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# Implementation of order sets for opioid alternatives in community hospital emergency departments

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**Purpose.** The design and implementation of alternatives to opioids (ALTO) order sets for the treatment of acute pain in a community health system's emergency departments are described.

**Summary.** Healthcare institutions nationwide have incorporated policies and procedures to assist prescribers in the safe and effective management of pain. These adopted approaches may be targeted at mitigating opioid prescribing as well as promoting the optimization of nonopioid analgesics. Institutions that enact innovations and track outcomes may be eligible for reimbursement through the Centers for Medicare and Medicaid Services' Merit-based Incentive Payment System. Emergency departments may monitor implementation progress and outcomes through participation in the American College of Emergency Physician's Emergency Quality Network. Clinical pharmacists were tasked with assisting an institution's emergency departments to create and implement two order sets containing ALTO analgesics and supportive medications for atraumatic headache and general acute pain management. Key steps of order set implementation included collaborative development with emergency department providers, implementation with information services, and the development of provider-focused education by project pharmacists. The implementation of ALTO order sets has set the foundation for expansion of pain control protocols and algorithms within our institution. Furthermore, the approach detailed in this article can be adapted and implemented by other healthcare systems to help reduce opioid prescribing.

**Conclusion.** The implementation of ALTO order sets within an electronic health record can encourage decreased prescribing of opioids for the treatment of acute pain, promote and optimize dosing of nonopioid analgesics, and may augment reimbursement for services in the emergency department.

**Keywords:** analgesics; emergency medicine; medication-use technology; non-narcotic

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Between 1999 and 2007, US opioid overdose-related deaths per year rose from 8,048 to 18,515, with an exponential increase to 47,600 in 2017.<sup>1</sup> In October 2017, the United States declared the opioid crisis a national public health emergency.<sup>2</sup> Since 2007, overdose deaths related to use of prescription opioids have gradually increased, whereas deaths associated with street drugs like heroin have escalated rapidly.<sup>1</sup> In a survey of nonprescription opioid abusers, many patients reported that their first abused opioid was a prescription drug.<sup>3</sup>

In light of the opioid crisis, it is especially important for healthcare providers to be judicious in the administration and prescribing of these medications. Pain is commonly encountered in the emergency department (ED) setting, and rapid clinical decision making is required in order to address appropriately. To help assist in this clinical decision making, healthcare institutions nationwide have taken steps to assist prescribers in the efficient and appropriate management of pain through nonopioid modalities by the

incorporation of alternatives to opioids (ALTO) protocols, pain management algorithms, and order sets. These resources may be used by institutions to facilitate the development of opioid-sparing interventions.

## Background

Parkview Health is a community-based health system located in northeastern Indiana. The health system is comprised of a level II trauma center, an urban hospital, and 6 rural community hospitals. In 2018, approximately 206,000 patient visits occurred across all EDs within the health system. The ED provider group is composed of physicians and physician assistants, who routinely rotate among hospital locations for staffing. Decentralized clinical pharmacist coverage is provided at the level II trauma center's ED during the evening shift 7 days a week.

Parkview Health participates in the American College of Emergency Physician (ACEP) Emergency Quality Network (E-QUAL) program.<sup>4</sup> Participation in the E-QUAL program facilitates benchmarking and reporting to the Centers for Medicare and Medicaid Services' Merit-based Incentive Payment System (MIPS).<sup>5</sup> The E-QUAL program offers emergency medicine-focused initiatives to meet the MIPS performance requirements for improvement activities, which mandate that participants actively try to improve the quality and reduce the cost of care. Demonstrating that efforts are made to meet improvement activities requirements helps institutions earn performance-based adjustments of Medicare Part B payments. For the 2018 calendar year, Parkview Health elected to participate in improvement activities related to the opioid management with the goal of reducing opioid-associated harm through safer prescribing and the implementation of evidence-based interventions. Participation in the opioid management improvement activities required that one of the following specific pain indications be selected for evaluation: low back pain, atraumatic headache pain, or dental

pain. Atraumatic headache pain was selected by Parkview Health as the measure to be targeted for improvement and assessment.

## Problem

ED providers were tasked with implementing opioid optimization strategies that would meet the improvement activities requirements, address the opioid crisis by promoting use of nonopioid modalities, and could be executed across all EDs within the health system. Earlier in 2018, the state's opioid prescription drug monitoring program (PDMP) was integrated into the electronic health record (EHR) to allow providers to consult the database prior to prescribing opioid therapies. Incorporating the PDMP into the EHR earned points for improvement activities in the E-QUAL program; however, additional points were required in order to fully meet the initiative. ED providers requested the development of decision support tools and treatment protocols to aid in analgesic prescribing.

As a result, ED physicians, in collaboration with the project pharmacists, decided to design ALTO order sets that could be integrated into the EHR. Two objectives were deemed necessary by initiative leaders to help guide ALTO order set creation to maximize benefits for patients and the health system: (1) the order sets needed to promote ACEP's policy statement that acutely painful conditions in the emergency department should optimally begin with a nonopioid agent,<sup>6</sup> and (2) an order set was needed to meet the criteria for promoting safe and effective nonopioid analgesia for atraumatic headache. Additionally, providers requested that order sets be user-friendly and that selection of medications for inclusion in order sets be evidence based.

## Analysis and resolution

**Prototype reveal for provider feedback.** Project pharmacists delivered a presentation during monthly ED grand rounds. Objectives of the presentation were to reveal the order set

prototype, promote the advantages of ALTO order sets vs opioid prescribing, and encourage provider discussion and feedback. The objectives for the presentations were met by delivering a presentation that briefly described the national and local impact of the opioid crisis, visually demonstrated use of the ALTO order set, and detailed how the project correlated to institutional opioid-reduction strategies. After the presentation, providers were given a written questionnaire designed to assess overall provider support for the order set and, more specifically, the analgesics that were initially proposed for inclusion in the order set project. Space was available for providers to write in additional comments and provide suggestions for other nonopioid analgesics not initially included.

Two major project changes occurred as a result of provider discussion during grand rounds. First, the discussion led to the creation of 2 separate order sets targeting pain; this was done to accommodate 2 areas of provider concern. A majority of providers were concerned that further expansion of the number of analgesics included in the initially proposed order set would create an overly lengthy order set that would hinder order selection. Additionally, some providers were concerned that a single order set might not be enough. Therefore, they proposed creation of a second order set specifically for medications used to treat atraumatic headache would allow for headache-specific analgesics to be included on a second, more concise order set, which would align with and promote E-QUAL initiative goals.

The second major change was to include the order sets as a link on the ED provider Quicklist, a rapid-ordering functionality within the Epic EHR system (Epic Systems Corporation, Verona, WI), rather than requiring a search of available order sets within the order set search bar. Within our EHR, the ED providers have a Quicklist screen that encompasses commonly used medications, laboratory results, consultations, and radiological tools.

The Quicklist facilitates expedited ordering from a single screen as opposed to searching for individual orders. Having the orders sets included as part of the Quicklist was significant as it allowed providers to have easier access to the order sets, and its appearance on the medications tab served as a reminder for provider usage.

Proposed changes to the order set prototype primarily were derived from feedback on the questionnaire distributed to 46 ED providers. The questionnaire response rate was 69.6% (32 of 46 providers). Responses to the questionnaire showed that 29 of 32 providers (90.6%) supported

implementation of the ALTO order sets. Survey results showing provider preferences regarding a list of medications originally proposed for inclusion in order sets, as well as write-in suggestions, are presented in Table 1.

#### Order set analgesic selection.

Of the 12 medications originally proposed for order set inclusion, only 2 garnered less than 50% provider support. Despite intravenous (i.v.) lidocaine having less than 50% provider support, it was selected for order set inclusion; but was deemed necessary to build a distinct analgesic i.v. lidocaine order in addition to the existing antiarrhythmic order to reduce dosing

and administration errors. Specifically, the i.v. lidocaine for analgesia order included a built-in maximum dose, slower administration rate, and required cardiac monitoring. Due to lack of support, gabapentin was removed from the order set. The lack of support for gabapentin was based on skepticism of its use as an acute analgesic and concern regarding potential adverse effects if the dose were not tapered appropriately. Additionally, our institution routinely serves patients from Ohio, which recently categorized gabapentin as a schedule V controlled substance. Rizatriptan and sumatriptan had a lower provider preference rating, but it was theorized that the approval rating may have reflected the original proposal for one order set and that providers might not have considered that these medications would be limited to the atraumatic headache order set.

With consideration of the 9 provider write-in recommendations, 6 additional agents were added to the order sets. Some analgesics with alternate routes of administration were requested by multiple providers for addition to the order sets, such as intramuscular and oral orphenadrine and intramuscular dicyclomine. Other agents did not have multiple write-in requests for addition to the order sets but were ultimately included, such as i.v. magnesium and i.v. dihydroergotamine. To ensure the atraumatic headache order set had a sufficient breadth of agents available for selection, these medications were reviewed and added despite less than 50% provider support. Intravenous acetaminophen was requested by multiple providers, but due to institutional cost-based formulary restrictions, the medication was not added to the order sets. Due to a concurrent evaluation of ketamine order sets for analgesia in the ED, ketamine was not added to the ALTO order sets to prevent confounding of project results.

After analyzing provider responses regarding analgesic selection, project pharmacists began the process of evaluating route, dose, and frequency for the creation of the 2 order sets. While

**Table 1.** Results of Survey of Provider Preferences for Medications to be Included in ALTO Order Set

Medication (Route)	No. (%) Supporting Inclusion (n = 32)
Initially proposed for inclusion	
Acetaminophen (oral)	29 (91)
Ibuprofen (oral)	29 (91)
Ketorolac (i.v.)	29 (91)
Lidocaine (transdermal)	26 (81)
Metoclopramide (i.v.)	26 (81)
Dicyclomine (oral)	25 (78)
Orphenadrine (i.v.)	24 (75)
Cyclobenzaprine (oral)	23 (72)
Rizatriptan (oral)	17 (53)
Sumatriptan (subcutaneous)	17 (53)
Lidocaine (i.v.)	14 (44)
Gabapentin (oral)	6 (19)
Proposed by write-in request	
Orphenadrine (i.m.)	13 (41)
Dicyclomine (i.m.)	11 (34)
Acetaminophen (i.v.)	10 (31)
Ketorolac (i.m.)	6 (19)
Haloperidol (i.v.)	5 (16)
Prochlorperazine (i.m.)	5 (16)
Orphenadrine (oral)	2 (6)
Magnesium (i.v.)	1 (3)
Dihydroergotamine (i.v.)	1 (3)

Abbreviations: ALTO, alternatives to opioids; i.m., intramuscular; i.v., intravenous.

many agents selected for the order sets can be administered at different doses and frequencies, the project pharmacists reviewed literature and other institutions' nonopioid analgesic programs to optimize the default dose of each medication specified in the order sets. If providers wanted to change the dose or frequency, they had the option to open the full order and make adjustments via other preselected dose and frequency buttons. For example, the 15-mg dose of ketorolac was selected as the default dose, as recent literature from Motov et al<sup>7</sup> indicated that doses greater than 10 mg were not more effective in pain reduction. As 15-mg ketorolac dose increments are commonly used within our institution, 15 mg was selected as the default option. However, providers have the option to open the full order, where prespecified buttons for 10-, 15-, and 30-mg doses are available. Additionally, some medications on the order sets can be given both intravenously and intramuscularly. Both safety of administration and provider preference of administration route were assessed when selecting a default route. Providers could alter the default parenteral route of administration after selecting the medication on the order sets. Since orphenadrine is supplied in both oral and injectable formulations, a separate entry was created for the oral formulation to prevent errors in dosing, as the i.v.-to-oral conversion ratio is not 1:1.

Although orphenadrine is not referenced frequently in various pain guidelines, provider preference for its inclusion in an order set was strong within our institution. Orphenadrine, like other muscle relaxants, can be used to treat musculoskeletal pain as monotherapy or used in combination with initial pain therapies such as acetaminophen and ibuprofen. Within the order sets, providers can select multiple agents at once to create a multimodal approach to the treatment of acute pain if it is deemed that monotherapy is not clinically appropriate. Additionally, the order sets included several medications as adjuvant therapy for pain that could be combined

with first-line options as well as medications with off-label pain indications. Low-dose haloperidol was added to the order set for consideration in the adjuvant treatment of abdominal pain and gastroparesis refractory to other pain control interventions.<sup>8</sup> Intravenous lidocaine was added because recent literature supports its use for the management of pain associated with renal colic.<sup>9</sup> Several other novel pain control approaches, including ultrasound-guided nerve blocks and inhaled nitrous oxide, were discussed during the inaugural meeting; however, these interventions were not included in the final order sets due to cost considerations and complex administration requirements.

Lastly, per provider request, additional medications were selected for their supportive care benefits when used in conjunction with medications on the order set (eg, the treatment of nausea for patients with migraine). Diphenhydramine monotherapy is not commonly used for the treatment of migraine headaches but can be administered with metoclopramide as adjuvant therapy. Additionally, diphenhydramine may reduce the occurrence of undesirable adverse effects associated with metoclopramide (eg, akathisia). Initially, potential inclusion of ondansetron in the order sets was not discussed, as only medications for which there was published data to support use as adjuvant therapies were discussed. Several weeks later, to aid in ordering and reduce provider ordering fatigue, ondansetron was added to the atraumatic headache order set, as it was felt the drug would be ordered at the same time as analgesia for the acute management of migraines. The completed order sets are detailed in [Tables 2 and 3](#).

#### Order set implementation.

Within our institution, the information services (IS) department has a division dedicated to in-house builds and support for the Epic EHR. The pharmacy and ED have dedicated members within the EHR service center who were able to incorporate the order sets into the ED provider Quicklist.

Prior to order set creation, some medications that were incorporated into the order sets were available on the ED Quicklist. To encourage order set usage and congregate similar medications, several medications were removed from the ED Quicklist and transitioned to the order sets. The medications that were removed were nonopioid analgesics not used for alternative therapies (eg, dicyclomine). Medications that have alternative therapies, such as fever reduction, were still included in the order sets and included on the Quicklist for provider accessibility (eg, acetaminophen).

Project pharmacists collaborated with the IS team to set the default dose, route, and frequency for each medication. Pharmacists made additional recommendations regarding prespecified buttons available for each medication when the full order is opened. When deemed necessary, additional order and administration comments were drafted by the pharmacists and incorporated into the order. For example, the i.v. lidocaine included a note that cardiac monitoring was required during the administration period. Additionally, each medication's priority status, as well as the need for pharmacist verification, was evaluated by the pharmacists. Medications deemed appropriate for autoverification did not need a change in dispensing status (ie, emergent vs routine) because they would be readily available for administration after the order is placed. For medications deemed to require pharmacist verification, the priority status was changed to "stat" so that the medications would appear at the top of the pharmacist verification queue to reduce time to medication availability.

**Provider education.** Education was developed by project pharmacists and targeted to ED providers. The questionnaire distributed to providers during the grand rounds presentation included an assessment of preference of education format and included the options of an emailed handout, a slideshow presentation, or a live in-service. An emailed handout

**Table 2.** Medications in ALTO Order Set for Generalized Pain, With Default Dose, Route, and Frequency

Medication	Formulation	Dose	Route	Frequency
Acetaminophen	Tablet	1,000 mg	Oral	Every 6 hours
Ibuprofen	Tablet	400 mg	Oral	Every 6 hours
Ketorolac	Injection	15 mg	i.v.	Every 6 hours
Dicyclomine	Capsule	20 mg	Oral	Every 6 hours
Dicyclomine	Injection	20 mg	i.m.	Every 6 hours
Orphenadrine	Tablet	100 mg	Oral	Every 12 hours
Orphenadrine	Injection	60 mg	i.v.	Once
Cyclobenzaprine	Tablet	10 mg	Oral	Every 8 hours
Lidocaine	Infusion	1.5 mg/kg	i.v.	Once
Lidocaine	Patch	4% patch	Transdermal	Every 24 hours
Haloperidol	Injection	2 mg	i.v.	Once

Abbreviations: ALTO, alternatives to opioids; i.m., intramuscular; i.v., intravenous.

**Table 3.** Medications in ALTO Order Set for Atraumatic Headache, With Default Dose, Route, and Frequency

Medication	Formulation	Dose	Route	Frequency
Acetaminophen	Tablet	1,000 mg	Oral	Every 6 hours
Ibuprofen	Tablet	400 mg	Oral	Every 6 hours
Ketorolac	Injection	15 mg	i.v.	Once
Metoclopramide	Injection	10 mg	i.v.	Once
Diphenhydramine	Injection	25 mg	i.v.	Once
Prochlorperazine	Injection	10 mg	i.m.	Once
Dexamethasone	Injection	8 mg	i.v.	Once
Magnesium	Infusion	1 g	i.v.	Once
Rizatriptan	Tablet	10 mg	Oral	Once, may repeat <sup>a</sup>
Sumatriptan	Injection	6 mg	Subcutaneous	Once
Dihydroergotamine	Injection	1 mg	i.v.	Once, may repeat <sup>b</sup>
Ondansetron	ODT	4 mg	Oral	Once
Ondansetron	Injection	4 mg	i.v.	Once

Abbreviations: ALTO, alternatives to opioids; i.m., intramuscular; i.v., intravenous; ODT, orally disintegrating tablet.

<sup>a</sup>Repeat dose may be given once after 2 hours if significant relief not attained (maximum dose of 20 mg in 24 hours).

<sup>b</sup>Repeat dose may be given once after one hour if significant relief not attained (maximum dose of 2 mg in 24 hours).

was the preferred route of education. The objective of the education was to provide an overview of order set function, information about medications on the order sets, and possible benefits of order set utilization. Overview of the order sets included their location within the Quicklist and functionality of ordering within the order set.

Medication-specific information included a summary of the medications on each order set, default settings and available alternative prespecified options, discussion of possible adverse effects and monitoring needs, and clinical pearls for provider consideration. The review of the benefits of order set utilization primarily focused on reduction

of opioid prescribing and the functionality of selecting multiple medications in the order set to create a multimodal approach for pain management.

Provider education was conducted 2 weeks prior to the implementation of the order sets. A pharmacist presence in the ED during the implementation period (both clinical pharmacists and



pharmacy residents) helped to promote order set use in addition to serving as an avenue for any provider questions involving order set usage. Pharmacists' activities to promote order set use included reminders of order set availability, recommendations regarding medications included on the order sets, and requests for provider feedback.

## Discussion

From the inaugural meeting to completed EHR implementation, the project took place over a 6-month period. Order set usage is trackable within the data analytic center within the EHR. This allows project pharmacists to have the opportunity to complete drug use evaluations for order set analgesics and opioids prescribed in the ED. Areas for possible evaluation include comparison of morphine milligram equivalents administered to patients who receive medications from an ALTO order set and those who did not, comparisons of pain and satisfaction scores, and rates of discharge prescriptions for opioid agents. Participation in the E-QUAL program to improve MIPS reimbursement does not require submission of data to demonstrate that system improvement processes correlate with a reduction of opioid prescribing and adverse effects. Implementation of the order sets meets specific parts of the criteria but not all necessary criteria. Thus, together with fulfillment of other criteria by the health system and medical director, the order set project resulted in an increase in MIPS reimbursement for the next calendar year.

At our institution, as providers become more accustomed to ordering from the ALTO order sets and gain confidence treating pain without the need for opioids, the implementation of further transitional steps can be facilitated. The philosophy of the project was to implement incremental projects one at a time rather than creating large-scale changes in order to maintain provider buy-in and not disrupt other aspects of the current patient care model. One opportunity for further enhancement of this project

development could be the removal of opioid medications from the Quicklist and requiring providers to access them via a medication search. The objective of this would be to limit the ease of ordering opioids and encourage further reduction in overall opioid prescribing. During our implementation, opioids were not removed from the Quicklist due to provider pushback, including concerns about increased time to therapy for patients for whom prescribing an opioid would be appropriate and about provider dissatisfaction due to loss of convenience.

When evaluating which type of intervention to make within our institution, we identified institutions that had implemented treatment algorithms or incorporated additional stepwise guidance within order sets to standardize care for specific pain indications. Such interventions were not made within our institution; instead, the implemented order sets allowed providers to select therapy deemed clinically appropriate outside of an algorithm. The education that was provided as part of the order set implementation did not direct providers to select first-, second-, or third-line treatment options but rather provided details of what type of pain or combination of therapy may be appropriate for different types of pain within the clinical pearls section. Depending on data compiled during the initial review of order set implementation, if order set education and availability alone do not result in a trend towards opioid reduction and increased opioid alternative usage, then further prescribing recommendations and algorithm guidance can be built within the order sets.

As previously mentioned, ketamine was not included in the initial ALTO order sets due to concurrent project evaluation. While ketamine usage was not evaluated as part of the project described here, the concurrent project supported a similar goal of opioid reduction through its focus on ketamine as an analgesic. Following completion of the concurrent project evaluation, there may be a future opportunity to include ketamine in the ALTO order sets for convenience

and to provide more comprehensive analgesic options. Additionally, as provider preferences change and new information on nonopioid analgesic options emerges, the order sets can be expanded to include therapies not already included. Previously discussed options may also be reviewed, with reconsideration for order set inclusion at a future time. Intravenous acetaminophen was not included in the order sets due to health-system restrictions on use of the medication due to its higher cost relative to alternative formulations. Due to the high level of support for inclusion of i.v. acetaminophen in the order set initiative expressed during grand rounds, future evaluations could lead to expansion of the health system restrictions to include a 1-time dose in the ED; however, this would likely require additional criteria prior to use, as it would not be a preferred first-line formulary option for all pain types.

## Conclusion

The implementation of ALTO order sets within our institution's EHR helped to secure increased MIPS reimbursement relating to participation in ACEP's E-QUAL initiative. Additional objectives of order set implementation are to decrease prescribing of opioids for acute pain treatment, promote and optimize dosing of nonopioid analgesics, and further increase pharmacists' ED involvement.

## Disclosures

The authors have declared no potential conflicts of interest.

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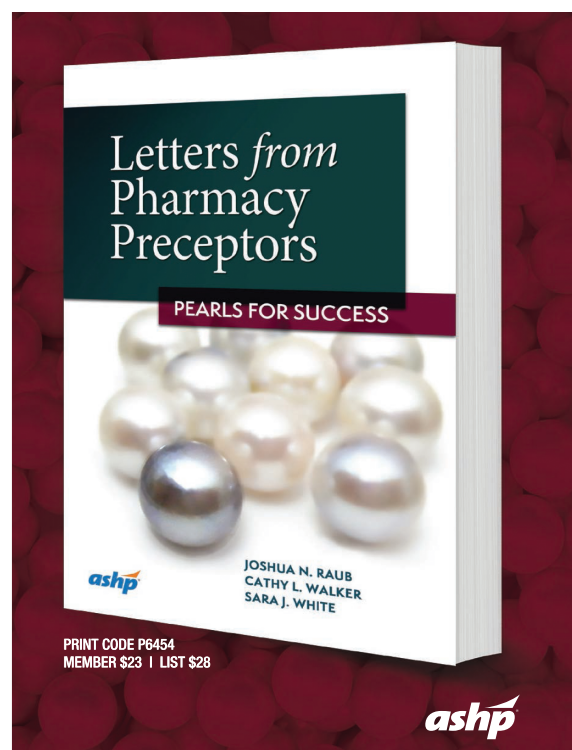
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