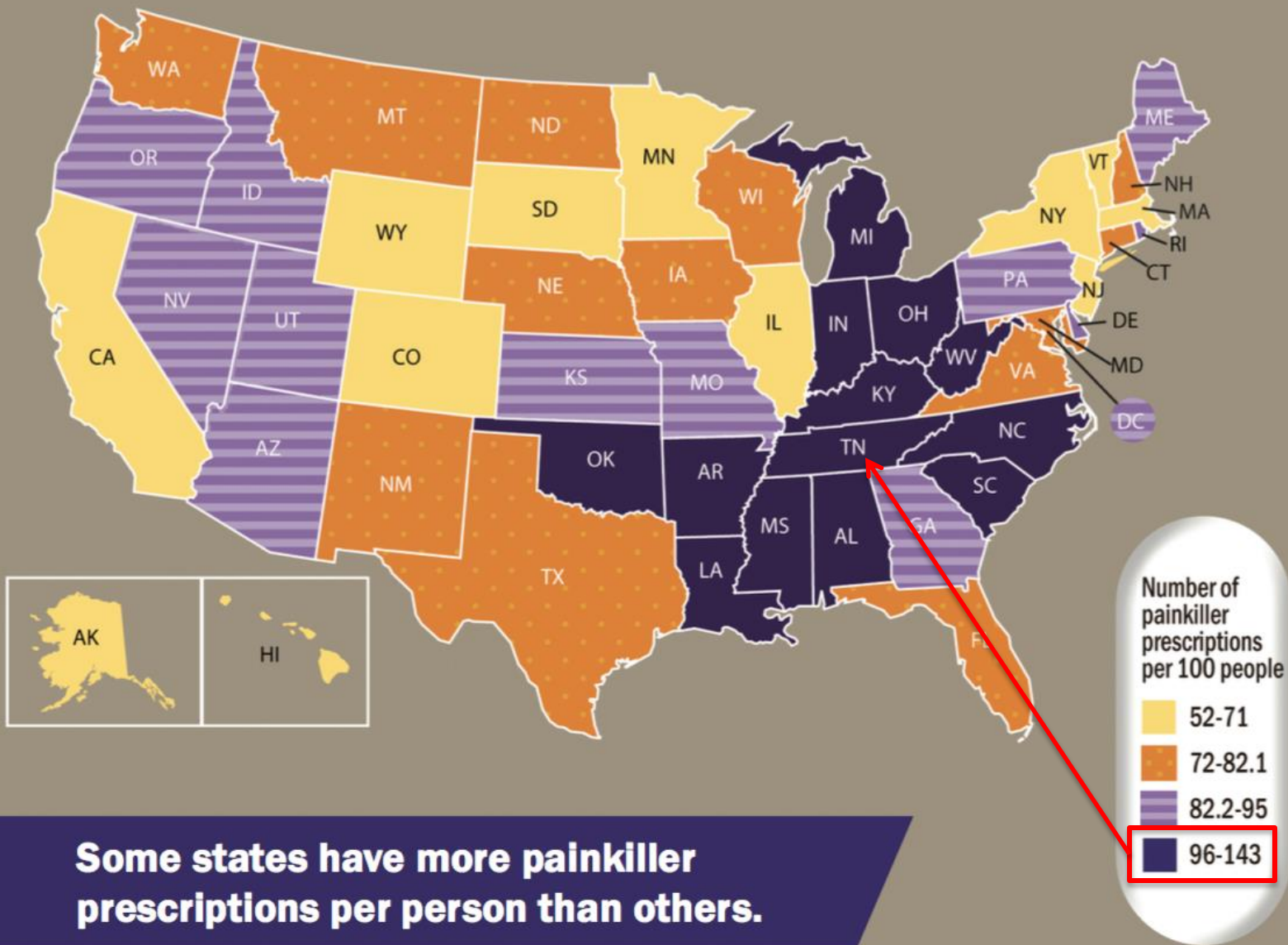


# Opioid reduction strategies in an academic tertiary medical center

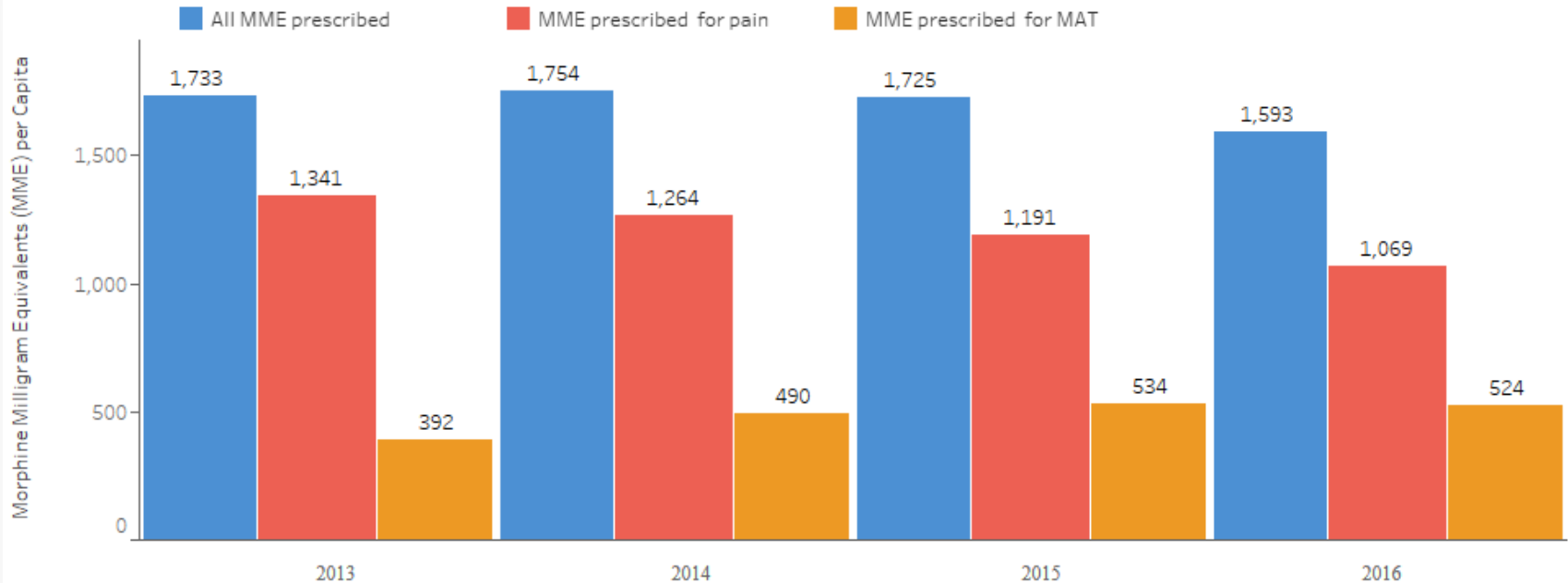
Terry Bosen, PharmD  
Medication Safety Program Director  
Vanderbilt University Medical Center





**Some states have more painkiller prescriptions per person than others.**

# Tennessee MME data per capita



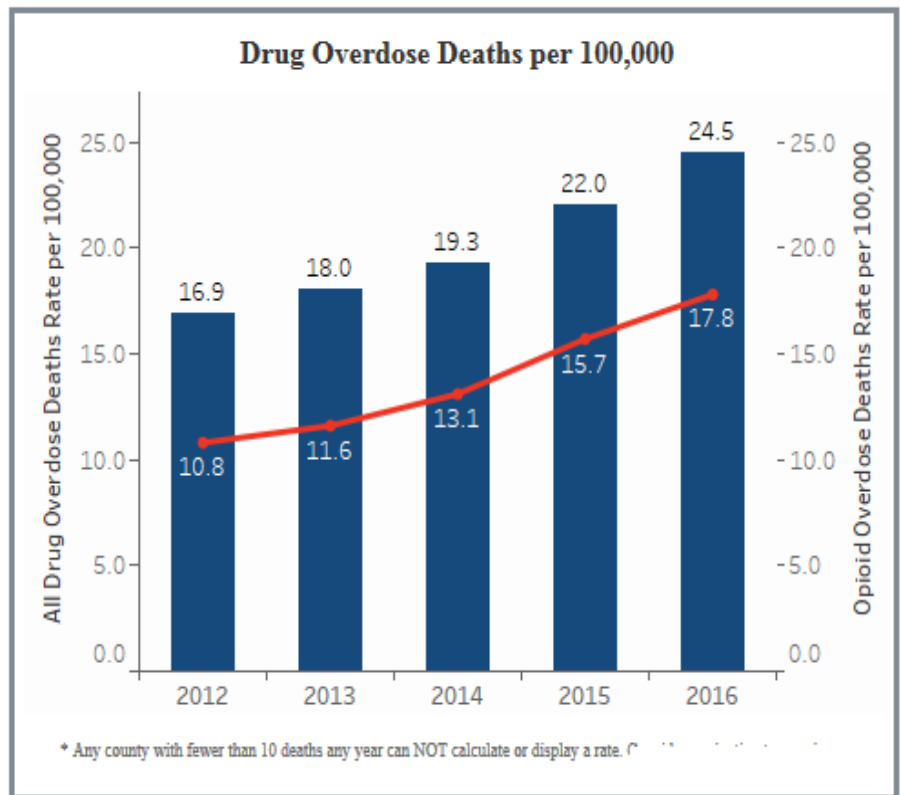
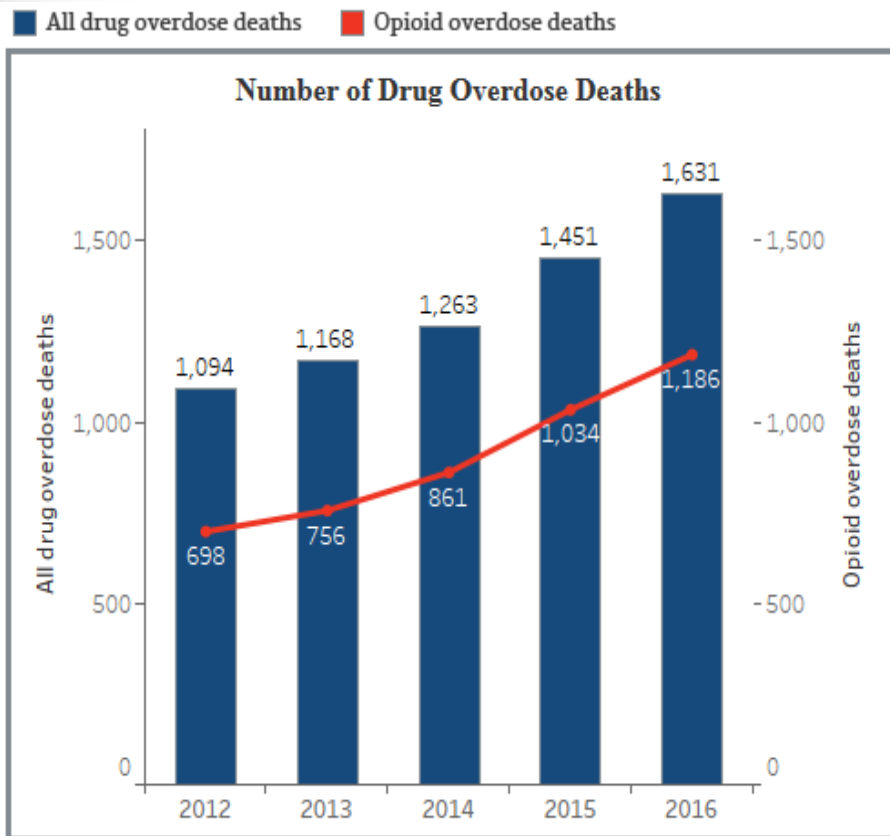
	2013	2014	2015	2016		
All MME prescribed	1,733	1,754	1,725	1,593	↓	-8.08 %
MME prescribed for MAT	392	490	534	524	↑	33.60 %
MME prescribed for pain	1,341	1,264	1,191	1,069	↓	-20.28 %

**MME** = Morphine milligram equivalent, a way to calculate the total amount of opioids between drug types and strengths

**MAT** = Medication-assisted treatment, the use of drugs (such as buprenorphine) with counseling and behavioral therapies to treat substance use disorders

Source: <http://tn.gov/health/topic/pdo-data-dashboard>

# Tennessee drug overdose data



# Background

- **Vanderbilt University Hospital (VUH)** set to focus on providing perioperative care that:
  - **Maximizes perioperative pain control**
  - **Reduces opiate requirements and opiate adverse events**
- A multimodal approach to analgesia is recommended for managing acute pain to improve analgesia and decrease opioid consumption
- Intravenous lidocaine has been studied for perioperative pain management and may provide beneficial outcomes with minimal side effects
- Ketamine is a dissociative anesthetic agent at high doses, but is an analgesic at low doses and can play a role in pain control

# Lidocaine infusion for pain

- Pilot started in July 2014
- **Indications:**
  - Patients undergoing colorectal surgery
  - Maximum duration of 24 hours post-operation
- **Dosing:** actual weight required for order

Patient Weight	Lidocaine Dose
< 70 kg	1 mg/min
70 – 100 kg	1.5 mg/min
> 100 kg	2 mg/min

- **Contraindications:**
  - Patients with past medical history of unstable coronary disease, recent myocardial infarction, heart failure, heart block, liver disease, cardiac arrhythmia disorders, seizure disorders, and active electrolyte disturbances

# Lidocaine infusion – clinical decision support

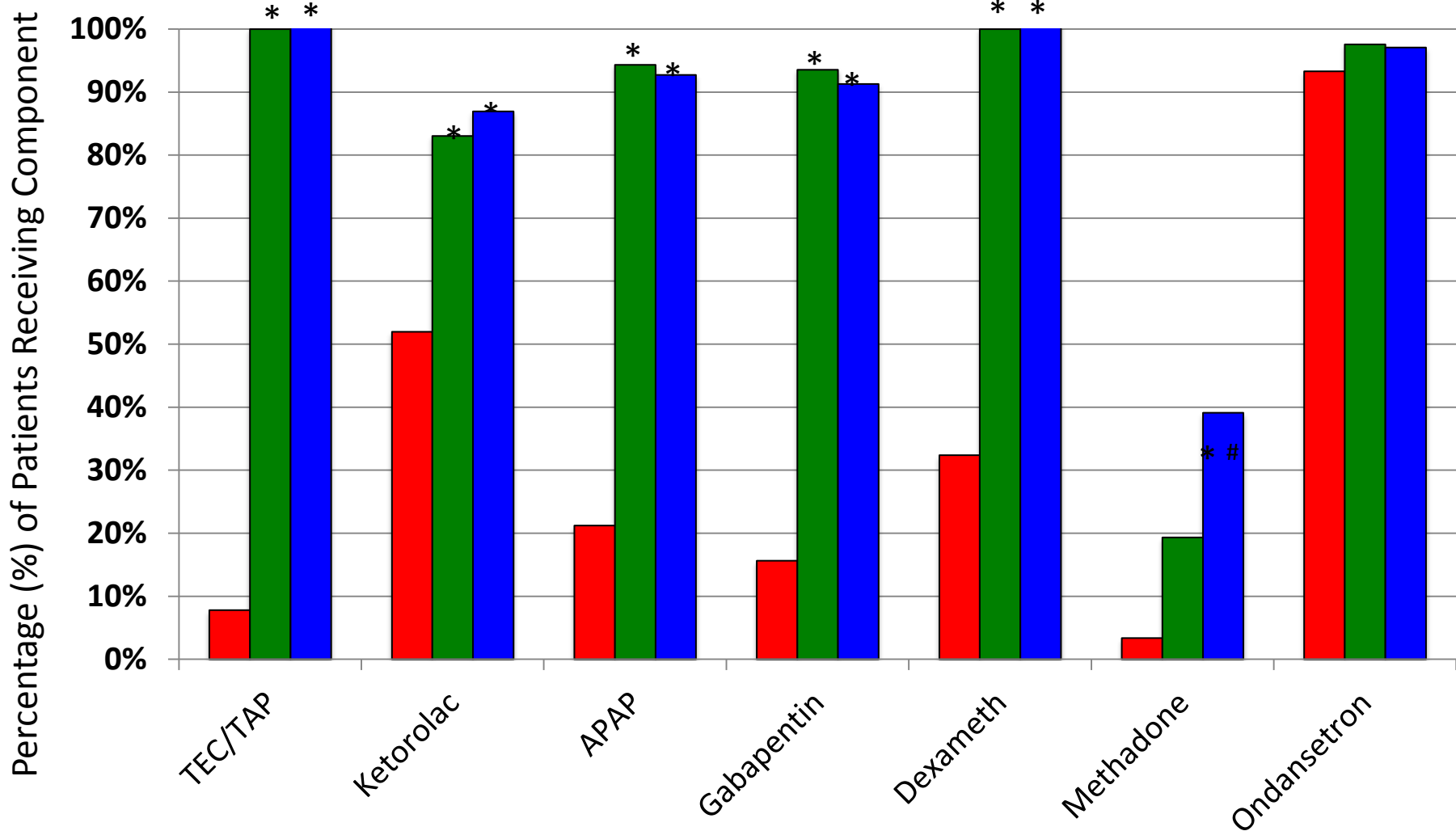
- Displays recent  $K^+$  and  $Mg^{++}$  values
  - If low, must correct electrolytes
  - Hard stop if no levels
- Displays recent Tbili
  - If  $> 2$ , advise prescriber to avoid use of lidocaine in patients with liver disease
  - Can override
- Displays all antiarrhythmics and anticonvulsants
  - If any are present, pop up message states that lidocaine is contraindicated in patients with arrhythmias or seizure disorders
  - Requires override reason to order lidocaine
- Order limits infusion to 24 hour duration



# Preop and Intraop ERAS Bundle Components for Multimodal Analgesia Before and After Implementation of the ERAS Pathway for Colorectal Patients

Phase 0 (N=179)    Phase 1 Post (N=124)    Phase 2 Post (N=241)

Data as % of group receiving bundle component; \*P<0.01 v. Baseline, #P<0.01 v. Phase 1

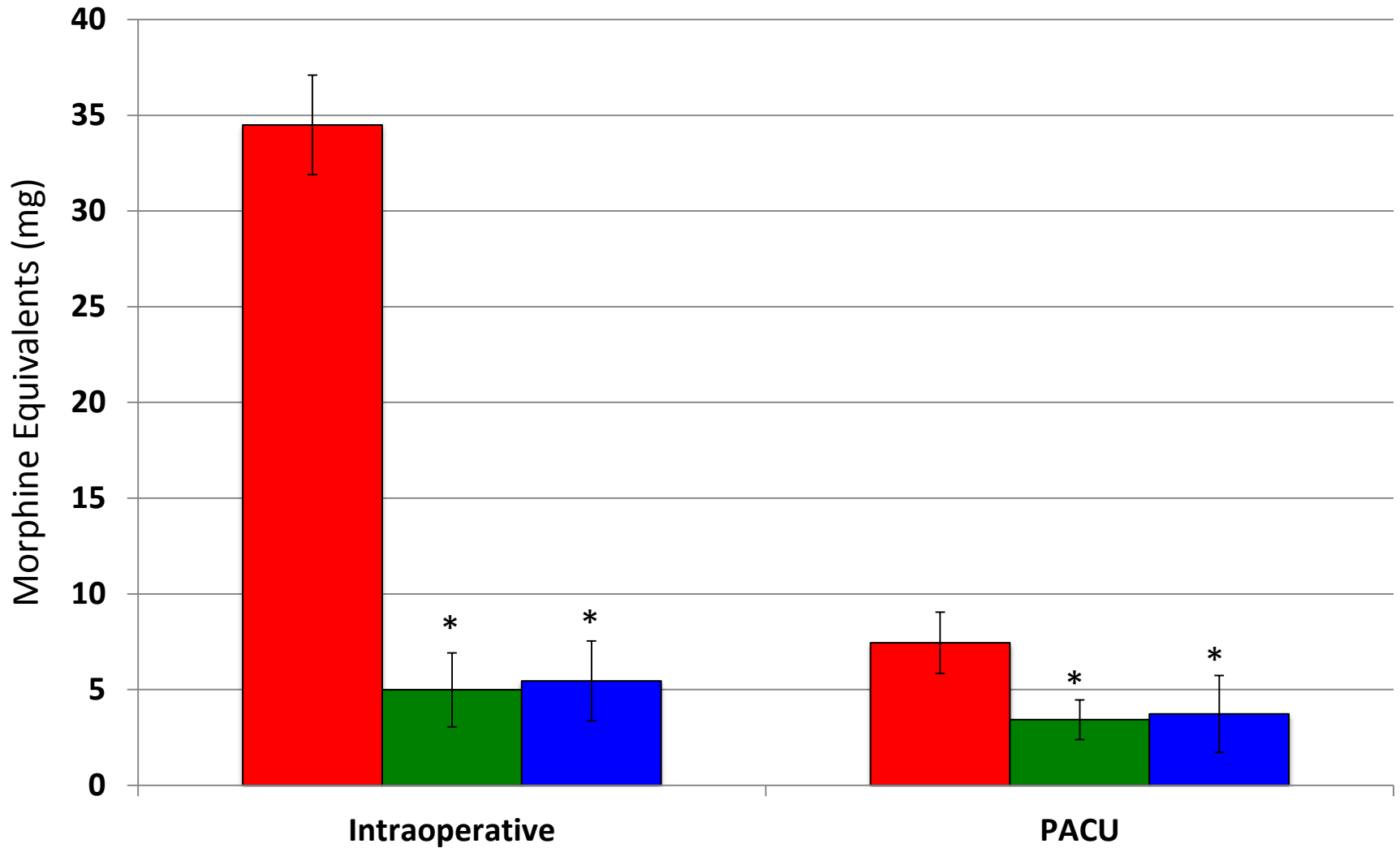


ERAS = enhanced recovery after surgery



# Intraoperative and PACU Opioid Use by Phase

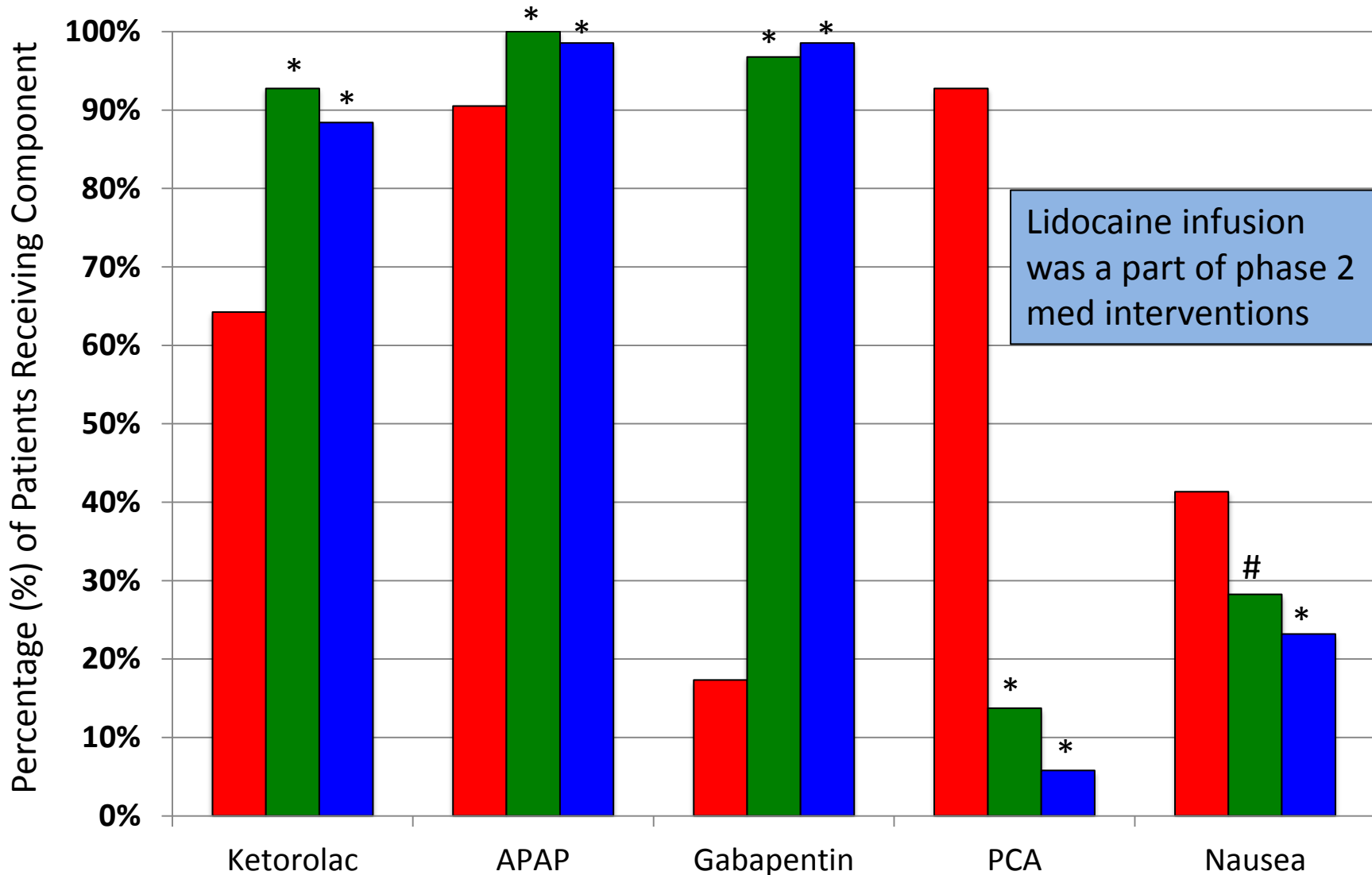
Phase 0 (N=179)    Phase 1 Post (N=124)    Phase 2 Post (N=241)  
Data as Mean±95CI    \*P<0.0001 v. Phase 0



# Use of Postoperative ERAS Bundle Components for Multimodal Analgesia Before and After Implementation of the ERAS Pathway for Colorectal Patients

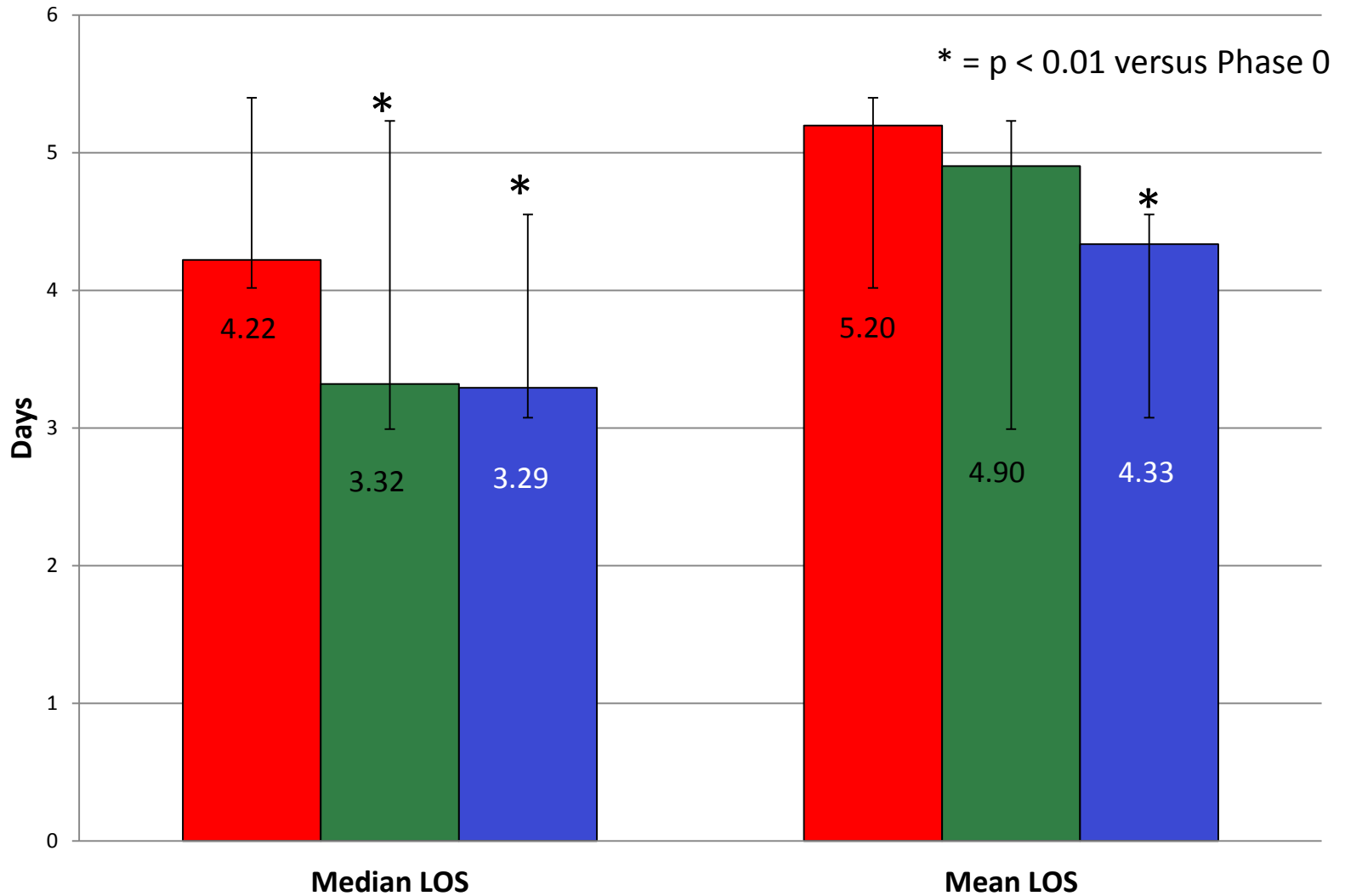
Phase 0 (N=179)    Phase 1 Post (N=124)    Phase 2 Post (N=241)

Data as % of group receiving bundle component; \*P<0.01 v. Phase 0, #P<0.05 v. Phase 0



# Length of Stay

Phase 0 (N=181)    Phase 1 Post (N=129)    Phase 2 Post (N=155)



# Ketamine infusion for pain

- Pilot started in May 2017
  - Surgery population: major intra-abdominal
- Pilot units: S44, 9N, 9S, 7T3, 9T3 (3 stepdown, 2 general care)
- Contraindications: patients with psychosis or recent acute MI
- Medication use evaluation (MUE) data collected on 100 patients for report to P&T committee

# Ketamine infusion for pain

- Ordering restricted to pain service attendings
- Pharmacy prepares 500 mg/100mL bag (5000 mcg/mL conc. in NS) loaded in ADC in PACU and participating units
  - Infused on Alaris pump with infusion lock box
- Patient is initiated at a rate of 2.5 mcg/kg/min in PACU
- Low mL/hr rate requires NS carrier order & administration
- Patient is monitored by PACU nurses for adverse effects
- Patient is transferred to only pilot unit. Otherwise, ketamine infusion must be discontinued.
- Rate can be decreased by provider if needed for tolerance but not increased
- 48 hour order duration can be renewed by anesthesia

# Ketamine infusion monitoring

- **Nurses monitor per the PCA/Controlled Substance Infusion Policy:**
  - Monitor vital signs, pain, sedation, and respiration at baseline before infusion, then every 30 minutes x 2, then every 4 hours after the following, and as needed:
    - Therapy initiation
    - Adverse event or patient deterioration (e.g. change in sedation score)
  - Respiratory monitoring per policy:
    - Respiratory rate, respiratory quality & SPO2

# Safeguards

- Smart pump file work
  - Separate Guardrails files/therapy types
    - Lidocaine – ‘Cardiac’ & ‘Pain’
    - Ketamine – ‘Sedation’ & ‘Pain’

Continuous/Bolus Drug Setup Group - Adult General Care

Drug Concentration Therapy Advisory

Drug Name: Lidocaine Infusion

Pain Cardiac

Non-Weight Based Weight Based

Setup: Lidocaine Infusion / . Pain / Non-weight based

Concentrations:

Concentration	Pump
8,000 mcg / 1 mL (8,000 mcg / mL)	<input type="checkbox"/>
8 mg / 1 mL (8 mg / mL)	<input type="checkbox"/>
1,000 mg / 250 mL (4 mg / mL)	<input type="checkbox"/>
<b>2,000 mg / 250 mL (8 mg / mL)</b>	<input checked="" type="checkbox"/>

Continuous Infusion:  Bolus Dose:

Dosing Units: mg/min

Dosing range: 0.0001 to 99,999

Soft Min: 0.5

Soft Max: (Optional)

**Hard Max: 2.1**

Initial Value: (Optional)

Continuous/Bolus Drug Setup Group - Adult Critical Care

Drug Concentration Therapy Advisory

Drug Name: ketamine

Anesthesia Only Pain Sedation

Non-Weight Based Weight Based

Setup: ketamine / Pain / Weight based

Concentrations:

Concentration	Pump
1 mg / 1 mL (1 mg / mL)	<input type="checkbox"/>
5 mg / 1 mL (5 mg / mL)	<input type="checkbox"/>
<b>500 mg / 100 mL (5 mg / mL)</b>	<input checked="" type="checkbox"/>
--- mg / --- mL	<input type="checkbox"/>

Continuous Infusion:  Bolus Dose:

Dosing Units: mcg/kg/min

Dosing range: 0.0001 to 99,999

Soft Min: 1

Soft Max: (Optional)

**Hard Max: 2.5**

Initial Value: 2.5

## Hard maximum limits

- Lidocaine – 2.1 mg/min
- Ketamine – 2.5 mcg/kg/min
- RN independent double check on bag changes for ketamine
- Tracing the line – important RN check

# Pitfalls and setbacks

- Pilot expansion without education
- Carrier orders
- IV compatibility
- Pilot non-compliance
  - Prescribing on non-pilot units
  - Drip initiation outside of PACU
- Adverse drug events



# Next steps

- Vanderbilt Opioid Stewardship & Safety (VOSS)
  - System wide opioid reduction goal
  - Opioid tableau
    - Service level data
    - Prescriber level data
  - Prescriber opioid education
  - EHR advisories
  - Resources on opioid disposal