

2019 WACEP Alternatives to Opioids (ALTO) Pathways

Statement of Purpose

A State in Crisis

The opioid epidemic in Wisconsin is unprecedented in scale and scope. 20,590 Wisconsinites suffered from opioid use disorder in 2016 (triple the rate observed in 2005). 1,074 Wisconsinites died from an opioid overdose in 2016 (double the rate observed in 2005). Wisconsin led the nation in ED opioid overdose visits between 2016-2017 with an increase of 109%. Nationwide, 42,249 Americans died of an opioid overdose in 2016 and the death rate from all opioids (including heroin) now exceeds the death rate from motor vehicle accidents. One of every 550 patients started on opioid therapy died of opioid-related causes a median of 2.6 years after the first dose.

A Plan to Save Lives and Curb an Epidemic

The ED is actually a minor source of opioid prescriptions (4% of all opioid prescriptions originate from the ED); however, initial exposure to opioids is common in the ED setting since patients routinely present in acute pain. In an effort to do our part, proactive emergency physicians have developed a four-fold strategy to address the opioid epidemic from the ED: (1) Reduce the amount of opioids used in the ED, (2) Reduce the amount of opioids prescribed from the ED, (3) Offer patients harm reduction interventions from the ED if appropriate (i.e. naloxone prescriptions), (4) Treat addicted/withdrawing patients and refer them to treatment.

A Duty to the Individual Patient

The Alternatives to Opioids (ALTO) pathways address the need to reduce opioid use and prescriptions in the ED, while respecting the need to provide analgesia to patients in acute pain. ALTO interventions are not one-size-fits-all and should always be administered with the individual patient's risk profile in mind (age, allergies, weight, etc)

Balancing Evidence-based Practice with the Urgency of this Historical Moment

ALTO interventions are based on the evidence that is available. WACEP members can expect multiple iterations of these pathways, updated as the evidence evolves.

Expectations from Our Patients, Colleagues, and Community Partners

These materials are being put forth in good faith by concerned physicians with the aim of saving lives by limiting patients' exposure to opioids. The ALTO pathways are not intended to substitute professional, medical or legal judgment/advice. WACEP disclaims all liability and responsibility arising from any reliance placed on these materials.

WACEP ALTO Pathways Team:

1. Lisa Maurer, MD, FACEP –WACEP Immediate Past President
2. Bobby Redwood, MD, MPH, FACEP—WACEP Past President
3. Jeff Pothof, MD, FACEP—WACEP President
4. Julianna Doniere, MD
5. Marielle Brenner, MD

2019 WACEP ALTO Pathways

Renal Colic

1ST LINE

- Ketorolac 15-30 mg IV/IM
- Lidocaine PF 1.5 mg/kg IV over 10 minutes (MAX 200 mg)
- Acetaminophen 1000 mg PO/PR/IV
- Apply heat to abdomen and low back region

2ND LINE

- Desmopressin 40mcg intranasal

2019 WACEP ALTO Pathways

Musculoskeletal Pain

(Sprains, strains, or Opioid Naïve Lower Back Pain)

- Ibuprofen 600 mg PO or Ketorolac 15-30 mg IV/IM
- Acetaminophen 1000 mg PO/PR/IV
- Diclofenac 1% topical gel or 1.3% transdermal patch (MAX 1 patch)
- Cyclobenzaprine 5 mg PO or Diazepam 5 mg PO
- Lidocaine 4-5% transdermal patch (MAX 3 patches)
- Trigger Point Injection 1-2 mL of Bupivacaine 0.25-0.5% and/or Lidocaine 1-2%
- Gabapentin 300 mg PO (neuropathic component of pain)

2019 WACEP ALTO Pathways

**Acute on Chronic Radicular LBP
(Opioid Tolerant)**

- Ibuprofen 600 mg PO or Ketorolac 15-30 mg IV/IM
- Acetaminophen 1000 mg PO/PR/IV
- Cyclobenzaprine 5 mg PO or Tizanidine 2 mg PO
- Lidocaine 4-5% transdermal patch (MAX 3 patches)
- Dexamethasone 8 mg IV
- Trigger Point Injection 1-2 mL of Bupivacaine 0.25-0.5% and/or Lidocaine 1-2%
- Gabapentin 300 mg PO (neuropathic component of pain)
- Ketamine 0.2mg/kg IV (MAX 25 mg) +/- 0.1 mg/kg/hour infusion

2019 WACEP ALTO Pathways

Headache

1ST LINE

- Prochlorperazine 10 mg IV or Metoclopramide 10 mg IV
- 1 L 0.9% NS bolus (if dehydrated or emesis)
- Ibuprofen 600 mg PO or Ketorolac 15-30 mg IV/IM
- Acetaminophen 1000 mg PO/PR/IV
- Dexamethasone 10 mg IV (to prevent recurrence)

2ND LINE

- Caffeine 200 mg PO
- Magnesium 1 gm IV infusion
- Haloperidol 5 mg IM/IV or Chlorpromazine 25 mg IV
- Cervical or Trapezius Trigger Point Injection 1-2 mL of Bupivacaine 0.25-0.5% or Lidocaine 1-2%
- Lidocaine 4% IN Sphenopalatine Ganglion Block
- Sumatriptan 6 mg subQ (Migraine Hx)

3RD LINE

- Valproic acid 500 mg IV infusion

LAST LINE

- Dihydroergotamine 1 mg IV

2019 WACEP ALTO Pathways

Extremity Fracture or Joint Dislocation

(Medications while setting up for nerve block)

MILD TO MODERATE PAIN

- Ibuprofen 600 mg PO or Ketorolac 15-30 mg IV/IM
- Acetaminophen 1000 mg PO/PR/IV

MODERATE TO SEVERE PAIN

- Ketamine Intranasal 0.5 mg/kg (MAX 50 mg) or 0.2 mg/kg IV (MAX 25 mg)
- Nitrous Oxide titrate up to 50-70%

NERVE BLOCK

- Ultrasound Guided Regional Anesthesia
 - 5mL Lidocaine 1% and 5mL Bupivacaine 0.5% peri-neural infiltration
- Core ALTO Fracture / Dislocation Nerve Blocks
 - Hematoma block
 - Intra-articular shoulder injection (dislocation)
 - Fascia-iliaca block (hip fracture)
 - Digital block

2019 WACEP ALTO Pathways

Chronic Abdominal Pain

ALL TYPES

- Ibuprofen 600 mg PO or Ketorolac 15-30 mg IV/IM
- Acetaminophen 1000 mg PO/PR/IV

GASTROPARESIS TYPE

- Haloperidol 5 mg IM/IV or Metoclopramide 10 mg IV or both

CYCLIC VOMITING/ABDOMINAL MIGRAINE

- Sumatriptan 6 mg subQ or 20 mg Intranasal
- Ondansetron 4 mg IV or Metoclopramide 10 mg

SPASM / IBS TYPE

- Dicyclomine 20 mg PO/IM

REFRACTORY PAIN

- Ketamine 0.2 mg/kg IV (MAX 25 mg) +/- 0.1 mg/kg/hour infusion

References

RENAL COLIC

1. Afshar K, Jafari S, Marks AJ, Eftekhari A, Macneily AE. Nonsteroidal anti-inflammatory drugs (NSAIDs) and non-opioids for acute renal colic. *Cochrane Database Syst Rev.* 2015;(6):CD006027.
2. Motov S, Yasavolian M, Likourezos A, et al. Comparison of Intravenous Ketorolac at Three Single-Dose Regimens for Treating Acute Pain in the Emergency Department: A Randomized Controlled Trial. *Ann Emerg Med.* 2017;70(2):177-184.
3. Türk C, Petřík A, Sarica K, et al. EAU Guidelines on Diagnosis and Conservative Management of Urolithiasis. *Eur Urol.* 2016;69(3):468-74.
4. E silva L, Scherber K, Cabrera D, et al. Safety and Efficacy of Intravenous Lidocaine for Pain Management in the Emergency Department: A Systematic Review. *Ann Emerg Med.* 2018;72(2):135-144.
5. Worster AS, Bhanich supapol W. Fluids and diuretics for acute ureteric colic. *Cochrane Database Syst Rev.* 2012;(2):CD004926.
6. Sin B, Koop K, Liu M, Yeh JY, Thandi P. Intravenous Acetaminophen for Renal Colic in the Emergency Department: Where Do We Stand?. *Am J Ther.* 2017;24(1):e12-e19.
7. Arhami dolatabadi A, Memary E, Kariman H, Nasiri gigloo K, Baratloo A. Intranasal Desmopressin Compared with Intravenous Ketorolac for Pain Management of Patients with Renal Colic Referring to the Emergency Department: A Randomized Clinical Trial. *Anesth Pain Med.* 2017;7(2):e43595.
8. Roshani A, Falahatkar S, Khosropanah I, et al. Assessment of clinical efficacy of intranasal desmopressin spray and diclofenac sodium suppository in treatment of renal colic versus diclofenac sodium alone. *Urology.* 2010;75(3):540-2.
9. Jalili M, Entezari P, Doosti-irani A, Masoomi R, Mirfazaelian H. Desmopressin effectiveness in renal colic pain management: Systematic review and meta-analysis. *Am J Emerg Med.* 2016;34(8):1535-41.
Kober A, Dobrovits M, Djavan B, et al. Local Active Warming: An Effective Treatment for Pain, Anxiety and Nausea Caused by Renal Colic. *J Urol.* 2003;170:741-4.

MUSCULOSKELETAL PAIN

1. Chou R, Peterson K, Helfand M. Comparative Efficacy and Safety of Skeletal Muscle Relaxants for Spasticity and Musculoskeletal Conditions: A Systematic Review. *Journal of Pain and Symptom Management.* 2004 Aug; 28(2):140-175.
2. Deepak PS, Adrian BA. "Do NSAIDs Impair Healing of Musculoskeletal Injuries?" *Rheumatology Network, Modern Medicine Network,* 2011 June 7.
3. Epstein B, Childers MK. The Use of Gabapentin for Neuropathic and Musculoskeletal Pain: A Case Series. *Neurorehabilitation and Neural Repair.* 1998 June 1; 12(2): 81-85.
4. Friedman BW, Dym AA, Davitt M, Holden L, Solorzano C, Esses D, Bijur PE, Gallagher EJ. Naproxen With Cyclobenzaprine, Oxycodone/Acetaminophen, or Placebo for Treating Acute Low Back Pain: A Randomized Clinical Trial. *JAMA.* 2015 Oct 20;314(15):1572-80.
5. Galer BS, Gammaitoni AR, Oleka N, Jensen MP, Argoff CE. Use of the lidocaine patch 5% in reducing intensity of various pain qualities reported by patients with low-back pain. *Curr Med Res Opin.* 2004;20 Suppl 2:S5-12.
6. Graboski CL, Gray DS, Burnham RS. Botulinum toxin A versus bupivacaine trigger point injections for the treatment of myofascial pain syndrome: a randomized double blind crossover study. *Pain.* 2005; 118:170-175.
7. Hong CZ. Lidocaine injection versus dry needling to myofascial trigger point. The importance of the local twitch response. *Am J Phys Med Rehabil.* 1994; 73(4):256-63.
8. Korza K, Ferguson MC. Gabapentin Dosing for Neuropathic Pain. *Practical Pain Management.* 2016 Dec; 16(10).

9. Moore RA, Derry S, Wiffen PJ, Straube S, Aldington DJ. Overview review: Comparative efficacy of oral ibuprofen and paracetamol (acetaminophen) across acute and chronic pain conditions. *Eur J Pain*. 2015 Oct;19(9):1213-23.
10. Nair B, Taylor-Gjevre R. A Review of Topical Diclofenac Use in Musculoskeletal Disease. *Pharmaceuticals*. 2010 June;3: 1892-1908.

ACUTE ON CHRONIC RADICULAR LBP

1. Balakrishnamoorthy R, Horgan I, Perez S, Steele MC, Keijzers GB. Does a single dose of intravenous dexamethasone reduce Symptoms in Emergency department patients with low Back pain and RAdiculopathy (SEBRA)? A double-blind randomised controlled trial. *Emerg Med J*. 2015;32(7):525-30.
2. Chou R, et al. Systemic Pharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline. *Ann Intern Med*. 2017 Apr 4;166(7):480-492
3. Chou R, Peterson K, Helfand M. Comparative efficacy and safety of skeletal muscle relaxants for spasticity and musculoskeletal conditions: a systematic review. *J Pain Symptom Manage*. 2004 Aug;28(2):140-75
4. Cummings TM, White AR. Needling therapies in the management of myofascial trigger point pain: a systematic review. *Arch Phys Med Rehabil*. 2001 Jul;82(7):986-92
5. Friedman BW et al. A randomized placebo-controlled trial of single-dose IM corticosteroid for radicular low back pain. *Spine (Phila Pa 1976)*. 2008 Aug 15;33(18):E624-9
6. Hyllested M, Jones S, Pedersen JL, Kehlet H. Comparative effect of paracetamol, NSAIDs or their combination in postoperative pain management: a qualitative review. *Br J Anaesth*. 2002;88(2):199-214.
7. Moore RA, Derry S, Wiffen PJ, Straube S, Aldington DJ. Overview review: Comparative efficacy of oral ibuprofen and paracetamol (acetaminophen) across acute and chronic pain conditions. *Eur J Pain*. 2015 Oct;19(9):1213-23
8. Motov S, Drapkin J, Likourezos A, et al. Continuous Intravenous Sub-Dissociative Dose Ketamine Infusion for Managing Pain in the Emergency Department. *West J Emerg Med*. 2018;19(3):559-566.
9. Motov S, Rockoff B, Cohen V, et al. Intravenous Subdissociative-Dose Ketamine Versus Morphine for Analgesia in the Emergency Department: A Randomized Controlled Trial. *Ann Emerg Med*. 2015;66(3):222-229 e221.
10. Saeidian S, et al. Effect of Trigger Point Injection on Lumbosacral Radiculopathy Source. *Anesth Pain Med*. 2014 Oct; 4(4): e15500.

HEADACHE

1. Binfalah M, Alghawi, Shosha E, et al. Sphenopalatine ganglion block for the treatment of acute migraine headache. *Pain Res Treat*. 2018 May 7;2018:2516953
2. Cady R, Saper J, Dexter K, et al. A double blind, placebo controlled study of repetitive transnasal sphenopalatine ganglion blockade with Tx360 as acute treatment for chronic migraine. *Headache* 2015;55:101-116
3. Colman I, Friedman BW, Brown MD, Innes GD, Grafstein E, Roberts TE, Rowe BH. Parenteral dexamethasone for acute severe migraine headache: meta-analysis of randomised controlled trials for preventing recurrence. *BMJ*. 2008 Jun 14;336(7657):1359-61.
4. Demirkaya S, Vural O, Dora B, Topçuoğlu MA. Efficacy of intravenous magnesium sulfate in the treatment of acute migraine attacks. *Headache*. 2001;41(2):171-7.
5. Duncan RW, Smith KL, Mauire M, et al. Alternatives to opioids for pain management in the emergency department decreases opioid usage and maintains patient satisfaction. *Am J Emerg Med*. 2018 Apr 22. pii: S0735-6757(18)30325-5. doi: 10.1016/j.ajem.2018.04.043
6. Erol DD. The analgesic and antiemetic efficacy of gabapentin or ergotamine/cafeine for the treatment of postdural puncture headache. *Adv Med Sci* 2011; 56: 25–29
7. Erol DD. The effect of oral gabapentin on postdural puncture headache. *Acute Pain*. 2006;8(4)169-173
8. Fahmida Ghaderibarmi, Nader Tavakkoli, Mansoureh Togha.. Intravenous Valproate versus Subcutaneous Sumatriptan in Acute Migraine Attack. *Acta Medica Iranica* 2015. 53(10):633-636

9. Gaffin ME, Bruner DI, Wason C, et al. A randomized trial of intravenous haloperidol vs intravenous metoclopramide for acute migraine therapy in the emergency department. *J Emerg Med.* 2015 Sep;49(3):326-34.
10. Gelfand AA, Goadsby PJ. A Neurologist's Guide to Acute Migraine Therapy in the Emergency Room. *The Neurohospitalist.* 2012;2(2):51-59.
11. Griffith JD, Mycyk MB, Kyriacou DN. Metoclopramide versus hydromorphone for the emergency department treatment of migraine headache. *J Pain.* 2008;9(1):88-94
12. Hanling SR, Lagrew JE, Colmenar DH, et al. Intravenous Cosyntropin Versus Epidural Blood Patch for Treatment of Postdural Puncture Headache *Pain Med.* 2016;17(7):1337-1342
13. Harden RN, Rogers D, Fink K, Gracely RH. Controlled trial of ketorolac in tension-type headache. *Neurology.* 1998;50(2):507-9.
14. Kostic MA, Gutierrez FJ, Rieg TS, et al. A prospective, randomized trial of intravenous prochlorperazine versus subcutaneous sumatriptan in acute migraine therapy in the emergency department. *Ann Emerg Med.* 2010;56(1):1-6
15. Linde M, Mulleners WM, Chronicle EP, McCrory DC. Valproate (valproic acid or sodium valproate or a combination of the two) for the prophylaxis of episodic migraine in adults. *Cochrane Database Syst Rev.* 2003
16. Lipton RB, Baggish JS, Stewart WF, Codispoti JR, Fu M. Efficacy and safety of acetaminophen in the treatment of migraine: results of a randomized, double-blind, placebo-controlled, population-based study. *Arch Intern Med.* 2000;160(22):3486-92.
17. Lipton RB, Diener H, Robbins MS, et al. Caffeine in the management of patients with headache. *J Headache Pain.* 2017;18(1):107
18. Orr, S. L., Friedman, B. W., Christie, S., Minen, M. T., Bamford, C., Kelley, N. E. and Tepper, D. (2016), Management of Adults With Acute Migraine in the Emergency Department: The American Headache Society Evidence Assessment of Parenteral Pharmacotherapies. *Headache: The Journal of Head and Face Pain*, 56: 911–940. doi:10.1111/head.12835
19. Pringsheim, T., Davenport, W. J., Marmura, M. J., Schwedt, T. J. and Silberstein, S. (2016), How to Apply the AHS Evidence Assessment of the Acute Treatment of Migraine in Adults to your Patient with Migraine. *Headache*, 56: 1194–1200. doi:10.1111/head.12870
20. Shahrami A, Assarzagdegan F, Hatamabadi HR, et al. Comparison of therapeutic effects of magnesium sulfate vs. dexamethasone/metoclopramide on alleviating acute migraine headache. *J Emerg Med.* 2015; 48(1):69-76.
21. Zeger W, Younggren B, Smith L. Comparison of cosyntropin versus caffeine for post-dural puncture headaches: a randomized double-blind trial. *World J Emerg Med.* 2012; 3(3):182-185.

EXTREMITY FRACTURE OR JOINT DISLOCATION

1. Blaivas M, Adhikari S, Lander L. A prospective comparison of procedural sedation and ultrasound-guided interscalene nerve block for shoulder reduction in the emergency department. *Acad Emerg Med.* 2011 Sep;18(9):922-7.
2. Herres J, Chudnofsky CR, Manur R, Damiron K, Deitch K. The use of inhaled nitrous oxide for analgesia in adult ED patients: a pilot study. *Am J Emerg Med.* 2016 Feb;34(2):269-73.
3. Moore RA, Derry S, Wiffen PJ, Straube S, Aldington DJ. Overview review: Comparative efficacy of oral ibuprofen and paracetamol (acetaminophen) across acute and chronic pain conditions. *Eur J Pain.* 2015 Oct;19(9):1213-23.
4. National Clinical Guideline Centre UK. Fractures (non-complex): Assessment and management. 2016.
5. National Clinical Guideline Centre UK. Fractures (complex): Assessment and management. 2016.
6. Motov S, Rockoff B, Cohen V, et al. Intravenous subdissociative-dose ketamine versus morphine for analgesia in the emergency department: a randomized controlled trial. *Ann Emerg Med* 2015;66(3):222–9.
7. Motov S, Mai M, Pushkar I, Likourezos A, et al. A prospective randomized, double-dummy trial comparing intravenous push dose of low dose ketamine to short infusion of low dose ketamine for treatment of moderate to severe pain in the emergency department. *Am J Emerg Med.* 2017 Mar;S0735-6757(17):30171

8. Sin B, Tatunchak T, Paryavi M, Olivo M, et al. The Use of Ketamine for Acute Treatment of Pain: A Randomized, Double-Blind, Placebo-Controlled Trial. *J Emerg Med*. 2017 May;52(5):601-608.

CHRONIC ABDOMINAL PAIN

1. Camilleri M, Parkman HP, Shafi MA, Abell TL, Gerson L, American College of G. Clinical guideline: management of gastroparesis. *Am J Gastroenterol*. 2013;108(1):18-37; quiz 38.
2. Chiou E, Nurko S. Management of functional abdominal pain and irritable bowel syndrome in children and adolescents. *Expert Rev Gastroenterol Hepatol*. 2010;4(3):293-304.
3. Evans RW, Whyte C. Cyclic vomiting syndrome and abdominal migraine in adults and children. *Headache*. 2013;53(6):984-993.
4. Hikita T, Kodama H, Kaneko S, et al. Sumatriptan as a treatment for cyclic vomiting syndrome: a clinical trial. *Cephalalgia*. 2011;31(4):504-507.
5. Hyllested M, Jones S, Pedersen JL, Kehlet H. Comparative effect of paracetamol, NSAIDs or their combination in postoperative pain management: a qualitative review. *Br J Anaesth*. 2002;88(2):199-214.
6. LOJ ES, Scherber K, Cabrera D, et al. Safety and Efficacy of Intravenous Lidocaine for Pain Management in the Emergency Department: A Systematic Review. *Ann Emerg Med*. 2018;72(2):135-144 e133.
7. Motov S, Drapkin J, Likourezos A, et al. Continuous Intravenous Sub-Dissociative Dose Ketamine Infusion for Managing Pain in the Emergency Department. *West J Emerg Med*. 2018;19(3):559-566.
8. Motov S, Rockoff B, Cohen V, et al. Intravenous Subdissociative-Dose Ketamine Versus Morphine for Analgesia in the Emergency Department: A Randomized Controlled Trial. *Ann Emerg Med*. 2015;66(3):222-229 e221.
9. Motov S, Strayer R, Hayes BD, et al. The Treatment of Acute Pain in the Emergency Department: A White Paper Position Statement Prepared for the American Academy of Emergency Medicine. *J Emerg Med*. 2018;54(5):731-736.
10. Motov S, Yasavolian M, Likourezos A, et al. Comparison of Intravenous Ketorolac at Three Single-Dose Regimens for Treating Acute Pain in the Emergency Department: A Randomized Controlled Trial. *Ann Emerg Med*. 2017;70(2):177-184.
11. Natesan S, Lee J, Volkamer H, Thoureen T. Evidence-Based Medicine Approach to Abdominal Pain. *Emerg Med Clin North Am*. 2016;34(2):165-190.
12. Olsen JC, McGrath NA, Schwarz DG, Cutcliffe BJ, Stern JL. A double-blind randomized clinical trial evaluating the analgesic efficacy of ketorolac versus butorphanol for patients with suspected biliary colic in the emergency department. *Acad Emerg Med*. 2008;15(8):718-722.
13. Ramirez R, Stalcup P, Croft B, Darracq MA. Haloperidol undermining gastroparesis symptoms (HUGS) in the emergency department. *Am J Emerg Med*. 2017;35(8):1118-1120.
14. Remington-Hobbs J, Petts G, Harris T. Emergency department management of undifferentiated abdominal pain with hyoscine butylbromide and paracetamol: a randomised control trial. *Emerg Med J*. 2012;29(12):989-994.
15. Roldan CJ, Chambers KA, Paniagua L, Patel S, Cardenas-Turanzas M, Chathampally Y. Randomized Controlled Double-blind Trial Comparing Haloperidol Combined With Conventional Therapy to Conventional Therapy Alone in Patients With Symptomatic Gastroparesis. *Acad Emerg Med*. 2017;24(11):1307-1314.
16. Ruepert L, Quartero AO, de Wit NJ, van der Heijden GJ, Rubin G, Muris JW. Bulking agents, antispasmodics and antidepressants for the treatment of irritable bowel syndrome. *Cochrane Database Syst Rev*. 2011(8):CD003460.
17. Weinberg DS, Smalley W, Heidelbaugh JJ, Sultan S, American Gastroenterological A. American Gastroenterological Association Institute Guideline on the pharmacological management of irritable bowel syndrome. *Gastroenterology*. 2014;147(5):1146-1148.

Appendix 1. Drug-specific Safety and Administration Tips

Acetaminophen¹⁻⁶

- No clear benefit of IV route as opposed to oral. Rectal route peak concentrations are lower and effects are significantly delayed
- Maximum of 4000 mg of acetaminophen from all sources in 24 hours
- Additive effects when combined with NSAIDS for pain

Caffeine³

- Can also be given IV, however oral route has rapid onset of effect

Chlorpromazine³

- Give slow IV infusion, risk of hypotension during and after infusion. Recommend fluid bolus prior to administration and patient to remain supine for 30 minutes after administration.
- Avoid in patients with Parkinson's disease

Cyclobenzaprine^{3,7}

- Consider 5mg for all patients especially patients >65 or <70kg OR concerns for somnolence. May increase initial dose to 10mg for patients >70kg OR <65 years old.
- 5mg doses appear as effective as 10mg for most individuals.

Dexamethasone^{3,8}

- Give slow IV push to decrease perianal tingling and itching.
- IV formulation can be given orally.

Diazepam⁹

- Not recommended if patient concurrently on opioids

Diclofenac Topical³

- Systemic absorption is very limited can consider in patients with contraindications to oral NSAID therapy.
- Available as patch and gel

Dihydroergotamine^{3,10}

- Pregnancy category X
- Contraindicated within 24 hours of Triptan use
- Pre-medicate with anti-emetics prior to administration

Gabapentin^{11,12}

- Single doses of gabapentin have been shown to be possibly effective for acute post-operative pain, however the data supporting this is derived from unpublished studies from the manufacturer.

Haloperidol³

- Not recommended in patients with long QT
- Avoid in patients with Parkinson's disease

Ibuprofen^{2,4,5,13}

- Studies suggest peak analgesic effects at doses of 400mg. Anti-inflammatory effects may increase at higher doses
- Additive effects when combined with acetaminophen for pain

Ketamine¹⁴⁻²¹

INTRAVENOUS (IV)

- Initial bolus for pain 0.1-0.3 mg/kg IV, higher doses and shorter infusions are associated with increased side effects.
- Recommend ideally giving over 10 minutes diluted, and capping doses at 25 mg.
- Dosing weight for low dose ketamine injection and infusion are also controversial. Recommend IBW if not using a maximum dose.
- If use ABW recommend bolus maximum of 25 mg and infusion maximum of 12 mg/hr

INTRANASAL (IN)

- Ketamine concentrations 100 mg/ml or 50 mg/ml can be used
- Maximum volume for IN is 1ml per nare
- Dosing is 0.5-0.75 mg/kg may need to reduce dose for small adults

Ketorolac^{3,22}

- Max IV dose of 15 mg if patient > 65 years old, < 50 kg or CrCl < 50 mL/min
- Studies show peak analgesic effect at doses of 10mg. Anti-inflammatory effects may increase at higher doses

Lidocaine^{3,23-25}

INTRAVENOUS

- May give as 1-2% preservative free undiluted injection slowly over 10 minutes or dilute in to 50-100ml

TRANSDERMAL PATCH

- To prevent tachyphylaxis instruct patient to remove after 12 hours
- 5% is RX and 4% available OTC, consider them interchangeable

Magnesium³

- Recommend infusion over 15-30 minutes

Metoclopramide^{3,26}

- Diluting and administering slowly decreases risk of EPS (Dystonic reactions, akathisia, ect.)
- Avoid in patients with Parkinson's disease

Prochlorperazine^{3,26}

- Diluting and administering slowly decreases risk of EPS (Dystonic reactions, akathisia, ect.)
- Avoid in patients with Parkinson's disease

Tizanidine³

- Can cause hypotension
- Contraindicated in patients taking ciprofloxacin

Sumatriptan³

- Contraindicated in patients with ischemic cardiovascular disease
- Contraindicated with 24 hours of Ergotamines

Valproic Acid^{3,27}

- Pregnancy category D/X
- Infusion over 15 minutes

1. Beck DH, Schenk MR, Hagemann K, Doepfmer UR, Kox WJ. The pharmacokinetics and analgesic efficacy of larger dose rectal acetaminophen (40 mg/kg) in adults: a double-blinded, randomized study. *Anesth Analg.* 2000;90(2):431-436.
2. Hyllested M, Jones S, Pedersen JL, Kehlet H. Comparative effect of paracetamol, NSAIDs or their combination in postoperative pain management: a qualitative review. *Br J Anaesth.* 2002;88(2):199-214.
3. Lexicomp Online. Wolters Kluwer Clinical Drug Information, Inc; 2018. Accessed December 14, 2018.
4. Moore PA, Hersh EV. Combining ibuprofen and acetaminophen for acute pain management after third-molar extractions: translating clinical research to dental practice. *J Am Dent Assoc.* 2013;144(8):898-908.
5. Ong CK, Seymour RA, Lirk P, Merry AF. Combining paracetamol (acetaminophen) with nonsteroidal antiinflammatory drugs: a qualitative systematic review of analgesic efficacy for acute postoperative pain. *Anesth Analg.* 2010;110(4):1170-1179.
6. Romsing J, Moiniche S, Dahl JB. Rectal and parenteral paracetamol, and paracetamol in combination with NSAIDs, for postoperative analgesia. *Br J Anaesth.* 2002;88(2):215-226.
7. Borenstein DG, Korn S. Efficacy of a low-dose regimen of cyclobenzaprine hydrochloride in acute skeletal muscle spasm: results of two placebo-controlled trials. *Clin Ther.* 2003;25(4):1056-1073.
8. Altamimi S, Robertson G, Jastaniah W, et al. Single-dose oral dexamethasone in the emergency management of children with exacerbations of mild to moderate asthma. *Pediatr Emerg Care.* 2006;22(12):786-793.
9. Dowell D, Haegerich TM, Chou R. CDC Guideline for Prescribing Opioids for Chronic Pain--United States, 2016. *JAMA.* 2016;315(15):1624-1645.
10. Gelfand AA, Goadsby PJ. A Neurologist's Guide to Acute Migraine Therapy in the Emergency Room. *Neurohospitalist.* 2012;2(2):51-59.
11. Straube S, Derry S, Moore RA, Wiffen PJ, McQuay HJ. Single dose oral gabapentin for established acute postoperative pain in adults. *Cochrane Database Syst Rev.* 2010(5):CD008183.
12. Wiffen PJ, Derry S, Bell RF, et al. Gabapentin for chronic neuropathic pain in adults. *Cochrane Database Syst Rev.* 2017;6:CD007938.
13. Seymour RA, Ward-Booth P, Kelly PJ. Evaluation of different doses of soluble ibuprofen and ibuprofen tablets in postoperative dental pain. *Br J Oral Maxillofac Surg.* 1996;34(1):110-114.
14. Andolfatto G, Willman E, Joo D, et al. Intranasal ketamine for analgesia in the emergency department: a prospective observational series. *Acad Emerg Med.* 2013;20(10):1050-1054.
15. Dargin J, Medzon R. Emergency department management of the airway in obese adults. *Ann Emerg Med.* 2010;56(2):95-104.
16. Farnia MR, Jalali A, Vahidi E, Momeni M, Seyedhosseini J, Saeedi M. Comparison of intranasal ketamine versus IV morphine in reducing pain in patients with renal colic. *Am J Emerg Med.* 2017;35(3):434-437.
17. Motov S, Drapkin J, Likourezos A, et al. Continuous Intravenous Sub-Dissociative Dose Ketamine Infusion for Managing Pain in the Emergency Department. *West J Emerg Med.* 2018;19(3):559-566.
18. Motov S, Rockoff B, Cohen V, et al. Intravenous Subdissociative-Dose Ketamine Versus Morphine for Analgesia in the Emergency Department: A Randomized Controlled Trial. *Ann Emerg Med.* 2015;66(3):222-229 e221.
19. Shimonovich S, Gigi R, Shapira A, et al. Intranasal ketamine for acute traumatic pain in the Emergency Department: a prospective, randomized clinical trial of efficacy and safety. *BMC Emerg Med.* 2016;16(1):43.
20. Shrestha R, Pant S, Shrestha A, Batajoo KH, Thapa R, Vaidya S. Intranasal ketamine for the treatment of patients with acute pain in the emergency department. *World J Emerg Med.* 2016;7(1):19-24.
21. Yeaman F, Meek R, Egerton-Warburton D, Rosengarten P, Graudins A. Sub-dissociative-dose intranasal ketamine for moderate to severe pain in adult emergency department patients. *Emerg Med Australas.* 2014;26(3):237-242.
22. Motov S, Yasavolian M, Likourezos A, et al. Comparison of Intravenous Ketorolac at Three Single-Dose Regimens for Treating Acute Pain in the Emergency Department: A Randomized Controlled Trial. *Ann Emerg Med.* 2017;70(2):177-184.
23. Firouzian A, Alipour A, Rashidian Dezfouli H, et al. Does lidocaine as an adjuvant to morphine improve pain relief in patients presenting to the ED with acute renal colic? A double-blind, randomized controlled trial. *Am J Emerg Med.* 2016;34(3):443-448.
24. Soleimanpour H, Hassanzadeh K, Mohammadi DA, Vaezi H, Esfanjani RM. Parenteral lidocaine for treatment of intractable renal colic: a case series. *J Med Case Rep.* 2011;5:256.
25. Soleimanpour H, Hassanzadeh K, Vaezi H, Golzari SE, Esfanjani RM, Soleimanpour M. Effectiveness of intravenous lidocaine versus intravenous morphine for patients with renal colic in the emergency department. *BMC Urol.* 2012;12:13.

26. D'Souza RS, Mercogliano C, Ojukwu E, et al. Effects of prophylactic anticholinergic medications to decrease extrapyramidal side effects in patients taking acute antiemetic drugs: a systematic review and meta-analysis. *Emerg Med J.* 2018;35(5):325-331.
27. Tanen DA, Miller S, French T, Riffenburgh RH. Intravenous sodium valproate versus prochlorperazine for the emergency department treatment of acute migraine headaches: a prospective, randomized, double-blind trial. *Ann Emerg Med.* 2003;41(6):847-853.

Appendix 2. ALTO Prescribing Guide for Discharge

Headache

FOR ACUTE ATTACKS

- Sumatriptan 100 mg PO
- Acetaminophen/aspirin/caffeine (Excedrin Migraine) PO every 6 hours OR acetaminophen 1,000 mg every 6 hours
- Dihydroergotamine mesylate 2 mg nasal spray
- Naproxen 500-550 mg 2x/day OR ibuprofen 600 mg PO every 6 hours
- Metoclopramide 10 mg PO every 6 hours

FOR PREVENTION

- Propranolol 40 mg PO 2x/day
- Divalproex DR 250 mg PO 2x/day OR extended release 500 mg PO daily
- Topiramate 25 mg PO at bedtime
- Magnesium supplementation 600 mg PO daily

Sore Throat

- Ibuprofen 600 mg PO every 6 hours
- Acetaminophen 1,000 mg PO every 6 hours
- Dexamethasone 10 mg PO once
- Viscous lidocaine

Fibromyalgia

- Cardiovascular exercise
- Strength training
- Massage therapy
- Amitriptyline 10 mg PO at bedtime
- Cyclobenzaprine 10 mg PO every 8 hours
- Pregabalin 75 mg PO 2x/day

Uncomplicated Neck Pain

- Acetaminophen 1,000 mg PO every 6 hours
- Ibuprofen 600 mg PO every 6 hours
- Cyclobenzaprine 5 mg PO every 8 hours
- Physical therapy
- Lidocaine 5% transdermal patch every 24 hours (remove after 12 hours)

Uncomplicated Back Pain

- Acetaminophen 1,000 mg PO every 6 hours
- Ibuprofen 600 mg PO every 6 hours
- Lidocaine 5% transdermal patch every 24 hours (remove after 12 hours)
- Diclofenac 1.3% transdermal patch 2x/day OR diclofenac 1% gel 4 g 4x/day as needed
- Cyclobenzaprine 5 mg PO 3x/day
- Heat
- Physical therapy
- Exercise program

Simple Sprains

- Immobilization
- Ice
- Ibuprofen 600 mg PO every 6 hours
- Acetaminophen 1,000 mg PO every 6 hours
- Diclofenac 1.3% transdermal patch 2x/day OR diclofenac 1% gel 4 g 4x/day as needed

Contusions

- Compression
- Ice
- Ibuprofen 600 mg PO every 6 hours
- Acetaminophen 1,000 mg PO every 6 hours
- Lidoderm 5% patch transdermal patch every 24 hours (remove after 12 hours)

Nontraumatic Tooth Pain

- Ibuprofen 600 mg PO every 6 hours PLUS acetaminophen 1,000 mg PO every 6 hours

Osteoarthritis

- Diclofenac 50 mg PO every 8 hours OR naproxen 500 mg PO 2x/day OR celecoxib 200 mg daily
- Diclofenac 1.3% transdermal patch 2x/day OR diclofenac 1% gel 4 g 4x/day as needed

Undifferentiated Abdominal Pain

- Dicyclomine 20 mg PO every 6 hours
- Ibuprofen 600 mg PO every 6 hours
- Acetaminophen 1,000 mg PO every 6 hours
- Metoclopramide 10 mg PO every 6 hours
- Prochlorperazine 10 mg PO every 6 hours

Neuropathic Pain

- Gabapentin 300 mg PO at bedtime
- Amitriptyline 25 mg PO at bedtime
- Pregabalin 75 mg PO 2x/day

Appendix 3. Medical Directors: Is Your ED ALTO-Ready?

Pathways

- Clearly define ketamine sedation as ≥ 1 mg/kg slow IVP. ALTO doses are considered analgesia.
- Nitrous oxide administration should not be considered a sedation.

Computerized physician order entry (CPOE)

- Creation of pain treatment order set
- Create order strings for unique entries – clearly label “for pain”
- Create ALTO discharge medication order sets per appendix 2.

Supplies

- High-quality, portable ultrasound machine
- Demand-valve mask with 50-50 % O₂-NO₂
- Pre-pack “block bags” that contain all supplies required for regional nerve blocks

Education

- Consider ALTO webinars or online modules for clinicians
- Consider regional or train-the-trainer ultrasound and nerve block training workshops

Internal quality metrics (preparation for CMS)

- # of ED opioid administrations (measured in morphine equivalent units / 1000 ED visits)
- # of ED ALTO administrations