Opioid Reduction in the Emergency Department: A Multidisciplinary Approach to Implementing Sustainable Opioid-Sparing Multimodal Strategies in the Midwest

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Abstract

Opioid-related overdose deaths have increased five-fold since 1999 prompting the Department of Health and Human Services to declare the opioid crisis a national public health emergency. In the same time frame, the Wisconsin rates of opioid overdose deaths have nearly doubled. More than 60% of those deaths have been attributed to prescription opioids. With the primary symptom of pain reported in 45% of emergency department (ED) visits, this presents a unique opportunity for ED providers to be on the forefront of opioid stewardship. Recent pilot programs across the nation have shown success in reducing opioid prescribing without sacrificing patient satisfaction scores. With this in mind the Pharmacy Society of Wisconsin has tasked the Critical Care and Emergency Medicine Pharmacy Resident Collaboration (CERC) to assist with further development of the Midwest Alternative to Opioids (ALTO) Program in Wisconsin. Together these pharmacists have critically evaluated peer-reviewed literature and contributed to the refinement of ALTO pain pathways for ED providers. The Midwest ALTO program assists cohort hospitals in adopting these care pathways with the goal of reducing the ordering and administrations of opioids in the ED.

More than 130 people in the United States die daily from opioid-related drug overdoses.[1] Due to a five-fold increase in death related to opioid overdoses since 1999, the Department of Health and Human Services declared the opioid crisis a nationwide public health emergency.[2] Although opioids are commonly prescribed for pain, inappropriate and an over reliance on opioid pain control strategies can lead to serious consequences and large societal cost. In the United States, this cost was estimated to be $78.5 billion, largely secondary to lost productivity, increases in healthcare and substance use disorder treatment costs, and increases in cost to the criminal justice system.[3]

Wisconsin has been hit particularly hard by the opioid epidemic. Between July 2016 and September 2017, opioid overdoses increased by 70% in the Midwestern region.[4] The regional statistics were largely driven by Wisconsin's 109% increase in emergency department (ED) visits for opioid overdose, the largest increase in the nation. Correspondingly, the Wisconsin rates of opioid overdose deaths nearly doubled, with more than 60% of deaths attributed to prescription opioids.[5] Misuse of prescription opioids also drives the Wisconsin heroin epidemic, with three out of four heroin users reporting having abused prescription opioids prior to using heroin.[6] In response to the state's opioid crisis, the Wisconsin legislature has passed—beginning in 2013, with strong bipartisan support—an ever-expanding slate of laws and regulatory reforms designed to curb the epidemic. The Heroin, Opiate, Prevention, and Education (HOPE) Agenda includes laws limiting and regulating opioid prescribing.[7] The HOPE Agenda, as well as a number of initiatives led by providers, health plans, and health-systems, have raised public awareness around the issue and have also resulted in positive change with regard to provider prescribing habits. For example; in 2017, the Wisconsin Prescription Drug monitoring Program (PDMP) reported a 12% decrease in the number of opioid dosages dispensed from the preceding year.

Alternatives to Opioids Programs

One opioid stewardship strategy is to utilize a non-opioid multimodal approach to pain management. An example of this strategy is channels enzyme receptor-targeted analgesia (CERTA).[8,9] CERTA focuses on shifting from a symptom-based approach to a mechanistic-based approach when treating acute and chronic pain syndromes. Often, this translates into using non-opioid pain medications such as non-steroidal anti-inflammatory drugs (NSAIDs), acetaminophen, ketamine, lidocaine, and gabapentinoids to achieve multi-modal pain control and thus reduce patient exposure to opioids. The Alternative to Opioids (ALTO) Program formalizes CERTA concepts and provides a toolkit for implementing an ALTO approach to acute pain control in the ED. The program focuses on six acute pain syndromes commonly encountered in the ED and provides pain management options,

materials for prescription selection, and patient education materials for discharge. The acute pain syndromes addressed by the ALTO Program include headache/migraine, musculoskeletal pain, acute on chronic radicular lower back pain, renal colic, chronic abdominal pain, and extremity fracture/joint dislocation. A multi-center pre-post pilot in Colorado demonstrated the benefit of a structured ALTO program.[9,10] Their implementation of ALTO-first multimodal treatment of acute pain in the ED at ten local emergency departments, including a Level 1 trauma center, resulted in a statistically significant decrease in the use of opioids by greater than 20 percent. This decreased the average morphine equivalent units per ED visit from 1.45 at the opioid usage baseline to 1.11 while maintaining non-inferior patient satisfaction scores at the end of the intervention period (-0.94, 95% CI -5.29 to 3.4).[9]

Local Opioid Reduction Program

Recently, the Pharmacy Society of Wisconsin (PSW) has collaborated with key stakeholders from Wisconsin, Illinois, and Michigan to implement ALTO programming region-wide.[11] With their presence in both the community and hospital settings, pharmacists will be key players in this initiative. The Critical Care and Emergency Medicine Pharmacy Resident Collaboration (CERC), a committee working within the PSW Health-System Pharmacy Advisory Board, is charged with assisting in the implementation of the Midwest ALTO Program in Wisconsin.

The CERC committee, which consists of critical care and emergency medicine pharmacy residents from three major health systems around the state, has critically evaluated peer-reviewed literature and contributed to the 2019 updates to the ALTO pain pathways. The pathways place an emphasis on non-opioid pain modalities as first and second line treatment options for acute pain syndrome in the ED, with opioids as a last resort when the aforementioned have failed. The goal of the project is to reduce the administration of opioid medications in the ED by 15% (measured in morphine equivalent units); the 2019 revisions to the ALTO pathways are available for reference to all hospitals throughout Wisconsin via the Midwest ALTO Project (see Figure 1).

Opioid-sparing Clinical Pathways

The six ALTO pathways offer evidence-based therapies that can be incorporated into any ED, whether it is within an academic medical center or a critical access hospital. While there is not a universal, stepwise treatment for patients, these peer-reviewed pathways can provide pharmacist approved input for institutions that may not have 24/7 access to pharmacists in the ED. See Figure 1 for pathways.

The Wisconsin Emergency Physician ALTO Experience

Six months into the Midwest ALTO Project, Wisconsin emergency physicians at participating hospitals have demonstrated a strong commitment to limiting opioids within the ED and adopting an ALTO culture at their institution. This initial assessment of emergency physician prescribing habits is based on confirmation of decreased opioid use, provided by quality improvement professionals and physician champions during weekly pacing calls. By project design, hospital level data is sealed until the project reaches completion in December 2019; however, preliminary pooled data demonstrates a decrease of at least 10% in morphine equivalent units. In many ways these preliminary results are not surprising as the ALTO pathways used in the project were originally developed by the Wisconsin Chapter of the American College of Emergency Physicians with an underlying philosophy that they should not significantly disrupt the normal practice of emergency physicians in the Midwest.[12] Additionally, emergency physicians are particularly motivated to combat the opioid epidemic, as they are routinely confronted with the end stage consequences of opioid use disorder, including cravings, withdrawal, overdose, and death. The drive among emergency physicians to tackle this challenge cannot be overstated.[7,13,14] Based on reports from quality improvement professionals and physician champions during weekly project pacing calls, there has not been any documented physician resistance and many physicians have actually reported appreciation for the resources provided by the Midwest ALTO Project. For example, physicians have reported that adapting their ED to an ALTO culture has allowed them to have initial or expanded access to ultrasound technology, nitrous oxide delivery systems, mini-infuser pumps for low-dose ketamine, and "block bag" kits for regional anesthesia. Access to these crucial technologies and care innovations improves emergency physician satisfaction and expands the capability of the ED staff in general in terms of customizing pain control plans based on the individual patient's presentation and needs.

Of course, implementation of an ED wide quality improvement project does not occur without having to overcome certain barriers. Physician champions of participating hospitals have reported both individual level and system level challenges when implementing ALTO in their EDs. For example, individual physicians have voiced concerns that their emergency physician groups require additional training in regional anesthesia techniques and use of ultrasound guidance in general, as these modalities have only entered the mainstream core curriculum of emergency medicine residency programs within the past 20 years. Similarly, computerized physician order entry (CPOE) culture varies greatly by physician group and there is no one-size-fits-all order set for ALTO pathways. Emergency physicians are well aware that a poorly designed order set can derail a quality improvement project and ALTO physician champions are taking great care to make sure that they develop physician-friendly ALTO support tools in the electronic health record. On a systems-level, participating hospitals have reported a wide variety of hospital policies that had to be eliminated or adapted in order to facilitate a smooth ALTO implementation. For example, in some hospitals, regional anesthesia was only performed by an anesthesiologist and in others any ketamine administration was considered a conscious sedation requiring continuous monitoring and a respiratory therapist at the bedside.

Other nuanced topics include cardiac monitoring requirements and availability of intralipid for intravenous lidocaine administration, sedation flowsheet requirements for patient-administered nitrous-oxide, and incompatible pump settings for low dose ketamine infusions between the ED and inpatient units. While the support team of the Midwest ALTO project is able to provide resources and best practices to help hospitals overcome these challenges, there are inherent growing pains associated with navigating changes in hospital culture across multiple hospital and departmental committees.

Future Directions

In addition to the updating the ALTO pathways as evidence evolves, the Midwest ALTO program intends to provide future resources that will further empower Wisconsin hospitals to tackle the opioid crisis. Medication considerations that are supported by clinical evidence and experts' opinions will accompany the ALTO pathways as additional guidance to providers and address common questions that may arise when utilizing multi-modal CERTA approach to analgesia. Plans are underway for additional support with discharge medications, patient education materials, and electronic health record (EHR) resources. Hospitals can utilize their EHR to incorporate opioid sparing programs such as admission/discharge order sets, pre-approved discharge phrases to allow for quick access to detailed patient instructions for providers and pharmacists, or default quantities for opioid prescribing. While understanding there is no one size fits all solution to this national and local problem, the Midwest ALTO program invites all hospitals to adopt the ALTO pathways. They are committed to providing the medical expertise, implementation resources, and quality-improvement/data-reporting tools to achieve the stated goal of a 15% reduction of intra-ED opioid administration.

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FIGURE 1. ALTO Pathways

MIDWEST ALTERNATIVES TO OPIOIDS PROGRAM

Renal Colic

1. Apply heat to abdomen and low back region
2. Ketorolac 15 mg IV (repeat once if necessary)
3. Lidocaine 1.5 mg/kg IV infusion over 10 minutes (MAX 200 mg)
4. Acetaminophen 1000 mg PO
5. 1L 0.9% NS bolus
6. If treatment failure, then Desmopressin 40 mcg intranasal
7. Consider initiation of tamsulosin 0.4 mg daily for 4 weeks to reduce recurrence of renal colic and analgesic requirements following discharge

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Renal Colic

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FIGURE 1. ALTO Pathways (Continued)

MIDWEST ALTERNATIVES TO OPIOIDS PROGRAM

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

1. Ibuprofen 600 mg PO OR Ketorolac 30 mg IV/IM
2. Acetaminophen 1000 gm PO
3. Diclofenac 1% gel or Diclofenac 1.3% patch
4. Muscle Relaxant (choose one of the following)
   a. Cyclobenzaprine 5 mg PO (patients >65 years old OR <70 kg OR concerns for somnolence)
   b. Cyclobenzaprine 10 mg PO (patients >70 kg, <65 years old)
   c. Diazepam 5 mg PO
5. Lidocaine 5% patch to most painful area, MAX 3 patches instruct patient to remove after 12 hours
6. Trigger Point Injection with 1-2 mL of Bupivicaine 0.5% or Lidocaine 1%

If a neuropathic component of pain is present:

7. Gabapentin 300-900 mg/ day PO in 1-3 divided doses

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Acute on Chronic Radicular LBP (Opioid Tolerant)

1. Acetaminophen 1000 mg PO
2. Ibuprofen 600 mg PO OR Ketorolac 30 mg IV/IM
3. Muscle Relaxant if spasm present(choose one)
   a. Cyclobenzaprine 5 mg PO (patients >65 years old OR <70 kg OR concerns for somnolence)
   b. Cyclobenzaprine 10 mg PO (patients >70 kg <65 years old)
   c. Tizanidine 2 mg PO
   d. Diazepam 5 mg PO
4. Dexamethasone 8 mg IV
5. Lidocaine 5% patch to most painful area, MAX 3 patches instruct patient to remove after 12 hours
6. Trigger Point Injection with Bupivicaine 0.5% or Lidocaine 1% 1-2 mL

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Headache

1. 1 L 0.9% NS bolus (if dehydrated or significant emesis)
2. Ibuprofen 600 mg PO Or Ketorolac 30 mg IM/IV
   a. If repeating ketorolac, reduce to 15 mg dose if patient greater than 65 years old, less than 50 kg or CrCl less than 50 mL/min.
3. Acetaminophen 1000 mg PO
   a. Maximum of 4000 mg of acetaminophen from all sources in 24 hours
4. Caffeine 200 mg PO
5. Magnesium 1 gm IV infusion over 15 minutes
6. Prochlorperazine 10 mg IV OR Metoclopramide 10 mg IV
7. Haloperidol 5mg IV OR chlorpromazine 25 mg IV
8. Cervical or Trapezius Trigger Point Injection with Bupivicaine 0.5% or Lidocaine 1%
9. Sphenopalatine ganglion block

If <50% pain relief then

1. Valproic Acid 500 mg IV infusion over 20 minutes
2. Dexamethasone 4mg IV

If <50% pain relief then

1. Sumatriptan 6 mg subq – may repeat in 1 hour (Max of 12 mg in 24-hour period) Plus. Ondansetron 4 mg IVP over 30 seconds (may give an additional 4mg in 30 minutes if no relief)
    a. Sumatriptan 10 mg intranasal if significant nausea/vomiting
        i. If headache persists in 2 hours, may dose 20 mg intranasal with maximum of 40 mg in 24 hours
2. Dihydroergotamine 1 mg IV – may repeat in 1 hour (Max 2 mg in 24 hour period) OR 0.5 mg intranasal into each nostril (Max 3 mg in 24 hour period) Plus Ondansetron 4 mg IVP over 30 seconds (may give an additional 4mg in 30 minutes if no relief)

If <50% pain relief then observe with Neuro consult

If secondary to post-dural puncture, consider:

1. Caffeine 500 mg in 1 L NS over 60 minutes or cosyntropin 0.75 mg in 1 L NS over 60 minutes
2. Epidural blood patch
3. Gabapentin 300mg TID for four days

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Extremity Fracture or Joint Dislocation

Mild to Moderate Pain:

1. Ibuprofen 600 mg PO or Ketorolac 30 mg IV/IM
    a. If repeating ketorolac, reduce to 15 mg dose if patient greater than 65 years old, less than 50 kg or CrCl less than 50 mL/min.
2. Acetaminophen 1000 mg PO or 650 mg PR
    a. Maximum of 4000 mg of acetaminophen from all sources in 24 hours

Moderate to Severe Pain: (Steps 1-4 done while setting up for block)

1. Ibuprofen 600 mg PO or Ketorolac 30 mg IV/IM
    a. If repeating ketorolac, reduce to 15 mg dose if patient greater than 65 years old, less than 50 kg or CrCl less than 50 mL/min.
2. Acetaminophen 1000 mg PO or 650 mg PR
    a. Maximum of 4000 mg of acetaminophen from all sources in 24 hours
3. Ketamine Intranasal 0.5 mg/kg (maximum dose 50 mg)
    a. Maximum volume per nare 1 mL
    b. Double check ketamine concentration. Higher concentrations (50 mg/mL or 100 mg/mL) preferred for intranasal administration.

c. If intranasal administration not possible, consider subdissociative dose of ketamine 0.3 mg/kg IV

4. Nitrous Oxide titrate up to 70%
5. Ultrasound Guided Regional Anesthesia
   a. Joint Dislocation
      i. Lidocaine 0.5 % peri-neural infiltration (Maximum 5 mg/kg)
   b. Extremity Fracture
      i. Ropivacaine 0.5% peri-neural infiltration (Maximum 3 mg/kg)

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Chronic Abdominal Pain/ Gastroparesis

First – Line Therapy

<u>All Types</u>

1. Ketorolac 15-30 mg IV/IM
2. Acetaminophen 500-1000 mg IV/PO/PR

<u>Gastroparesis Type</u>

Haloperidol 2.5-5mg IV +/- Metoclopramide 10mg IV +/ Diphenhydramine 25mg IV

<u>Cyclic Vomiting/Abdominal Migraine Type</u>

1. Sumatriptan 6mg SQ or 20mg IN
2. Ondasetron 4mg IV

<u>Spasm/IBS Type</u>

1. Dicyclomine 20 mg PO/IM

Second-line Therapy

1. Ketamine 0.2 mg/kg IV +/- 0.1 mg/kg hr gtt

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