EDUCATION & TRAINING SECTION

Evaluation of the Impact of an Online Opioid Education Program for Acute Pain Management

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Abstract

Objective. The University of Washington instituted a policy requiring all credentialed clinicians who prescribe opioids to complete a one-time education activity about safe and responsible opioid prescribing. A scenario-based, interactive online learning module was developed for opioid management of acute pain in hospitalized adults. This study examined the impact of the education module on learners' knowledge, perceived competence, and use of guideline-adherent practices. **Methods.** Clinicians who completed the education module participated in a voluntary de-identified online survey approximately six months after the learning activity. Survey questions were related to 1) the perception of improved knowledge; 2) impact on learner's use of three guideline-adherent practices; and 3) perceived competence in managing opioids for acute pain. Descriptive statistics were generated, and multiple linear regression models were used for analysis. **Results.** Clinicians (N = 167) reported improvement in knowledge and perceived competence. Controlling for other aspects of knowledge evaluated, learning to construct a safe opioid taper plan for acute pain, distinguishing between short- and long-acting opioids, and safely initiating opioids for acute pain were significantly associated with increased self-reported likelihood of incorporating the Washington state Prescription Monitoring Program ($P = 0.003$), using multimodal analgesia ($P = 0.022$), and reducing the duration of opioids prescribed ($P = 0.016$). Only improvement in knowledge of how to construct a safe opioid taper plan was significantly associated with increased perceived competence ($P = 0.002$). **Conclusions.** Our findings suggest that this online education module about safe opioid prescribing for acute pain management was effective at improving knowledge, increasing the likelihood of using guideline-adherent clinical practices, and increasing perceived competence.

Key Words: Pain Management; Opioid Prescribing; Online Education; Knowledge; Competence

Introduction

Opioid-related overdose death rates exceeded 100 people per day in the United States in 2016 [1,2]. To address this significant public health issue, numerous state and federal-level guidelines have been developed. Long-term opioid use, unused quantities of opioids in the community that may be diverted, and opioid use disorders can

begin with opioid treatment provided for acute pain [3]. For example, increased duration of the initial opioid prescription is associated with increased incidence of chronic opioid use and risk of opioid misuse and overdose [4].

As part of a health system response to wide variability in opioid prescribing practices, introduction of new

guidelines [5,6], and requirements of newly introduced state rules [7], the University of Washington (UW)—supported by the National Institutes of Health Pain Consortium—designated Center of Excellence in Pain Education—adopted a policy that requires all credentialed health care professional clinicians who prescribe opioids for any patient, regardless of dose, duration of therapy, or pain indication, to complete an educational activity about safe and responsible opioid prescribing. Although education programs to fulfill this requirement exist for chronic pain and outpatient opioid prescribing (e.g., Food and Drug Administration Risk Evaluation and Mitigation Strategy [REMS]), few educational resources exist for opioid management of acute pain. As such, a scenario-based, interactive online learning experience was developed to address learning needs for acute pain and hospital-based opioid prescribing.

The objective of this study was to examine the impact of this education module, titled “Opioid Management for Acute Pain in Hospitalized Adults” on clinicians’ knowledge, likely use of guideline-adherent opioid prescribing practices (including incorporating a Prescription Monitoring Program [PMP], using multimodal analgesia, and reducing the amount/duration of opioids prescribed upon discharge), and perceived competence in opioid management of acute pain.

Methods

Participants and Study Procedures

Clinicians who completed the education module ($N = 748$) were sent an e-mail invitation to participate in a voluntary de-identified online survey approximately six months after completing the learning activity. Email reminders were sent twice over a six-week period. This quality improvement project using de-identified participant data was exempt from human subjects review, as determined by the University of Washington Institutional Review Board.

Module Design and Content

Agile project management and human-centered design [8] were utilized to focus development of the content for the module on end-users and provide consistent iteration of module drafts. The final module includes four acute pain branching scenarios with interactive learning experiences that span acute opioid management from assessment, before initiation of opioids, to discontinuation of treatment. Rather than frontload information, learners begin by making decisions about patients and learn about opioid management from those decisions. Examples of interactive learning experiences include multiple choice questions, “drag and drop” matching exercises, exploring the patient’s medical history, and selecting verbal responses to a patient during mock bedside discussions. Learners are not graded but encounter questions to help

explore scenarios that do not necessarily have a right answer and receive immediate feedback on choices to reinforce learning. Avatar figures are used to illustrate patients in case-based acute opioid management situations, including:

1. A 52-year-old male admitted from the emergency department to learn about assessment of appropriateness for opioid treatment, identify risk factors for opioid adverse events, comply with opioid regulations, and consider referral to specialists.
2. A 72-year-old female on chronic opioid therapy admitted with acute pain to learn about initiating and modifying opioid treatment.
3. Three patient vignettes to learn about ongoing opioid treatment, functional goals, and reassessment.
4. A 45-year-old male preparing to discharge from the hospital with anticipated need for two to three weeks of continued opioid treatment to learn about discharge prescribing and taper plans.

On average, learners were able to complete the entire learning experience in 20 minutes. The module is currently available online at https://www.painconsortium.nih.gov/Funding_Research/CoEPEs.

Measures

The survey included demographic questions related to pain specialty, clinical role, physician specialty, and Drug Enforcement Administration (DEA) licensure of respondents. The remaining questions were rated on a 1 = “not at all true” to 7 = “very true” (4 = “somewhat true”) scale. Respondents rated their level of agreement with statements about the impact of the educational module on:

1. Knowledge change (e.g., “The opioid education module helped me improve my knowledge of how to:” identify patient risk factors for opioid-related adverse events in acute pain; recognize opioid tolerance; construct a safe opioid taper plan at the time of hospital discharge), seven questions.
2. Likelihood of using guideline-adherent clinical practices (i.e., “As a result of completing the opioid education module, I am now more likely to:” incorporate Washington state PMP information into routine care of patients with acute pain; use multimodal analgesia in management of acute pain; reduce the duration of opioids prescribed for acute pain), three questions.
3. Perceived competence in opioid management of acute pain (using a modified Perceived Competence Scale), four questions. The Perceived Competence Scale (PCS) is a brief questionnaire designed to assess constructs from Self-Determination Theory [9]. Items on the PCS are modified with respect to the relevant domain being studied. Studies indicate that this approach is a reliable, valid, and suitable tool for assessing physicians’ motivation for self-regulation [10].

Statistical Analysis

Descriptive statistics were generated for perceived knowledge improvement, likelihood of using guideline-adherent practices, and perceived competence as a result of completing the opioid education module.

Table 1. Demographic characteristics of the respondents (N = 167)

	% (N)
Clinical Roles	
Physician	45.5 (76)
Advanced registered nurse practitioner	22.2 (37)
Physician assistant	13.2 (22)
Pharmacist	3.6 (6)
Other (e.g., dentist)	3.0 (5)
Unknown	12.6 (21)
Physician Specialty (N = 113)	
Medicine	22.1 (25)
Anesthesiology	14.2 (16)
Surgery	14.2 (16)
Obstetrics/gynecology	7.1 (8)
Orthopedics	4.4 (5)
Pediatrics	3.5 (4)
Psychiatry	3.5 (4)
Neurology	3.5 (4)
Oncology	3.5 (4)
Family medicine	2.7 (3)
Other (e.g., rehabilitation medicine, emergency medicine, radiology, rheumatology, dermatology, cardiology)	21.2 (24)
DEA Licensure and Opioid Prescribing	
No DEA license to prescribe opioids	5.6 (9)
DEA license to prescribe opioids/does not prescribe opioids	17.9 (29)
DEA license to prescribe opioids/prescribes opioids	76.5 (124)

DEA = Drug Enforcement Administration.

Among respondents with a DEA license who prescribed opioids, multiple linear regression models were used to evaluate the relationship between specific aspects of knowledge improvement (controlling for changes in all other aspects of knowledge) and 1) the use of guideline-adherent clinical practices and 2) perceived competence. Data were analyzed using SPSS v.25 (IBM, Armonk, NY, USA).

Results

One hundred sixty-seven of 748 (22% response rate) providers completed the survey. Table 1 describes the respondent sample, including clinical role, physician specialty, and DEA licensure for opioid prescription. Respondents spanned a wide range of specialties and primarily identified as physicians (45.5%) and advanced registered nurse practitioners (22.2%). Only 6.1% (N = 10) of respondents self-identified as a pain specialist. The majority of the sample (76.5%) had a DEA license to prescribe opioids and reported prescribing opioids.

As shown in Figure 1, learners reported that their knowledge (Figure 1A), likelihood of adopting guideline-adherent practices (Figure 1B), and perceived competence (Figure 1C) related to management of acute pain improved as a result of the education module. Average scores across items ranged from 4.7 to 5.5, corresponding to >“somewhat true.” Further, a substantial proportion of respondents selected the highest rating possible (7) for their likelihood of using guideline-adherent practices as a

result of the education module (use of PMP = 27.5%, multimodal analgesia = 36.5%, reduced duration of opioids prescribed at discharge = 34.1%, respectively).

Table 2 describes results of the multiple linear regression analyses among clinicians with DEA licenses currently prescribing opioids. Controlling for other aspects of knowledge evaluated, greater perceived improvement in knowledge of how to construct a safe opioid taper plan for acute pain was significantly associated with self-reported likelihood of querying the PMP ($P = 0.003$). Improvement in the ability to distinguish a difference between short- and long-acting/extended-release opioids was uniquely associated with use of multimodal analgesia in the management of acute pain ($P = 0.022$), and improvement in knowledge of how to safely initiate opioids for acute pain was uniquely associated with reducing the duration of opioids prescribed for acute pain ($P = 0.016$). Only improvement in knowledge of how to construct a safe opioid taper plan was significantly associated with increased perceived competence ($P = 0.002$).

Discussion

Findings from this study suggest that this scenario-based, interactive online education module related to safe opioid prescribing for the management of acute pain was reasonably effective at improving knowledge, increasing the likelihood of adopting guideline-adherent clinical practices, and increasing perceived competence. Importantly, perceived competence has been associated with clinicians' report of a more consistent practice approach toward prescribing opioids, familiarity with Centers for Disease Control opioid prescribing guidelines, and identification of patients at risk for opioid misuse [11,12].

Findings from the regression analyses provide insight into aspects of acute pain management knowledge that may be most critical to the use of guideline-adherent practices and perceived competence in managing acute pain. Of note, improved knowledge about constructing a safe opioid taper plan was positively associated with likelihood of incorporating the PMP into clinical practice and was the *only* knowledge change associated with increased perceived competence, highlighting this skill as an important target for educational activities. Without knowledge of appropriate tapering, acute opioid therapy can become the start of new persistent opioid use. The probability of chronic opioid use based on the first episode of opioid treatment has been shown to increase sharply in the first days of therapy, particularly after five days, emphasizing the importance of acute opioid taper plans [13]. Among opioid-naïve postoperative patients, the total duration of opioid use was the strongest predictor of misuse, with an adjusted 44% increase in misuse for every refill fulfilled, or a 20% increase for every week of prescription [14].

Knowledge improvement in distinguishing between long- and short-acting opioids was uniquely associated

Figure 1. Average scores (standard deviation) for aspects of knowledge and perceived competence among learners.

with the use of multimodal analgesia for acute pain management, potentially because these concepts were portrayed in the same patient vignette to demonstrate that multimodal analgesia can be an effective strategy for

managing an elderly opioid-tolerant patient requesting extended-release oxycodone. This association suggests consolidation of material and the effectiveness of a patient narrative in educating clinicians.

Table 2. Relationship between improvements in knowledge and use of guideline-adherent practices and perceived competence among respondents with DEA license to prescribe who prescribe opioids (N = 124)

Improvement in Knowledge	Use of Best Practices			Competence
	Incorporate WA PMP Information into Routine Care of Patients with Acute Pain Standardized β , <i>P</i> Value	Utilize Multimodal Analgesia in the Management of Acute Pain Standardized β , <i>P</i> Value	Reduce the Duration of Opioid I, Prescribe for Acute Pain Standardized β , <i>P</i> Value	Perceived Competence Score Standardized β , <i>P</i> Value
Identify patient risk factors for opioid-related adverse events in acute pain	0.367, <i>P</i> = 0.062	0.227, <i>P</i> = 0.184	0.217, <i>P</i> = 0.225	0.145, <i>P</i> = 0.313
Articulate goals of opioid treatment for acute pain	0.236, <i>P</i> = 0.242	0.314, <i>P</i> = 0.076	0.043, <i>P</i> = 0.838	0.094, <i>P</i> = 0.528
Safely initiate opioids for acute pain	0.008, <i>P</i> = 0.979	−0.017, <i>P</i> = 0.946	0.658, <i>P</i> = 0.016	0.148, <i>P</i> = 0.493
Safely modify an opioid regimen for acute pain	−0.166, <i>P</i> = 0.563	−0.089, <i>P</i> = 0.722	−0.427, <i>P</i> = 0.106	0.120, <i>P</i> = 0.574
Recognize opioid tolerance	−0.211, <i>P</i> = 0.255	−0.149, <i>P</i> = 0.348	0.082, <i>P</i> = 0.618	−0.050, <i>P</i> = 0.708
Distinguish differences between short-acting and extended-release/long-acting opioids	0.051, <i>P</i> = 0.708	0.280, <i>P</i> = 0.022	0.072, <i>P</i> = 0.578	0.083, <i>P</i> = 0.416
Construct a safe opioid taper plan for acute pain at time of hospital discharge	0.458, <i>P</i> = 0.003	0.266, <i>P</i> = 0.051	0.175, <i>P</i> = 0.207	0.357, <i>P</i> = 0.002

DEA = Drug Enforcement Administration; WA PMP = Washington state Prescription Monitoring Program.

Improved knowledge of how to safely initiate opioids for acute pain was uniquely associated with likelihood of reducing duration of opioids prescribed at discharge. This finding is encouraging as it suggests an understanding of the concepts presented in the module and intended application of relevant learned material. That is, that opioids should be reserved for moderate to severe acute pain resulting from surgical procedures or other acute conditions and used at the lowest necessary dose and for the shortest duration, usually less than one week.

Limitations to this study are noteworthy. Voluntary participation with a response rate of 22% indicates that findings may not generalize to all learners. However, web-based surveys yield response rates similar to those observed here [15]. Another limitation is the long duration of time between the learning experience and the survey (about six months), allowing for recall bias and outside influences on knowledge and practice. In addition, baseline data (i.e., knowledge, practice, competence) were not collected before completing the educational module. However, survey questions specifically referred to knowledge, practice, and competence changes as a result of this educational module. Moreover, this time frame may allow learners to better assess the impact of the education on practice behaviors. Finally, the use of self-report to assess knowledge, competence, and adoption of guideline-adherent practices may not prove as valid and reliable as more objective outcome measures, such as validated instruments and/or clinical observation [16], such as appropriate

documentation of opioid taper plans and use of multimodal analgesia.

Conclusions

Development and utilization of brief, online, self-directed educational programs such as our module may benefit practicing clinicians. Although generally considered a weak intervention for practice change, education is a central part of the necessary cultural transformation of the approach to pain care [17]. Unfortunately, health science school curricula still do not devote substantial time to pain and opioid education [18], and simulation-based health science education is needed to enable clinicians to address the opioid epidemic [19]. Further studies using actual prescribing performance metrics, such as those now becoming available from Washington state and other PMP databases [15], are still needed to demonstrate that education does indeed improve clinical practice. Regardless, increased access to a wide range of opioid prescribing educational material is needed for prescribing clinicians and trainees who care for patients with acute, perioperative, and chronic pain.

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