

# Non-Opioid Pain Management: In the ED and Beyond

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# Objectives

- Describe the pathophysiology of pain
- Compare and contrast alternatives to opioids for pain management
- Analyze supporting literature for non-opioid pain options
- Recommend appropriate medication therapy given a patient case



# What is Covered

- Strategies and approaches to acute pain in ED
- Paradigm shifts in perceptions of pain management
- New data on combination therapy of acetaminophen + ibuprofen
- New data on ketorolac
- Ketamine
- Intravenous lidocaine

# What is Not Covered

- ICU Pain Management
- Neuropathic Pain
- Chronic Pain
- Cancer Pain



# Epidemiology

- 33,091 overdose deaths involving an opioid in 2015
- ED only accounts for 4.7% of opioid prescriptions, but is frequently where patients are first introduced to opioids
- Percentage of ED visits in which an opioid is prescribed rose from 20.8% in 2001 to 31.0% in 2010
- 17% of patient's prescribed an opioid for acute pain were still taking the medication 1 year after initial ED visit



# Red Flags for Opioid Abuse Potential

- Adolescents and young adults
- History of substance use (including tobacco)
- Social isolation or dysfunction
- Existing psychiatric disease
- Concomitant use of sedatives



# PHYSIOLOGY OF PAIN





# 5 PHASES OF ADAPTIVE PAIN

TRANSDUCTION  
CONDUCTION  
TRANSMISSION  
PERCEPTION  
MODULATION

NMDA RECEPTORS  
OPIOID RECEPTORS

NA<sup>+</sup> CHANNELS





# Acetaminophen + Ibuprofen

- Possible synergistic effect by decreasing pain through multiple mechanisms
- Combination used in Australia, New Zealand, and Europe
- Limited data to date – postoperative and dental pain
  
- Advantages
  - Cost-effective
  - Limited adverse effects
- Disadvantages
  - Perception & guidance

# Hot off the Press



# Non-Opioid vs. Opioid Extremity Pain

- Patients aged 21 to 64 presenting to ED with acute extremity pain
- Randomized, double-blind, treatment control
- 4 intervention groups
  - 400 mg ibuprofen + 1000 mg acetaminophen
  - 5 mg oxycodone + 325 mg acetaminophen
  - 5 mg hydrocodone + 325 mg acetaminophen
  - 30 mg codeine + 325 mg acetaminophen
- Primary: NRS pain score at 2 hours
- Secondary:
  - NRS pain score at 1 hour
  - Severity of pain – none, mild, moderate, severe

# Non-Opioid vs. Opioid Extremity Pain

- 411 patients enrolled
  - 101 patients – APAP + ibuprofen
  - 104 patients – oxycodone + APAP
  - 103 patients – hydrocodone + APAP
  - 103 patients – codeine + APAP
- Notable demographics
  - 60% latino, 31% black
  - 62% presented with muscle strain or sprain
  - 22% presented with extremity fracture



# Non-Opioid vs. Opioid Extremity Pain



- 17.8% of patients received rescue analgesia
  - Predominantly oxycodone





# PAIN MANAGEMENT

**KETOROLAC**



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- Patients aged 18-65 presenting to ED with acute flank,



# Ketorolac Dosing in ED

- 240 patients enrolled
  - 80 patients received 10 mg
  - 80 patients received 15 mg
  - 80 patients received 30 mg
- Notable demographics
  - 45% male
  - 38% abdominal pain, 33% flank pain, 24% musculoskeletal pain





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# PAIN MANAGEMENT

## KETAMINE





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# Ketamine

- Studied uses:
  - Acute pain – wide range of etiologies
  - Chronic pain
- Studied routes
  - IV, IM, Intranasal, SubQ
- Dosing
  - Subdissociative: 0.15 – 0.6 mg/kg IV bolus
    - Consider mixing in 50 mL NS and administer over 15 minutes (Motov, 2017)
  - Anesthetic: 1-4.5 mg/kg
- Duration of Effect
  - Peak at 15 minutes
  - May last up to 1-2 hours





- Advantages

- Large therapeutic window
- Lack of respiratory depression

- Disadvantages

- Limited data – small trials in ED and postoperative setting
-

# Ketamine Adverse Effects

<b>Subdissociative Dosing</b>	<b>Anesthetic Dosing</b>
Nausea	Hypertension
Dizziness	Tachycardia
Feeling of unreality	Emergence reactions
Hallucination - rare	Elevated intraocular pressures
Mild elevations in blood pressure	Elevations in intracranial pressures?



# Avoid Ketamine

- Psychiatric illness
- Systolic blood pressure  $>$  180 mmHg
- Heart rate  $>$  150 beats per minute

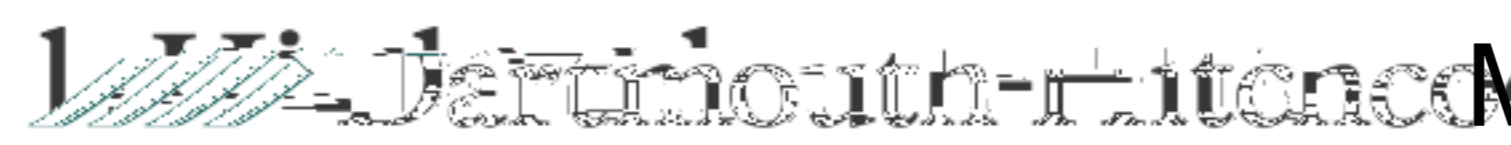
- Patients aged 18-55 presenting to ED with acute abdominal, flank, back, or musculoskeletal pain with a NRS > 5
- Prospective, randomized, double-blind
- 2 intervention groups
  - Ketamine 0.3 mg/kg
  - Morphine 0.1 mg/kg
- • Primary: reduction in time to discharge



- 90 patients enrolled

- 





Motov S, etal. Ann Emerg Med. 2015





U.S. Fire

Motov S, etal. Ann Emerg Med. 2015

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# Assessment Question

Which of the following patients is the best candidate for ketamine for pain?

- A. 27 year old with a fractured ankle and a history of schizophrenia
- B. 74 year old with back pain and a blood pressure of 170/110
- C. 55 year old with a myocardial infarction
- D. 46 year old with abdominal pain and a tolerance to opioids



# PAIN MANAGEMENT

**LIDOCAINE**



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# Lidocaine

- Dosing:
  - Intravenous lidocaine 2% (20 mg/mL)
    - Patients should be on 1.5 mg/kg actual body weight (max: 200 mg)
    - Dilute in 100-250 mL of D5W or NS
    - Infuse over 10-20 minutes
- Telemetry during administration and monitored for bradycardia

# Lidocaine

- Advantages
  - Safe and effective
  - Cost effective
- Disadvantages
  - Potential for medication errors
  - Data limited to small studies and case series
  - Indications in which most effective are limited
  - Consider telemetry monitoring with IV administration





- Common
  - Nausea, vomiting, abdominal pain
  - Dizziness
  - Perioral numbness
- Uncommon
  - Metallic taste
  - Tremor
  - Dry mouth
  -

# Lidocaine IV vs. Morphine in Renal Colic

- Adults aged 18-65 years presenting to ED with renal colic
- Prospective, randomized, double blind, single center
- 2 intervention groups
  - Lidocaine IV 1.5 mg/kg
  - Morphine IV 0.1 mg/kg
- Primary: reduction in VAS at 5, 10, 15, and 30 minutes
- Secondary:



# Lidocaine IV vs. Morphine in Renal Colic

- 240 patients enrolled
  - 120 received lidocaine IV
  - 120 received morphine IV
- Notable demographics
  - 73% patients were male
  - Mean age 36 years old



# Lidocaine IV vs. Morphine in Renal Colic



# Lidocaine IV vs. Morphine in Renal

## Colic

- More patients responded to lidocaine than morphine 90% vs 70% ( $p=0.00001$ )
- Lidocaine was well tolerated, with dizziness being the most common adverse effect
- Conclusion: lidocaine is a safe and effective alternative to opioids in managing renal colic



# Lidocaine IV vs. Ketorolac Back Pain

- Patients aged 15-55 with acute radicular back pain
- Randomized, double-blind, single center
- 2 intervention groups
  - Lidocaine IV 100 mg
  - Ketorolac IV 30 mg
- Primary: Difference in VAS at 60 minutes
- Secondary: Patient pain relief score at 1 week



# Lidocaine IV vs. Ketorolac Back Pain

- 41 patients enrolled
  - 21 patients received lidocaine
  - 20 patients received ketorolac
- Notable demographics
  - Mean age 37 years
  - Mean weight 88.6 kg







# Lidocaine IV vs. Ketorolac Back Pain

- 67% of patients in the lidocaine group required rescue analgesics
- No adverse effects were tracked
- Conclusions: while lidocaine decreased radicular back pain from baseline, it did not reach clinical significance



# Lidocaine Additional Data

Setting	Indication	N	Route	Dose	Comparator	Result	Conclusions	Reference
ED	Critical limb ischemia	63	IV	2 mg/kg	Morphine 0.1 mg/kg	At 60 minutes, lidocaine had a mean reduction of 2.25 in VAS	Lidocaine superior to morphine	Emerg Med J 2015
Meta-analysis	Neuropathic Pain	329	IV	1-5 mg/kg	placebo	Pooled analysis – reduction in VAS by 10.60 mm and superior to placebo (-10.02 mm, p=0.002)	IV lidocaine is effective compared to placebo for neuropathic pain	



# Assessment Question

Which of the following is FALSE about lidocaine for pain management?

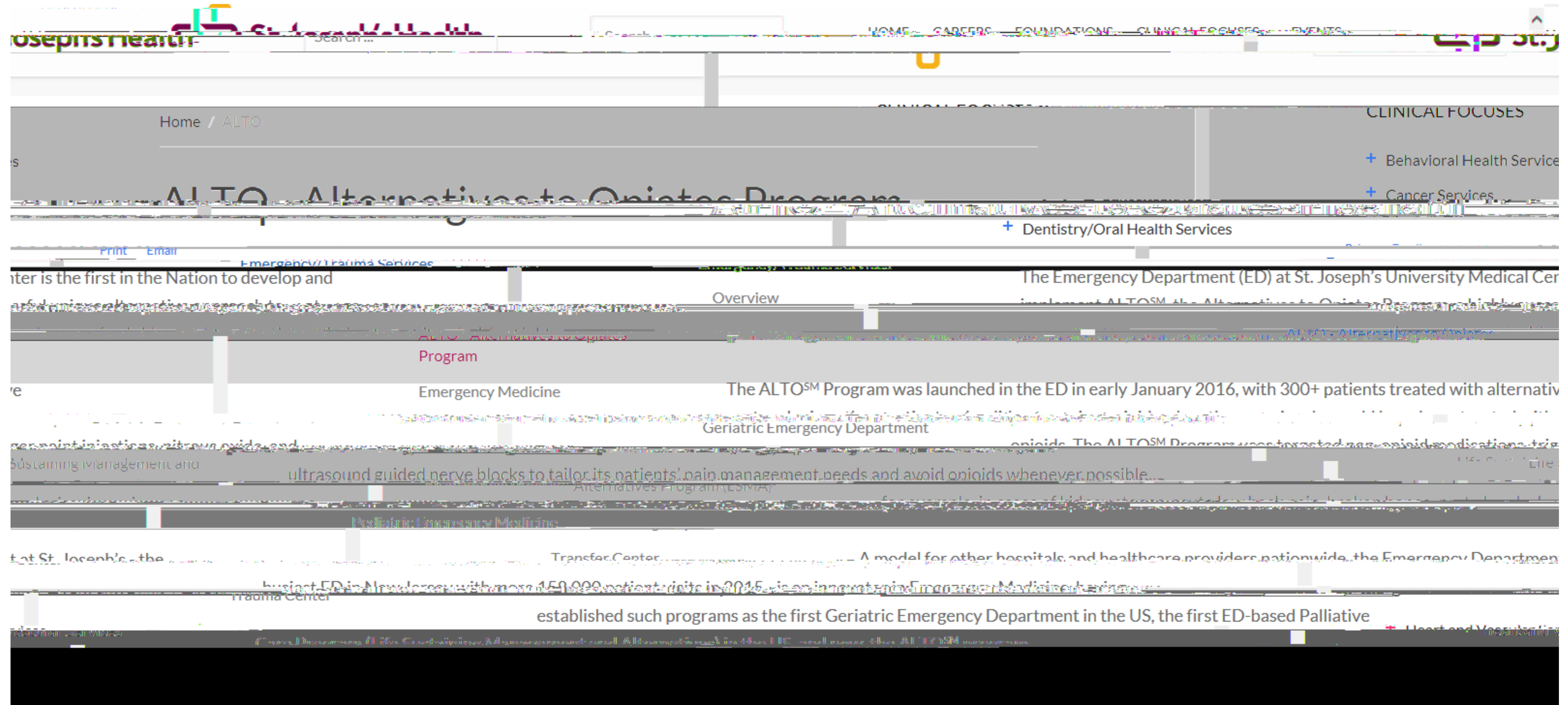
- A. Intravenous lidocaine has been shown to be efficacious when administered for acute lower back pain
- B. Lidocaine doses of 1.5 mg/kg (about 100 mg) have been shown to be safe with few side effects
- C. Much of the data for intravenous lidocaine in the ED comes from small studies and case series

JA is a 53 year old female presenting to the ED with 9/10 pelvic pain. A CT scan reveals a new nephrolithiasis in her ureter. JA's past medical history is significant for back pain and opioid abuse (sober for 3 years). Allergies list GI bleeding with NSAID use. Home medications include: acetaminophen 1000 mg every 6 hours as needed for back pain and omeprazole 20 mg daily. Given her history, JA requests avoiding anything with the potential for addiction.





# Future Directions



# Key Takeaways

- Consider non-opioid analgesia first, even if moderate-severe pain
  - Acetaminophen 1000 mg + ibuprofen 400 mg
  - Ketorolac at limited doses (10 mg)
- Subdissociative ketamine is an effective alternative to opioids for pain
  - Administer over 15 minutes to reduce adverse effects
- Lidocaine is effective for renal colic and neuropathic indications but needs more research
  - While safe, recommend cardiac monitoring

# Questions?

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