# Can You Feel It Now Mr. Krabs? Evaluating IV Lidocaine for Post-Operative Pain Management after Abdominal Surgery

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No financial conflicts of interest to disclose


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## Pharmacist Learning Objectives

1. Describe the mechanism of action, pharmacokinetics, and toxicities associated with intravenous lidocaine when used for post-operative pain management
2. Assess the direct and indirect costs associated with surgical complications following abdominal surgery and their impact on patient outcomes
3. Evaluate primary literature to assess the efficacy of intravenous lidocaine for post-operative pain management after abdominal surgery
4. Using a patient case, develop a comprehensive treatment algorithm for a post-operative patient using intravenous lidocaine

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## Technician Learning Objectives

1. Explain the proposed mechanism of action of intravenous lidocaine
2. Recognize common surgical complications associated with opioid use
3. Identify signs and symptoms of toxicities that may occur with intravenous lidocaine

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## Abbreviations

| Abbreviation | Meaning | Abbreviation | Meaning |
|---|---|---|---|
| APS | American Pain Society | POD | Post-operative day |
| ORADEs | Opioid-related adverse drug events | MSOFA | Modified sequential organ failure assessment |
| POI | Post-operative ileus | MDE | Morphine dose equivalents |
| VAS | Visual analog scale | IBD | Inflammatory bowel disease |
| IQR | Interquartile range | ITT | Intention-to-treat |
| ADR | Adverse drug reaction | PCA | Patient controlled analgesia |

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## Knowledge Check

Which of the following best describes the principle of multimodal analgesia in postoperative pain management?

A. Using a single analgesic medication at high doses to control pain
B. Combining multiple medications and techniques that target different pain pathways to enhance pain relief and reduce side effects
C. Focusing on opioid utilization for pain relief
D. Utilizing non-pharmacological methods, such as physical therapy, to manage pain

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## Post-Operative Pain

- More than 80% of patients who undergo surgical procedures experience acute postoperative pain
- Less than half of patients who undergo surgery report adequate pain relief
- 2016 APS guidelines for management of postoperative pain recommends the use of multimodal analgesia

J Pain, 2018, 17(2): 131-157

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## Providing Pain Control

- The Joint Commission emphasizes a patient's right to pain relief but emphasizes:
  - Safe use of opioids
  - Patient education on pain management
  - **Multimodal approach to pain control**

The Joint Commission

TJC, 2017, Hospital and Hospital Clinics Manual: Leadership

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What is Multimodal Analgesia?

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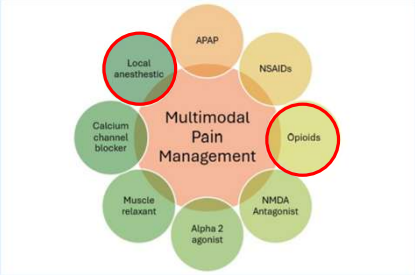
## Multimodal Pain Control SBO




OpenAnesthesia. Multimodal Analgesia. 2024.

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## Multimodal Analgesia for Abdominal Surgeries

| | | |
|---|---|---|
| APAP | NSAIDs | Opioids |
| Neuropathic agents | Muscle relaxants | Local Anesthetics |

J Pain, 2018, 17(2): 131-157

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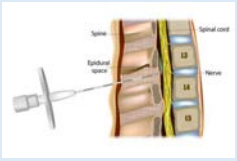
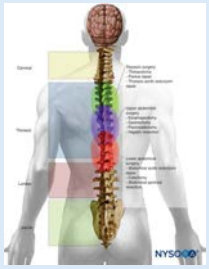
## Multimodal Analgesia for Abdominal Surgeries





J Pain, 2018, 17(2): 131-157

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## Epidural Contraindications

- Active infection
- Allergy to anesthetic agent
- Use of anticoagulation, clotting disorders
- Spinal deformities
- Patient refusal or inability to cooperate

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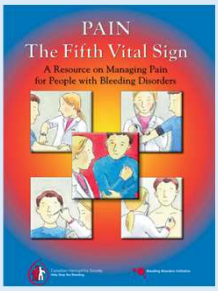
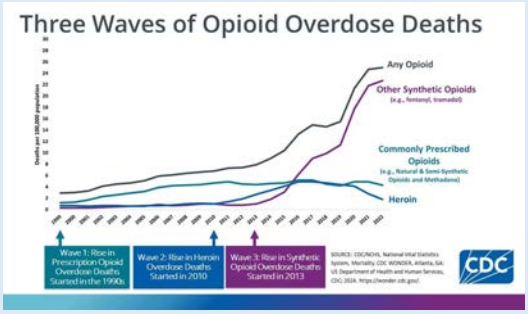
## Pain As The 5th Vital Sign

- Dr. James Campbell urged healthcare providers to treat pain as the "5th vital sign"
- In 2016, the American Medical Association voted to stop treating pain as the 5th vital sign




Pain Manag Nurs, 2017, 19(2): 125-129

17



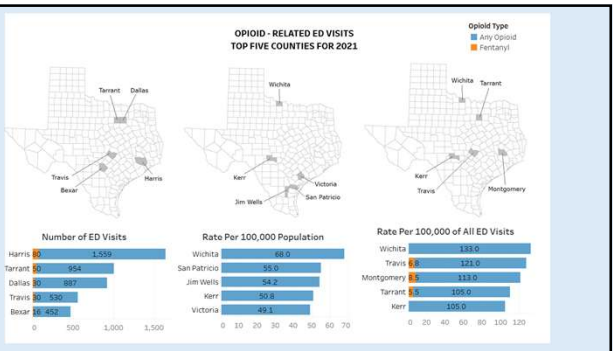

1999-2022 Opioid Overdose Deaths: ~727,000 Americans

CDC. Understanding the Opioid Overdose Epidemic. Accessed 2024.

18

**Slide 13**

**SB0** Make sure to explain not all these are used routinely. I like that this image shows the options in pretty much our order of prevalence/usage starting with APAP and going clockwise.
Berman, Dr. Sarah E., 2024-12-16T21:33:41.226




Texas Department of State Health Services. Opioid-Related Emergency Department Visits. Accessed 2024.

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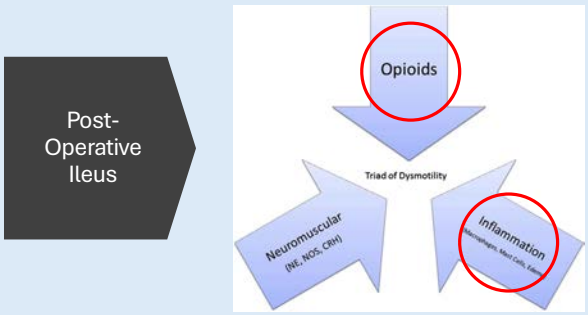


Surg Clin North Am, 2012, 92(2):259-272

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## Knowledge Check

Which of the following is NOT a contributing factor to the etiology of postoperative ileus?

A. Opioids
B. Inflammation
C. Neuromuscular factors
D. Increased physical activity after surgery

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## Knowledge Check

Which of the following is NOT a contributing factor to the etiology of postoperative ileus?

A. Opioids
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D. Increased physical activity after surgery

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## Post-Operative Ileus (POI)

- Delays recovery time and prolongs hospitalization
- Up to 25% of colectomy patients experience POI, which doubles their cost of care
- Estimated to cost the healthcare system an additional $750 million USD annually from prolonged initial hospitalization alone

Surg Clin North Am, 2012, 92(2):259-272

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## Lidocaine

**Mechanism**
- Blocks nerve impulse initiation and conduction by reducing sodium ion permeability

**Dosing (Ventricular tachycardia)**
- Bolus: 1-1.5 mg/kg; repeated with 0.5 to 0.75 mg/kg; max bolus dose of 3 mg/kg
- Continuous infusion: 1-4 mg/min; max cumulative dose of 300 mg in 1 hour

**Dosing adjustments**
- CrCl ≤ 30 mL/min - Administer lower maintenance infusion rate with close monitoring for toxicity
- Altered liver function - Administer lower maintenance infusion rate with close monitoring for toxicity

**Adverse Effects**
- Bradycardia, hypotension, anxiety, agitation, metallic taste, paresthesia, slurred speech, twitching, seizure


Lidocaine. *Lexi-Drugs*. UpToDate Lexidrug. UpToDate Inc. https://online.lexi.com. Accessed December 16 2024.

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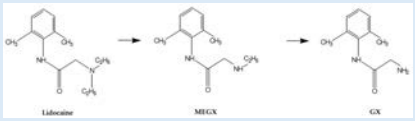
## Lidocaine Pharmacology

- Metabolized by the liver into MEGX and GX
- MEGX has local anesthetic effects as well as cardiotoxic effects in those with liver dysfunction.
  - Accumulation has been associated with arrhythmias and seizures
- GX has been known to accumulate in patients with renal failure




Pharmaceutics, 2021, 13(2):203 BJA Educ, 2016, 16(9):292-298

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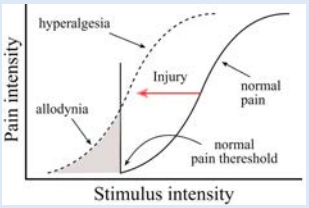
## Lidocaine Pharmacology: Analgesic

- Effects attributed to NMDA and voltage gated calcium receptors
- Animal studies with IV lidocaine showed reduced hyperalgesia and modulation of inflammation




Hyperalgesia curve vs. normal pain responses

Psychopharmacol Bull. 2024;54(3):73-96.

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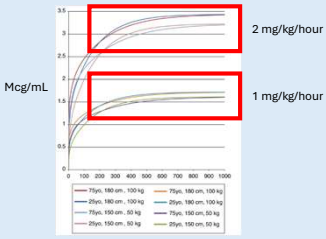
## Lidocaine Pharmacology




Left side of the data represents 2 mg/kg/hr, right is 1 mg/kg/hr

BJA Educ, 2016, 16(9):292-298

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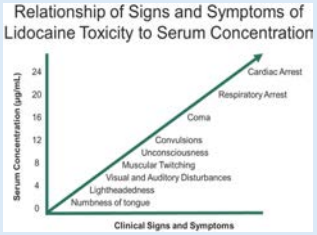
## Toxicity

- Narrow therapeutic range (1.5-5 µg/mL)
- Lidocaine levels recommended in:
  - Durations >24 hours
  - Heart failure, liver and renal dysfunction




American Journal of Emergency Medicine, 2022, 59:42-48

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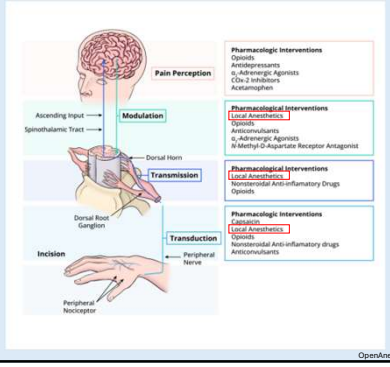


OpenAnesthesia. Multimodal Analgesia. 2024.

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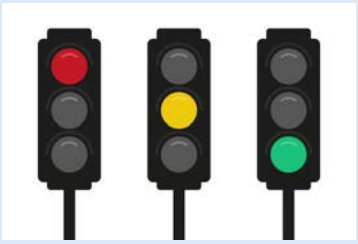
## Local Anesthetics and Ileus

- Local anesthetics can stimulate intestinal smooth muscle
- Intestinal inhibitory reflexes can be triggered by direct insult to parietal peritoneum



Am J of Surgery, 2009, 198(2): 231-236

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| Recommendation | Consensus Statement |
|---|---|
| Dosing | ➢ Ideal body weight should be used for dose calculation<br>➢ Intravenous lidocaine should not be used in patients weighing <40 kg<br>➢ No more than 120 mg/hour should be infused for any patient<br>➢ Max infusion of 1.5 mg/kg /hour for no longer than 24 hours |
| Bolus Dosing | ➢ No more than 1.5 mg/kg x 1 given as an infusion over 10 minutes |
| Monitoring | ➢ Patients should be managed in a monitored bedspace in a high dependency unit (level 2 care)<br>➢ Heightened monitoring for those with existing comorbidities<br>➢ Intravenous lidocaine should not be used within 4 hours of any nerve or fascial plane block or infiltration of laparoscopic port sites<br>➢ Lipid emulsion 20% should be readily available wherever IV lidocaine is used |
| Relative Contraindications | ➢ Heart failure<br>➢ Severe renal and hepatic insufficiency |

Anesthesia, 2021, 76: 238-250

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**Objective**

- Evaluate the use of intravenous lidocaine in ICU patients as an adjunct analgesic agent for pain

**Study Design**

- Multicenter (2 institutions), retrospective, pre-post intervention, observational chart review

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**Inclusion**

- ≥ 18 years old
- ICU stay ≥ 24 hours
- Systemic lidocaine infusion for any duration as an adjunct therapy for pain management during ICU stay

**Exclusion**

- Received intravenous lidocaine within 24 hours of admission
- Patients who received ketamine infusion in conjunction with intravenous lidocaine or within 24 hours of discontinuation
- Started on intravenous lidocaine as part of comfort care due to terminal illness

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## Intervention

- Initiation, dosing, and duration determined at provider discretion
- Continuous infusion at an average rate of 0.93 mg/min for a mean duration of 48 hours
- Pain scores recorded for 24 hours prior to IV lidocaine initiation

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## Endpoints

**Primary**
- Time to ≥ 20% reduction in pain scores
- Opioid requirements
- Pain scores prior to and during treatment with IV lidocaine

**Secondary**
- Doses and duration of IV lidocaine
- ICU and hospital length of stay

**Safety**
- Adverse drug events associated with IV lidocaine toxicity

Am J Clin Pharmacol, 2017, 57: 830-836

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| Characteristic | Number of Patients (N=21) |
|---|---|
| Age, mean, years (SD) | 66 (14) |
| BMI, mean (SD) | 30 (7) |
| MSOFA* scores, mean (SD) | 4 (3) |
| Sex, n (%) | |
| Male | 14 (67) |
| Female | 7 (33) |
| Surgery, n (%) | |
| Yes | 20 (95) |
| ▪ Gastrointestinal | 12 (57) |
| ▪ Vascular | 3 (14) |
| ▪ Neuro/Spinal | 2 (10) |
| ▪ Thoracic | 3 (14) |
| No | 1 (5) |
| Home opioid use, n (%) | 4 (19) |
| Received non-opioid pain medications n, (%) | 10 (48) |

* Modified sequential organ function assessment

Am J Clin Pharmacol, 2017, 57: 830-836

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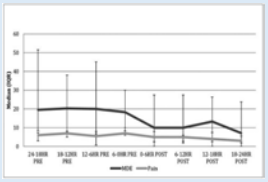
## Primary Endpoints

**Mean times to ≥ 20% reduction in pain scores**
- 3.3 ± 2.2 hours

**MDE pre/post IV lidocaine**
- 6h – 18.3 vs. 10 mg; p=0.002
- 12h – 41.8 vs. 18.3; p=0.002
- 24h – 93.5 vs. 30.5; p=0.037

* Morphine dose equivalents



Am J Clin Pharmacol, 2017, 57: 830-836

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| Patient | Patient Factors | Noted Reaction | Dose and Serum Level | Timing |
|---|---|---|---|---|
| Patient #1 | • History of diastolic heart failure and atrial fibrillation<br>• SCr of 1.56 mg/dL (baseline 1)<br>• BUN of 40 mg/dL (baseline 18)<br>• Decreased urine output (0.1-0.2 mL/[kg*hr]) | Less responsive on Riker Sedation-Agitation scale (from 5 to 2) | Dose – 1 mg/min<br>Serum level – 8.4 µg/mL | 26 hours after IVLI initiation |
| Patient #2 | • History of congestive heart failure<br>• SCr of 1.51 mg/dL (baseline 0.86)<br>• Elevated AST/ALT of 339 and 523, respectively (baseline WNL) | Episodes of dizziness when attempting to stand up | Dose - 0.5 mg/min<br>Serum level:<br>#1 – 3.2 µg/mL<br>#2 – 11.5 µg/mL | #1 – 19 hours after IVLI initiation<br>#2 – 63 hours after IVLI initiation |
| Patient #3 | • History of aortic valve replacement<br>• SCr of 2.58 mg/dL (baseline 1.06) | Disorientation and confusion | Dose – 2.1 mg/min<br>Serum level not collected | 19 hours after IVLI |

Am J Clin Pharmacol, 2017, 57: 830-836

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## Safety

- IV lidocaine discontinued in 3 patients
- Elevated serum levels associated with 2 of the ADRs

Am J Clin Pharmacol, 2017, 57: 830-836

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**Strengths**

- Clear inclusion criteria
- Evaluated safety
- Evaluated patient condition via mSOFA scores
- Multicenter

**Limitations**

- Retrospective
- No control group
- Lack of dose standardization
- Lack of multimodal analgesia
- Small sample size
- Majority male
- Improvement in opioid consumption could be due to improvement after surgery

Am J Clin Pharmacol, 2017, 57: 830-836

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## Application

**Key Takeaways**

- Intravenous lidocaine did not demonstrate a meaningful decrease in pain scores, but showed a decrease in overall MDE consumption
- Patients who experienced side effects had some degree of organ dysfunction and had infusions lasting > 24 hours

**Therapy Considerations**

- Continuous infusion no longer than 24 hours
- Caution in heart failure, hepatic dysfunction, renal dysfunction

Am J Clin Pharmacol, 2017, 57: 830-836

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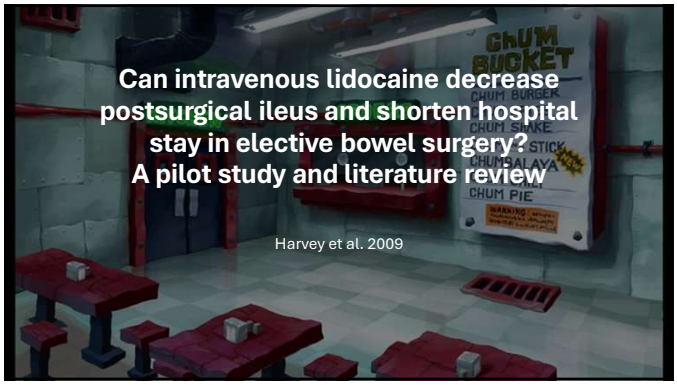


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**Objective**

- Evaluate postsurgical pain, return of bowel function, amount of morphine used, and length of stay in patients undergoing elective bowel surgery who receive IV lidocaine compared to placebo

**Study Design**

- Randomized, double-blinded, placebo-controlled trial

Am J of Surgery, 2009, 198(2): 231-236

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**Inclusion**

- ≥ 18 years old
- Undergoing elective bowel surgery

**Exclusion**

- Drug sensitivity to lidocaine
- Pre-existing:
  - Heart failure
  - Sepsis
  - Liver disease
- Taking beta-blockers or cimetidine
- Unable to communicate or understand the aim of the study

Am J of Surgery, 2009, 198(2): 231-236

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**Intervention**

- Intravenous lidocaine at 1 mg/min^ for 24 hours with a morphine PCA

**Control**

- Normal saline for 24 hours with a morphine PCA

^Corresponds to a dose range of 0.63-0.95 mg/kg/hour based on mean patient weights

Am J of Surgery, 2009, 198(2): 231-236

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## Endpoints

- VAS scores at 6, 18, and 24 hours after surgery
- Morphine use at 6, 18, and 24 hours after surgery
- Time to first flatus (hours)
- Hospital length of stay (days)

Am J of Surgery, 2009, 198(2):231-236

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## Baseline Characteristics

| Characteristic | Lidocaine (N=11) | Placebo (N=11) |
|---|---|---|
| Age, years | 60 ± 5.7 | 65 ± 3.5 |
| Sex, male (%) | 55% | 55% |
| Weight (kg) | 83 ± 11 | 74 ± 11 |
| ASA score | 2.18 ± 0.18 | 2.0 ± 0.19 |

Data represented as mean ± SEM unless otherwise noted

Am J of Surgery, 2009, 198(2):231-236

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## Pain Scores and Morphine Use

| VAS Score | Lidocaine Group | Placebo Group | P-value |
|---|---|---|---|
| VAS at 6 hours | 44.6 ± 5.59 | 54.0 ± 5.36 | 0.241 |
| VAS at 18 hours | 38.8 ± 8.8 | 49.3 ± 6.2 | 0.2606 |
| VAS at 24 hours | 26.1 ± 8.2 | 45.4 ± 6.4 | 0.08 |

| Morphine Use | Lidocaine Group | Placebo Group | P-value |
|---|---|---|---|
| Morphine use at 6 hrs | 17.5 ± 3.2 | 17.3 ± 3.4 | 0.97 |
| Morphine use at 18 hrs | 19.0 ± 3.8 | 14 ± 2.5 | 0.2987 |
| Morphine use at 24 hrs | 11.63 ± 3.8 | 8.36 ± 1.8 | 0.4496 |
| Total morphine | 47.2 ± 8.2 | 39.7 ± 5.3 | 0.4525 |

Morphine consumption in milligrams (mg); data presented as mean ± SEM

Am J of Surgery, 2009, 198(2):231-236

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## Bowel Function and Hospital Duration

| Endpoint | Lidocaine | Placebo | P-value |
|---|---|---|---|
| Flatus (h) | 68.2 ± 9.7 | 86.9 ± 13.6 | 0.2802 |
| Bowel movement (h) | 88.3 ± 6.08 | 116.2 ± 10.1 | **0.0286** |
| Days in the hospital | 3.76 ± 0.24 | 4.93 ± 0.42 | **0.0277** |

Data presented as mean ± SEM

Am J of Surgery, 2009, 198(2):231-236

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### Strengths

- Randomized
- Effective double-blinding
- Standardization of pain management protocol with morphine PCA
- Evaluated patient safety

### Limitations

- Small sample size
- Single, community hospital
- Low doses of lidocaine relative to patient weight
- No primary outcome or study power defined

Am J of Surgery, 2009, 198(2):231-236

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## Application

### Key Takeaways

- Patients receiving intravenous lidocaine:
  - Trend towards decreased pain scores
  - Faster return to bowel function
  - Decreased hospital length of stay
- No patients experienced side effects

### Therapy Considerations

- Bolus dosing to reach effective serum levels
- Duration of 24 hours post-operatively appears safe
- Lower doses appear less effective

Am J of Surgery, 2009, 198(2):231-236

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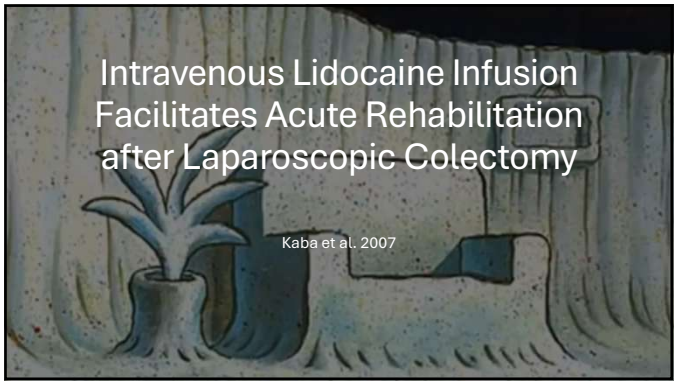


55

**Objective**

- Evaluate the effects of intravenous lidocaine on facilitation of acute rehabilitation after laparoscopic colectomy

**Study Design**

- Randomized, double-blinded, placebo-controlled trial in Belgium

Anesthesiology, 2007, 106(1): 11-18

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**Inclusion**

- Elective laparoscopic colectomy for nonmalignant disease
- ASA status I-III

**Exclusion**

- >70 years old
- History of gastroduodenal peptic ulcers
- Renal or hepatic failure
- Psychiatric disorders
- Steroid treatment
- Chronic treatment with opioids

Anesthesiology, 2007, 106(1): 11-18

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**Intervention**

- IV lidocaine bolus of 1.5 mg/kg, followed by 2 mg/kg/hour during surgery, followed by 1.33 mg/kg/hour for 24 hours post-operatively

**Control**

- Equal volumes of normal saline

* All patients received acetaminophen 2 g IV 30 minutes before the end of surgery and then every 6 hours and ketorolac 30 mg IV every 8 h

Anesthesiology, 2007, 106(1): 11-18

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## Endpoints

**Primary**

- Return of bowel function (measured by time to first flatus and defecation)

**Secondary**

- Piritramide (opioid) consumption
- VAS pain scores at rest, during mobilization and coughing
- Post-operative fatigue scores
- Post-operative gastrointestinal discomfort
- Hospital duration (days)

**Safety**

- Lidocaine plasma concentrations

Anesthesiology, 2007, 106(1): 11-18

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## Baseline Characteristics

| Characteristic | Saline (N=20) | Lidocaine (N=20) |
|---|---|---|
| Age, mean, years | 52 ± 13 | 57 ± 17 |
| Height, cm | 170 ± 11 | 174 ± 9 |
| Weight, kg | 73 ± 20 | 77 ± 11 |
| Sex, male (%) | 55% | 75% |
| Type of surgery<br>Right/left hemicolectomy | 6/14 | 3/17 |
| Duration of anesthesia, min | 170 ± 48 | 169 ± 47 |
| ASA physical status, I/II/III | 7/12/1 | 7/10/3 |

Data presented as mean ± SD, unless otherwise noted

Anesthesiology, 2007, 106(1): 11-18

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## Return of Bowel Function/ Hospital Duration

| Endpoint | Saline | Lidocaine | P-value |
|---|---|---|---|
| First flatus (hours) | 28 [25-33] | 17 [11-24] | **<0.001** |
| Defecation (hours) | 51 [41-70] | 28 [24-37] | **0.001** |
| Hospital stay (days) | 3 [3-4] | 2 [2-3] | **0.001** |

Reported as median [IQR]

Anesthesiology, 2007, 106(1): 11-18

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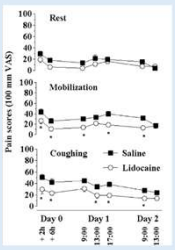
## Pain Scores

- Pain scores during *rest* were not different between the two groups
- Pain scores during *mobilization* and *coughing* were statistically significant across almost all time points




* = p<0.05 as compared to saline

Anesthesiology, 2007, 106(1): 11-18

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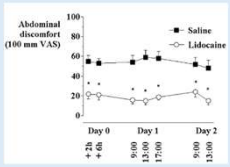
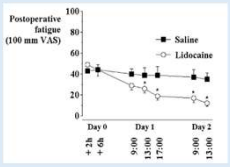
## Abdominal Discomfort and Fatigue




* = p<0.05 as compared to saline




* = p<0.05 as compared to saline

Anesthesiology, 2007, 106(1): 11-18

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## Opioid Consumption (piritramide in mg)

| Hours after surgery | Saline | Lidocaine | P-value |
|---|---|---|---|
| 0-2 | 8 [4-11] | 2 [0-5] | **0.002** |
| 2-6 | 3 [0-9] | 2 [1-3] | 0.46 |
| 6-20 | 7 [4-16] | 3 [2-9] | 0.06 |
| 20-24 | 6 [3-7] | 1 [0-1] | **<0.001** |
| 0-24 | 22 [14-36] | 8 [5-18] | **0.005** |

Reported as median [IQR]

**Opioid consumption decreased by more than 50% in the intravenous lidocaine group during the first 24 hours**

Anesthesiology, 2007, 106(1): 11-18

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## Lidocaine Plasma Concentrations

| Time | Plasma Concentration, µg/mL, mean ± SD | Highest Plasma Concentration, µg/mL |
|---|---|---|
| 5 minutes* | 1.6 ± 0.9 | **3.5** |
| 15 minutes* | 1.3 ± 0.4 | **2.1** |
| 60 minutes* | 1.8 ± 0.5 | **2.6** |
| End of surgery | 2.4 ± 0.6 | **4.0** |
| End of 24-hour infusion | 2.7 ± 1.1 | **4.6** |

*time after bolus injection of lidocaine

Anesthesiology, 2007, 106(1): 11-18

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**Strengths**

- Randomized
- Balanced groups
- Standardization of surgical procedures and pain management
- Bolus and weight-based dosing utilized

**Limitations**

- Small sample size
- Single center
- Primary outcome was return of bowel function

Anesthesiology, 2007, 106(1): 11-18

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## Application

**Key Takeaways**

- Patients in this study:
  - Younger and healthier on average
  - Were given bolus doses of lidocaine
  - Experienced decreased pain scores during movement and coughing
  - Shorter hospital durations
  - Earlier return of bowel function

**Therapy Considerations**

- Health status of the patient
- Bolus dosing of lidocaine
- Higher weight-based dosing of lidocaine

Anesthesiology, 2007, 106(1):11-18

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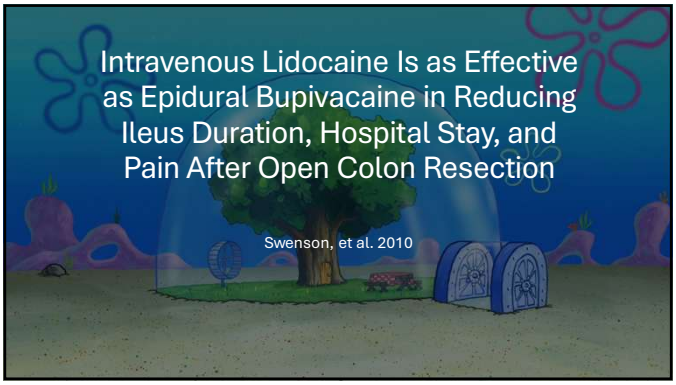


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**Objective**

- To compare perioperative administration of IV vs. epidural local anesthetic in combination with epidural hydromorphone in patients undergoing open colon surgery

**Study Design**

- Randomized control trial, single center in Virginia

Regional Anesthesia &Pain Medicine, 2010, 35 (4):370-376.

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**Inclusion**

- 18-75 years old
- Scheduled for elective colon resection
- ASA status I-III

**Exclusion**

- Allergy to local anesthetics
- Myocardial infarction within 6 months before surgery
- Liver disease or renal impairment (CrCl < 60 mL/min)
- Systemic corticosteroid use
- Chronic use of opiates
- Unwillingness or contraindication to epidural analgesia
- Pregnancy or active breast feeding

Regional Anesthesia &Pain Medicine, 2010, 35 (4):370-376.

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**Intervention**

- IV lidocaine bolus of 1.5 mg/kg at induction, followed by a maintenance dose of 1 mg/min in patients <70 kg or 2 mg/min for patients ≥70 kg
  - Continued for 5 days or until first flatus

**Control**

- T8-T12 epidural with bupivacaine 0.125% and hydromorphone 6 µg/mL @ 10 mL/hour within 1 hour of the end of surgery
  - Continued until first flatus, but could be continued at discretion of team

Regional Anesthesia &Pain Medicine, 2010, 35 (4):370-376.

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## Endpoints

**Primary**

- Return of bowel function (time to first flatus or first bowel movement)
- Average pain scores over 5 days post-op

**Secondary**

- Daily opioid consumption
- Hospital length of stay
- Time to clear liquid diet

**Safety**

- Adverse effects

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## Baseline Characteristics

| Characteristic | Epidural | IV Lidocaine | P-value |
|---|---|---|---|
| Age, y | 49 (36-54) | 52 (40-62) | 0.23 |
| Female sex (%) | 4 (20%) | 12 (55%) | 0.021 |
| BMI, kg/m$^2$ | 28 (22-31) | 25 (19-29) | 0.20 |
| ASA Score (%)<br>I<br>II<br>III | <br>1 (5%)<br>18 (95%)<br>0 (0%) | <br>1 (5%)<br>14 (64%)<br>7 (32%) | 0.014 |
| Duration of infusion, hours | 69.9 hours (±28.23 hours) | 91.6 hours (±41.05 hours) | N/a |

Reported as median [IQR] unless otherwise noted

Regional Anesthesia &Pain Medicine, 2010, 35 (4):370-376.

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## Return of Bowel Function/ Hospital Duration

| Endpoint | Epidural | IV Lidocaine | P-value |
|---|---|---|---|
| First flatus | 1.6 (1.2-3.4) | 2.7 (1.9-3.5) | 0.17 |
| First bowel movement | 3.0 (1.7-4.5) | 2.9 (2.3-3.6) | 0.99 |
| Time of advancement to clear liquid diet | 3.6 (2.6-4.8) | 2.9 (2.7-3.7) | 0.47 |
| Hospital length of stay | 5.3 (4.7-7.9) | 5.1 (4.8-5.9) | 0.80 |

Endpoints are reported in days, data represented as median (IQR)

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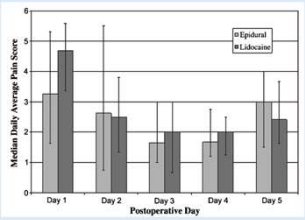
## Pain Scores




- 5-day averaged pain scores (epidural vs. lidocaine)
  - 2.2 (IQR 1.6-3.4) vs. 3.1 (2.3-4.3); p=0.25
- 2 patients were excluded from pain analysis as they had baseline chronic pain and required opiate doses 10x the median for their group

Regional Anesthesia &Pain Medicine, 2010, 35 (4):370-376.

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## Daily Opioid Consumption

| | Op. Day | POD 1 | POD 2 | POD 3 | POD 4 |
|---|---|---|---|---|---|
| **Epidural group, mg** | 25 (11-50) | 57 (27-100) | 40 (7-74) | 29 (12-89) | 30 (18-87) |
| **Lidocaine group, mg** | 17 (8-56) | 48 (30-83) | 23 (17-76) | 20 (14-64) | 7 (4-59) |
| **P-value** | 0.884 | 0.961 | 0.883 | 0.657 | 0.111 |

Data is represented as median (IQR)

Regional Anesthesia & Pain Medicine, 2010, 35 (4):370-376.

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## Adverse Effects

| Patient | ADR | Dose and serum level | Timing of level |
|---|---|---|---|
| Patient #1 (lidocaine group) | Facial paresthesia, perioral numbness, shortness of breath, and palpitations | Dose – Not noted<br>Serum level – <5 µg/mL | Not listed |
| Patient #2 (lidocaine group) | Hospital day 4 – disoriented with visual hallucinations<br>Hospital day 7 – ventricular tachycardia that required cardioversion and placement of implantable cardioverter defibrillator | Dose - Not noted<br>Serum level – 6.5 µg/mL | Hospital day 4 |
| Patient #3 (epidural group) | Atrial fibrillation | Dose - Not noted<br>Serum level – not collected | N/a |

Regional Anesthesia & Pain Medicine, 2010, 35 (4):370-376.

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**Strengths**

- Randomized
- Clearly defined inclusion/exclusion criteria
- ITT protocol
- Bolus dosing used
- Monitored safety
- Met power

**Limitations**

- Did not record patient specific factors that experienced adverse events
- Sex distribution and ASA class not distributed equally
- Not blinded

Regional Anesthesia &Pain Medicine, 2010, 35 (4):370-376.

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## Application

**Key Takeaways**

- Both groups in this study experienced similar pain scores, time to return of bowel function, had similar rates of opioid consumption

**Therapy Considerations**

- ASA status
- Higher dosing lidocaine
- Lidocaine as potential alternative to epidural analgesia
- Higher weight-based dosing of lidocaine

Regional Anesthesia &Pain Medicine, 2010, 35 (4):370-376.

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## Study Comparison

| Study | Bolus? | Maintenance dosing (mg/kg/hr) | More pain reduction? | Faster return of bowel function? | Comparator |
|---|---|---|---|---|---|
| Mo, et al. | – | 0.93 (mean) | – | N/a | Pain scores prior to IV lidocaine initiation |
| Harvey, et al. | – | 0.63-0.95 | – | + | Normal saline & Morphine PCA |
| Kaba, et al. | + | 2 mg/kg/hr in surgery 1.33 mg/kg/hr x24 hours | + | + | Normal saline |
| Swenson, et al. | + | Variable, exact dosing unknown | = | = | T8-T12 epidural with bupivacaine and hydromorphone |

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## What to do with this information?

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## Do not use lidocaine:

- Allergy to local anesthetic
- Inability to communicate symptoms of lidocaine toxicity
- Within 4 hours before or after other recent local anesthetic use
- Within 96 hours of exparel administration
- If patient weighs <40 kg

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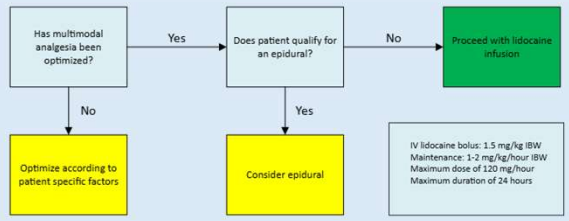
## Treatment Algorithm

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## Post-Presentation Questions

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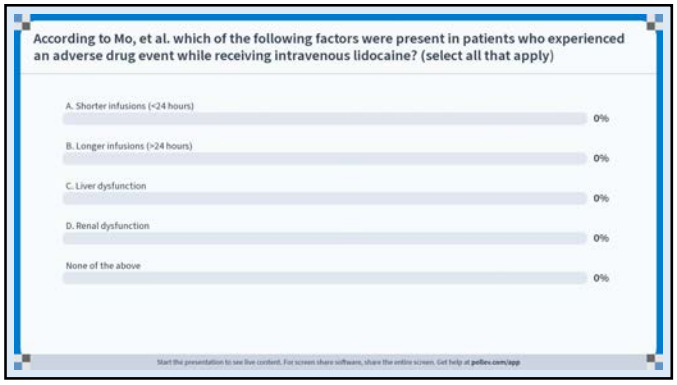


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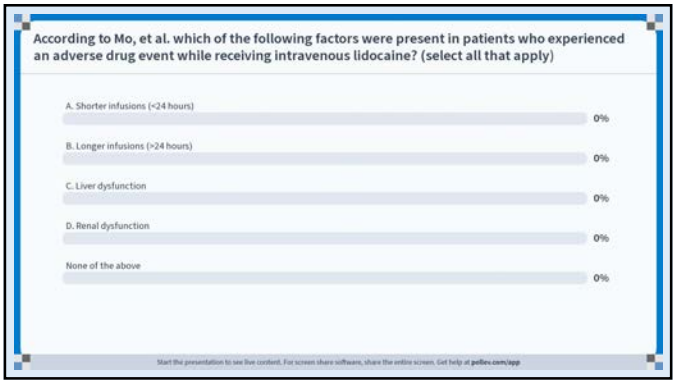


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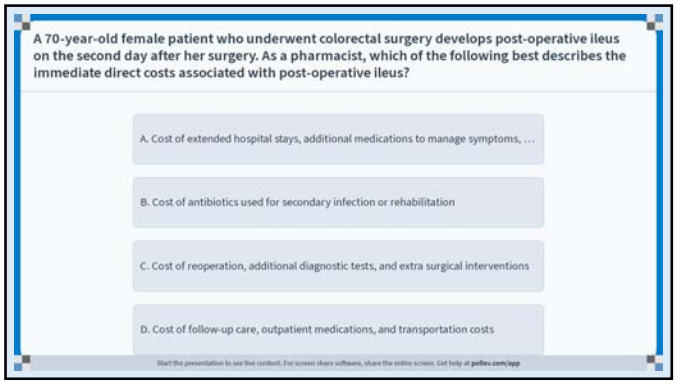


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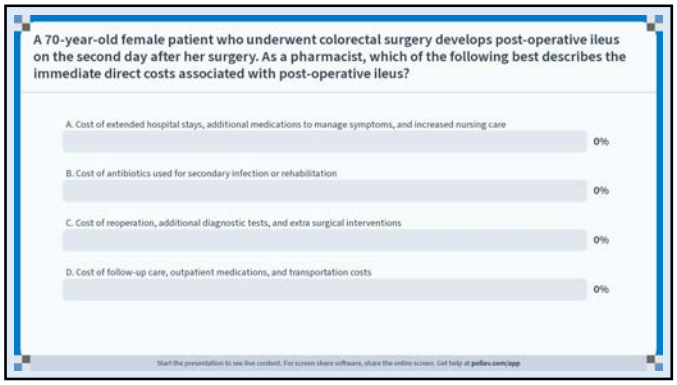


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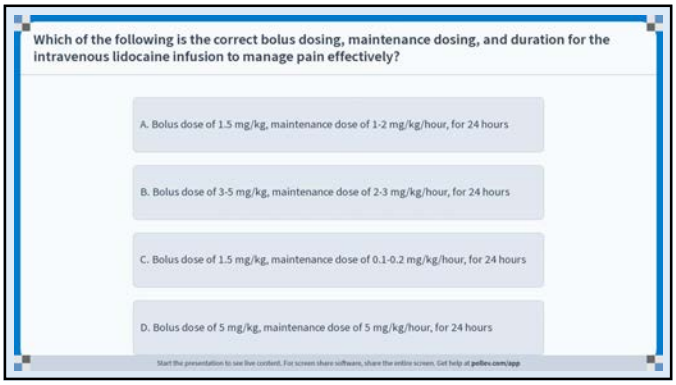


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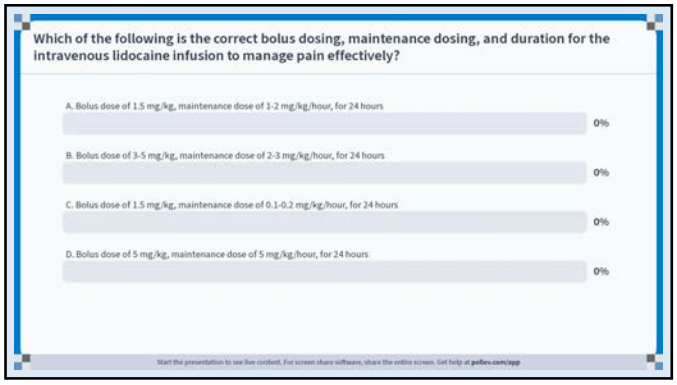


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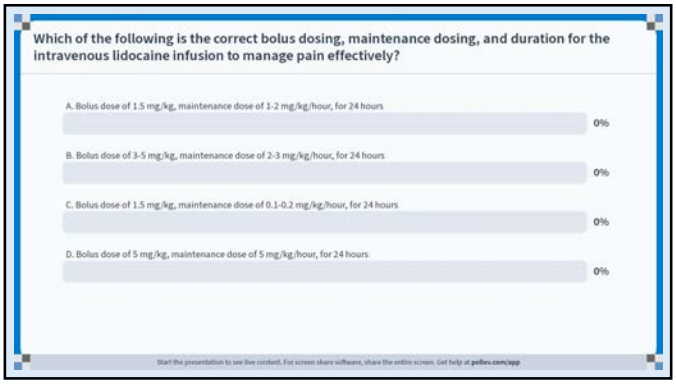


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## Resources for Pharmacists


- Chou R et al. Management of Postoperative Pain: A Clinical Practice Guideline From the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council. J Pain. 2016 Feb;17(2):131-57. doi: 10.1016/j.jpain.2015.12.008. Erratum in: J Pain. 2016 Apr;17(4):508-10. doi: 10.1016/j.jpain.2016.02.002. Dosage error in article text. PMID: 26827847.
- Foo I, et al. The use of intravenous lidocaine for postoperative pain and recovery: international consensus statement on efficacy and safety. Anaesthesia. 2021;76(2):238-250. doi:10.1111/anae.15270


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## Co-Curricular Credit

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