Improving safe opioid prescribing among internal medicine residents using an observed structured clinical exam (OSCE) education tool

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Boston University
IMPROVING SAFE OPIOID PRESCRIBING AMONG INTERNAL MEDICINE RESIDENTS USING AN OBSERVED STRUCTURED CLINICAL EXAM (OSCE) EDUCATION TOOL

by

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B.A., Assumption College, 2009

Submitted in partial fulfillment of the requirements for the degree of Master of Science 2015
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BRITTANY LEE CARNEY

ABSTRACT

Background: Many patients face chronic pain, which can be debilitating and dramatically impair patient’s quality of life. These patients often seek treatment from their primary care physicians, who may utilize a wide range of options to manage their chronic pain, including opioids. Opioids provide analgesia while potentially leading to other adverse effects, including misuse, addiction and overdose. Therefore there is a need for clinicians to develop safe opioid prescribing practices. This has been recognized by the development of national guidelines and recommendations to improve the training and education of physicians in this domain. However, a gap in medical education and training for safe opioid prescribing skill exists, creating physicians who may feel ill prepared to treat this patient population.

To remedy this problem, an educational intervention was designed that utilized a didactic session with or without an immediate or delayed observed structured clinical exam (OSCE) to improve safe opioid prescribing skills among internal medicine residents at an academic medical center. The specific aims of this thesis are to understand both quantitative and qualitative impacts of this educational intervention, specifically to describe participant characteristics,
quantitatively evaluate within and between group changes at 8-months in safe opioid prescribing knowledge, confidence and self-reported practices and qualitatively describe participants’ experience of the OSCE as a learning tool.

Methods: Using a quasi-experimental design, 39 internal medicine residents were assigned to either a control or intervention groups. The intervention groups received a didactic session alone, a didactic session and immediate OSCE or a didactic session and a delayed OSCE. Participants were surveyed at baseline, 4- and 8-month follow-up to assess their safe opioid prescribing knowledge, confidence, and self-reported practices.

Results: Participants in the didactic followed by immediate OSCE group significantly improved both within group confidence and practices at 8-month follow-up. Additionally, participants in this group improved their confidence at 8-month follow-up significantly compared to the control group. Participants from the other educational intervention groups (didactic followed by delayed OSCE and didactic only) also saw improvements in confidence and practice, but the effect was not as robust. OSCE participants found the OSCE to be a useful learning tool and both participants in the immediate and delayed OSCE groups highlighted the need to receive the didactic session immediately prior to the OSCE session.

Discussion: Despite many barriers in safe opioid prescribing facing internal medicine residents including limited faculty mentorship and difficult inherited patients, this educational intervention still improved their safe opioid
prescribing knowledge, confidence and practice. The use of OSCEs as an education tool is an innovative approach to develop clinical skills and can be adapted in a variety of ways to accommodate institutional and learners’ needs.
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LIST OF ABBREVIATIONS

CNS.................................................................Central Nervous System
OSCE............................................................Observed Structured Clinical Exam
PCP.................................................................Primary Care Physician
SP.................................................................Standardized Patient
UDT..............................................................Urine Drug Test
INTRODUCTION

Chronic Pain in Primary Care

Clinicians work with their patients to help manage and treat a variety of symptoms and diseases that often can be challenging. One of these complex symptoms is chronic pain, which is thought to impact the lives of over 100 million Americans.\(^1\) Recent results from the National Ambulatory Medical Care Survey, suggest that among patients presenting to their primary care physicians, 20.7% of office visits between 2000–2010 were because of pain.\(^2\)

General clinical recommendations and treatment options for patients with chronic pain have been developed. First line of treatment of chronic pain is non-opioid therapy, such as acetaminophen or non-steroidal anti-inflammatory drugs (NSAIDS).\(^3\) However, sometimes these treatment options are ineffective for managing the patient’s pain and opioids may be the appropriate next line of therapy.\(^3\)

Opioids: Mechanism of Action

Opioids bind to a variety of G-protein coupled receptors, located both in the central nervous system\(^4\) and peripheral nervous system, which can create a variety of responses. The µ-receptor, one of four opioid receptor sub-types, is primarily responsible for generating analgesia.\(^4\) When an exogenous opioid (e.g., hydrocodone) binds to a µ-receptor, potassium ion channels are blocked leading to hyperpolarization of the cell, which prevents the propagation of action potentials, and leads to analgesia.\(^4\) Opioids stop action potentials causing a
decreased activity of pain-stimulated neurons, and create pain relief for the patient. However, opioids can lead to a variety of side effects including hyperalgesia (i.e., paradoxical increase in pain), sedation, constipation, cardiac and hormonal changes (i.e., hypogonadism) as well as opioid use disorder and overdose. The latter adverse effects highlight the high-risk potential of opioid misuse, which may lead to changes in CNS reward pathways over time. For example, opioids can have a euphoric effect produced by increased levels of dopamine in particular regions of the brain, which overtime can become reinforcing and led to tolerance.

**Guidelines for Safe Opioid Prescribing**

The potential for opioid-related risks has been established and in turn clinicians need to acquire appropriate knowledge and practices to provide safe opioid prescribing practices to their patients. Recently, guidelines have been developed to help providers safely manage patients with chronic pain on opioids, which focus on developing strategies to help minimize and mitigate risks that may occur when prescribing opioids. Nuckols and colleagues reviewed 13 safe opioid prescribing guidelines to determine their efficacy in decreasing opioid overdose and misuse. They found consensus among the guidelines, which included safe opioid dosing practices (e.g., monitoring higher dose opioids or particular formulations) as well as the need to use opioid risk assessment tools (i.e., urine drug testing) to monitor and assess patient benefit and risk.

Clinicians should complete a thorough history and physical before
initiating opioid therapy, including assessing for opioid misuse risks. Some studies suggest that particular characteristics may increase a patient’s likelihood of opioid misuse. These factors include younger age, history of substance use, mental illness, or a family history of substance use. Opioid use should be used with caution in some instances including particular drug-drug interactions (e.g., sedatives) or disease-interactions (e.g., sleep apnea). The choice of opioid and dosing should be individualized, and should take previous opioid use and age into account. There also are tools available to assist the clinician with assessment of the patient, which should be appropriately documented.

Once opioid therapy is initiated, clinicians are encouraged to discuss the parameters of opioid treatment plans, which help providers assess benefit and risk to the patient. Opioid treatment plans include a variety of components including patient-clinician agreements, informed consent, as well as outlining the overall treatment plan, which may include monitoring using pill counts and urine drug testing.

**Opioid Efficacy for Chronic Pain**

The use of opioids for treatment of chronic pain remains a debated topic. In a recent systematic review of over 35 studies, Chou and colleagues found no benefit beyond 3-months for chronic non-cancer pain patients receiving opioids. Additionally, this review found a correlation between increased opioid dose and increased harms, including overdose and opioid
abuse. However, in a Cochrane review by Noble and colleagues including over 4,800 patients on opioids for chronic non-cancer pain, opioids were found to lead to side effects in less than 1% of patients. Together these findings highlight some of the complexities of opioid prescribing including the importance of patient selection in and developing strategies to mitigate risks, such as safer opioid prescribing practices among clinicians.

**Provider’s Attitudes and Safe Opioid Prescribing Practices**

To add to the complexity of this issue, providers do not feel well prepared to treat patients with chronic pain. Medical students, residents, and attending physicians report negative impressions of this patient population. One study assessing attitudes of medical students’ cited they felt chronic pain patients were drug seeking. Furthermore, residents report lower levels of confidence working with chronic pain patients, as well as lower levels in required skills such as interpreting results of urine drug testing. These gaps create frustrated residents whose lack of confidence may translate to decreased safe opioid prescribing skills.

The need for primary care providers (PCPs) to have adequate opioid risk management skills is highlighted in the work done by Chiauzzi and colleagues. Based on expert faculty opinion, they outline specific skills and content areas that physicians need to develop, with some of the most important including managing patients with chronic pain among other comorbidities, knowing what unusual drug taking behavior is and how to address it (i.e., abnormal urine drug tests) and
developing opioid management plans. \textsuperscript{24} This further emphasizes that guidelines provide the framework to address how to care for patients suffering from chronic pain that may benefit from opioids, however there is a gap in putting these guidelines into practice, particularly in working to manage the potential benefits and harms for patients.

\textit{Strategies to Improve Safe Opioid Prescribing}

The risk for opioid misuse is present and further complicated by the gap in providers appropriately implementing safe opioid prescribing practices. In 2012, the Food and Drug Administration revised their physician guidelines for education and safety of opioid drugs, known as their risk evaluation mitigation strategy (REMS), \textsuperscript{25} whose goal is to match physician education and training to the risk of opioid prescribing.

To mitigate these gaps, a variety of educational interventions have been developed to improve clinicians’ knowledge and skills. The REMS initiative led to newly developed online and in-person training programs\textsuperscript{26} that target improving safe opioid prescribing specifically. Residents are a target group of interest as they are beginning to develop their clinical skills and abilities, while serving as both the learner (intern) and then the teacher (junior and senior resident). These individuals have the ability to learn about appropriate measures early on in their medical careers and then translate that knowledge into their own practices as well as teach others about appropriate practices in primary care. Other successful interventions\textsuperscript{27–29} have utilized a variety of educational tools targeting
the resident population specifically, including didactic sessions, workshops, role-play or other innovative curriculum techniques to develop residents’ confidence in treating patients with chronic pain.

In an attempt to further bridge this gap in safe opioid prescribing skills among internal medicine residents, this study developed an educational intervention consisting of a didactic session with or without an observed structured clinical exam (OSCE) to improve residents’ knowledge, confidence and self-reported practices.
SPECIFIC AIMS

The safe opioid prescribing OSCE curriculum was developed as part of the National Institute of Drug Abuse, Center of Excellence and is available online. Preliminary results were presented at the 2010 Annual Meeting of the Society of General Internal Medicine and the Association for Medical Education and Research in Substance Abuse conferences and showed some quantitative improvements in safe opioid prescribing from the use of an educational intervention tool. This study also builds upon work done by Parish and colleagues who used an OSCE intervention to assess internal and family medicine residents’ substance use-related communication and management skills.

The aims of this thesis are to understand both quantitative and qualitative impacts of this educational intervention on internal medicine residents’ safe opioid prescribing outcomes including knowledge, confidence and self-reported practices. Furthermore it works to describe participant characteristics, quantitatively evaluate within and between group outcome changes at 8-months and qualitatively describe participants’ experience of the OSCE as a learning tool.
METHODS

This thesis was conducted after the educational intervention and data collection was completed. It included working with the program faculty (Dr. Alford) and program evaluator (Dr. Brett) to evaluate the thesis study aims. This study was considered exempt by the Boston University Institutional Review Board and original program support was provided by the National Institute on Drug Abuse N01DA-1142.

**Study Design and Subjects**

This thesis study was conducted in an academic medical setting, and utilized a quasi-experimental design. In this study, a group of internal medicine residents either received (intervention group) or did not receive (control group) a safe-opioid prescribing education intervention. The educational intervention included a one-hour didactic presentation, with or without an immediate or delayed observed structured clinical exam (OSCE).

The intervention group included 3 subgroups: didactic with immediate OSCE (n=9), didactic with delayed OSCE (n=8) and didactic only (n=12). All residents that participated in the OSCE groups (both immediate and delayed) were part of the primary care residency tract. These individuals’ schedules permitted time for participation in the OSCE and they were assigned to their groups based on scheduling convenience. The control group (n=10) received no educational intervention. The immediate OSCE intervention group received the OSCE one day after the didactic learning session (September 2009).
delayed OSCE intervention group received the didactic session and then the OSCE four months after the didactic session (January 2010). All participants were practicing in a clinical environment where opioid monitoring tools were available, but not mandatory for all patients.

**Educational Program Description**

**Didactic Session**

The didactic session was a one hour, noon-conference presentation entitled, “Prescribing Opioids for Chronic Pain: When to Start, When to Continue and When to Stop”, delivered by one of the study faculty (Dr. Alford). The objectives of the session were to encourage the participants to 1.) assess pain, function and opioid misuse risk; 2.) monitor for opioid benefits and risks; 3.) identify and manage opioid misuse; and 4.) identify exit strategies for lack of benefit and/or increased risk. All intervention participants attended this session as well as received a hardcopy of the didactic slides.

**Objective Structured Clinical Exam (OSCE)**

**OSCE: Case Development**

Three cases were developed for the OSCE that focused on assessing specific skills in safe opioid prescribing for the residents. These cases were developed by study faculty (Drs. Alford and Jackson). These cases focused on problem-solving specific clinical challenges physicians encounter related to safe opioid prescribing. As described in Table 1, case 1 focused on assessing the patient for risk and starting opioids safely, case 2 focused on aberrant (i.e.,
concerning) patient behavior, and case 3 dealt with diagnosing prescription drug abuse and stopping a patient’s opioid prescription. Each station also had task-driven specific clinical objectives (Table 1) that the resident was focused on completing for each station.

**Table 1. OSCE Stations and Objectives**

<table>
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<th>Station</th>
<th>Case Content</th>
<th>Resident Clinical Objectives</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>Assessing the patient for risk and starting opioids safely</td>
<td>• assess for baseline opioid risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• discuss risks and benefits of opioids for chronic pain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• discuss universal monitoring strategies</td>
</tr>
<tr>
<td>2</td>
<td>Aberrant patient behavior</td>
<td>• assess and diagnose the cause of aberrant medication taking behavior</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• give feedback and discussing concerns about the aberrant medication taking behavior</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• discussing appropriate strategies for addressing the aberrant medication taking behavior</td>
</tr>
<tr>
<td>3</td>
<td>Diagnosing prescription drug abuse and stopping a patient’s opioid prescription</td>
<td>• discuss abnormal urine drug test and aberrant medication taking behavior</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• discuss the lack of benefit and increased risk of continued opioid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• discuss the need for an opioid taper and substance abuse referral</td>
</tr>
</tbody>
</table>

**OSCE: Faculty**

The OSCE faculty members were experts in the fields of substance abuse and medical education and had prior experience teaching resident learners. There were five OSCE faculty members, one assigned to each station during OSCE administration. In preparation for the OSCE sessions, faculty attended a 90-minute orientation session prior to the implementation of the OSCE
intervention. This meeting allowed faculty to understand the rationale for the OSCE, review objectives for each case, highlight the roles of all involved (i.e., faculty, standardized patients and residents), discuss evaluation measures, as well as review logistics and administration of the OSCE. The primary role of faculty was to maintain the OSCE schedule, complete the station-based resident assessment, provide verbal feedback to each resident learner and standardized patient after each encounter, as well as to complete the OSCE assessment form for each resident.

OSCE: Standardized Patients

A standardized patient (SP) played the role of the patient for each station. The role of the SP was to act as a given patient during the patient encounter. Detailed descriptions of the case were provided to each SP, which included information on their background (name, age, marital status, children, occupation, and primarily pain complaint), as well as details on their history in regards to their pain, personality, past medical history, family history, psychosocial and substance use history. The SP was also provided with the clinical objectives the resident received for their specific station (Table 1).

Additionally, SPs attended the 90-minute orientation with program faculty. The orientation included general approaches to help SPs respond to anticipated questions and how to physically appear during the interview. SPs were also instructed how to give constructive and succinct feedback to the resident learner based on assessments they would complete for each resident upon completion.
of the individual stations (see OSCE Performance Assessments section). Each SP was paid $40/hour for approximately six hours, which included a 1.5-hour orientation with faculty and 4.5 hours of participating as a SP.

**OSCE: Residents**

As the participant, the role of the resident was to complete specific clinical objectives (Table 1) that were outlined in each station. These objectives focused on the case at hand, and were designed to develop the residents’ safe opioid prescribing skills. Prior to completing each OSCE station, residents were given an instruction page for each station that outlined the patient’s information, scenario, pain and functional assessment as well as directions and objectives for each case.

**OSCE Performance Assessments**

Assessment forms were completed by the faculty observers, resident and SP upon completion of each station. The assessment forms were modified with permission from Montefiore Medical Center. The faculty assessment form was divided into general communication skills, global rating and station specific clinical objectives assessment and management. The resident self-assessment included providing a global rating in overall performance for each station. The SP assessment form included a rating to assess their satisfaction with the physician (from “not satisfied: would not come back” to “very satisfied: would refer friends”) as well as opportunity to identify strengths and weaknesses for each resident learner.
These written assessment forms were used to guide post-OSCE resident feedback by the faculty observer and SP. After the SP interview and completion of the written assessments, the resident was asked to highlight what was most challenging aspect of the encounter, which was followed by verbal feedback to the resident by the SP and faculty observer.

**OSCE Administration**

Both OSCE learning experiences (immediate and delayed) were designed to be as consistent learning experiences as possible for the residents. Each resident completed all three, 20-minute stations. Each station had one resident interviewer, one SP and one faculty observer. Each station was designed to take 20 minutes and a specific schedule was provided to all participants that outlined how the allotted time was to be divided (Table 2).

**Table 2. OSCE Station General Schedule**

<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Resident read case and station objectives</td>
</tr>
<tr>
<td>10</td>
<td>Resident complete patient interview</td>
</tr>
<tr>
<td>1</td>
<td>Resident verbal self-assessment</td>
</tr>
<tr>
<td>1</td>
<td>SP provide feedback</td>
</tr>
<tr>
<td>5</td>
<td>Faculty provide feedback</td>
</tr>
<tr>
<td>1</td>
<td>Complete assessments</td>
</tr>
</tbody>
</table>

Additionally, there was an administrative staff member present to provide various timed announcements to maintain the OSCE station schedule and timing for all residents. The cost of this OSCE administration was $720, which compensated three SPs at $40/hour for six hours. Additionally, each interaction
was also videotaped for the resident to view and for examples of OSCE interactions to be provided to the funder. These videos were not reviewed for the purposes of this study.

*Baseline and Follow-up Surveys*

All residents received a one-page, consent form that outlined their roles in the study. The consent form outlined that participation in the study was voluntary. It also provided details of evaluation efforts, assurance that data would be de-identified and kept confidential, and notice that participants would receive a $50 gift card upon completion of the follow-up surveys. Additionally, all survey data was de-identified (coded with a specific ID), collected by an independent evaluator (Dr. Belle Brett) and reported to the course directors in aggregated unidentified form to maintain participant confidentiality.

All participants completed a baseline survey (on paper) before the didactic session was delivered. The primary outcome evaluation measures were from an eight month follow-up survey (identical to the baseline survey), which all participants completed. The survey utilized a variety of three and five-point Likert scales to assess participants’ knowledge, practice and confidence.

*Safe Opioid Prescribing Knowledge*

Participants' knowledge was assessed using four items (multiple choice, knowledge questions) that examined how to provide opioid efficacy, identify opioid misuse risk factors, monitoring and detect aberrant medication taking behavior.
**Safe Opioid Prescribing Confidence**

Confidence was measured using eight items that utilized 5-point Likert scales from 1-"not at all" or 5-"very" confident in various safe opioid prescribing practices. The items asked how confident the resident was in discussing opioid risks/benefits, distinguishing addiction from physical dependence, interpreting urine drug tests (UDTs), discussing abnormal UDTs, discussing abnormal UDTs with patients, discussing aberrant medication taking behaviors, knowing when opioids are helpful, stopping opioids due to lack of benefit or increased risk, and dealing with patients' possible anger with stopping opioids.

**Safe Opioid Prescribing Self-Reported Practices**

To be sure that the participants whose practices we were measuring were based on the presence of residents treating chronic pain patients with opioids, the four and eight month surveys were used to generate exclusion criteria for the practice variable analysis. All participants were asked “in the outpatient setting during the past three months, estimate the number of patients you have seen on long-term opioids (i.e., longer than three months) for chronic pain.” In order to be included in the practice item analysis, participants needed to answer yes to this question at four and/or eight months. Any participant that answered no to this item at four and eight months was excluded from the practice item analysis.

Safe opioid prescribing practices were measured using three items. Each item utilized a 5-point Likert scale that gauged the frequency of safe opioid prescribing practices from 1-"never/rarely" to 5-"always". These practices
included having patients sign a controlled substance agreement, collecting UDTs, and conducting pill counts.

Additionally, a composite summary score for both confidence and practice was created for each group. These scores were created by finding each group’s mean score at baseline and follow-up for both confidence and practice, respectively. In calculating the summary scores for confidence, all means were summed for the eight confidence items for each group, and then divided by eight. For calculating practice summary scores, all means were summed for the three practice items for each group, and then divided by three. This was completed at baseline and follow-up.

*Post-OSCE Qualitative Interviews*

All residents who participated in the OSCE completed both written evaluations and participated in a semi-structured group-based interview with the independent program evaluator (Dr. Brett) immediately following their OSCE. Residents were instructed that all comments would be confidential. The written evaluation assessed how realistic, difficult and valuable each station was. The group interviews used open-ended questions to discern differences in participants’ experiences of immediate versus delayed OSCEs. These sessions consisted of a variety of open-ended questions and were conducted in a group setting. Responses were summarized by the program evaluator.
**Statistical Analysis**

The primary categories of interest were the participants’ knowledge, confidence and current practices, which were measured at baseline and at eight month follow-up. Analyses were completed by the program evaluator (Dr. Brett) and included comparison of means across groups at baseline, as well as comparison of means from baseline to eight months within each groups and evaluation of baseline eight month differences across groups generated by summary confidence and practice scores. Additionally, chi-square and t-tests were performed on baseline characteristics, confidence and practice measures for means in which groups were compared with each other. Significance was measured using p=0.05. Semi-structured interview notes were reviewed to identify themes.
RESULTS

This study included 39 internal medicine residents from an urban, academic medical center. The participants were separated into control and intervention groups, which had similar characteristics at baseline (Table 3). However, gender and primary care likelihood were different with the delayed OSCE group being all (100%) female and the immediate OSCE and delayed OSCE groups favoring primary care careers. Participants also varied across residency training years and treating a fairly low volume of chronic pain patients, and an even lower volume of patients who were being managed with long-term opioids.
Table 3. Participant Baseline Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention</th>
<th>Control</th>
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<tbody>
<tr>
<td></td>
<td>Immediate OSCE (n=9)</td>
<td>Delayed OSCE (n=8)</td>
</tr>
<tr>
<td>Gender, Female</td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Post-Graduate Year, PGY-1</td>
<td>3 (33)</td>
<td>2 (25)</td>
</tr>
<tr>
<td>PGY-2</td>
<td>5 (56)</td>
<td>1 (13)</td>
</tr>
<tr>
<td>PGY-3</td>
<td>1 (11)</td>
<td>5 (63)</td>
</tr>
<tr>
<td>Variable</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td># pts with chronic pain</td>
<td>4.6 [4.3]</td>
<td>2.1 [2.0]</td>
</tr>
<tr>
<td># pts on long-term opioids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC Career Likelihood II</td>
<td>2.9 [0.3]</td>
<td>2.9 [0.4]</td>
</tr>
<tr>
<td>Amount of Prior OP Training in Opioid Use for Chronic Pain III</td>
<td>1.9 [0.3]</td>
<td>2.6 [0.8]</td>
</tr>
</tbody>
</table>

Legend:
I: number represents average number of patients per category seen in the OP setting in the last 3 months
II: 1- not likely; 2-not sure; 3- likely
III: 1-none; 2-some; 3- a lot

Safe Opioid Prescribing Knowledge

All four groups improved knowledge at eight month follow-up, with more total number of questions correct out of four knowledge items. The immediate OSCE group had a baseline mean knowledge score of 3.2 and a follow-up mean knowledge score of 3.7. The immediate OSCE group within group difference was not statistically significant (p=0.104). The delayed OSCE group had a baseline
mean knowledge score of 3.1 and a follow-up mean knowledge score of 3.3. The delayed OSCE within group difference was not statistically significant (p=0.732). The lowest mean baseline score was reported in the didactic group, which reported a baseline mean knowledge score of 2.4 and a follow-up mean knowledge score of 3.0. The didactic within group difference was statistically significant (p=0.027). The control group had a baseline mean knowledge score of 2.7 and a follow-up mean knowledge score of 3.1. The baseline to follow-up difference was not statistically significant (p=0.269).

**Safe Opioid Prescribing Confidence**

The specific items used to assess confidence are detailed in Table 4, and were measured from 1-“not at all confident” to 5-“very confident”. Mean eight month summary confidence scores were positive for all groups, highlighting improvement. When examining individual confidence items, both OSCE intervention groups (immediate and delayed) showed some of the greatest improvements in discussing aberrant behaviors, with immediate OSCE group confidence item increase of 1.22 and delayed OSCE confidence increase of 1.00. The control group was the only group that had a confidence item decrease or stay the same at follow-up. The control group reported no change in distinguishing addiction from physical dependence or interpreting urine drug tests. Additionally, the control group decreased (-0.20) in their confidence to discuss aberrant medication taking behaviors.
### Table 4. Change in Confidence in Safe Opioid Prescribing

<table>
<thead>
<tr>
<th></th>
<th>Immediate OSCE N=9</th>
<th>Delayed OSCE N=8</th>
<th>Didactic N=12</th>
<th>Control N=10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline Mean [SD]</td>
<td>8-mo Mean [SD]</td>
<td>Mean Change</td>
<td>Baseline Mean [SD]</td>
</tr>
<tr>
<td>Discussing opioid risks/benefits</td>
<td>3.33 [.87]</td>
<td>3.89 [.60]</td>
<td>+0.56</td>
<td>3.08 [1.00]</td>
</tr>
<tr>
<td>Distinguishing addiction from physical dependence</td>
<td>2.67 [1.00]</td>
<td>3.22 [.83]</td>
<td>+0.55</td>
<td>3.0 [1.13]</td>
</tr>
<tr>
<td>Interpreting UDTs</td>
<td>3.33 [.71]</td>
<td>4.11 [1.05]</td>
<td>+0.78</td>
<td>3.83 [1.03]</td>
</tr>
<tr>
<td>Discussing unexpected UDT with patient</td>
<td>2.89 [.93]</td>
<td>4.00 [.71]</td>
<td>+1.11</td>
<td>3.42 [.90]</td>
</tr>
<tr>
<td>Discussing aberrant medication taking behaviors</td>
<td>2.56 [.73]</td>
<td>3.78 [.67]</td>
<td>+1.22</td>
<td>3.0 [1.04]</td>
</tr>
<tr>
<td>Knowing when opioids are helpful</td>
<td>2.89 [.93]</td>
<td>3.44 [.73]</td>
<td>+0.55</td>
<td>3.0 [1.04]</td>
</tr>
<tr>
<td>Stopping opioids due to lack of benefit or increased risk</td>
<td>2.67 [.71]</td>
<td>3.11 [.78]</td>
<td>+0.44</td>
<td>2.67 [.65]</td>
</tr>
<tr>
<td>Dealing with pts' possible anger with stopping opioids</td>
<td>2.44 [.73]</td>
<td>3.11 [.78]</td>
<td>+0.67</td>
<td>2.25 [.97]</td>
</tr>
<tr>
<td><strong>Summary Score</strong></td>
<td>2.85 [.56]</td>
<td>3.58 [.55]</td>
<td>0.74</td>
<td>2.91 [.88]</td>
</tr>
</tbody>
</table>

**Legend: 1- not at all confident to 5- very confident**
In examining changes in confidence within groups (Figure 1), two of the three intervention groups (immediate OSCE and didactic) significantly increased their confidence from baseline to follow-up. The immediate OSCE and didactic groups’ confidence increased significantly at follow-up (0.74, p=.01) and (0.49, p=.006) respectively. The delayed OSCE group’s confidence increased, approaching significance, at follow-up (0.67, p=.06). The control groups’ confidence increased slightly from baseline to follow-up, but not significantly (p=.269).

**Figure 1.** Combined within group changes in confidence in 8 safe opioid prescribing skills (n=39) *p<0.05
When comparing the mean summary eight month change in confidence compared to the control group (Figure 2), all intervention groups had greater change with the immediate OSCE group showing significant changes between group means (0.52, p=0.049) followed by delayed OSCE (0.45, p=0.23) and didactic (0.27, p=1.36) groups.

*Figure 2. Combined between group summary change in confidence (Control group mean summary change 0.22)*p<0.05

Safe Opioid Prescribing Self-reported Practice

The specific items used to assess confidence are detailed in Table 5. Five participants were excluded as they did not met criteria to be included in the practice analysis (see Methods section), therefore the participants included in practice item analysis is thirty-four. All groups improved in practice at follow-up
with the greatest improvements seen among the OSCE-intervention groups. When examining individual practice items, the immediate OSCE group showed substantial improvements in all practice items, with individual mean practice scores 1 or above in all three items (see Table 5). Both OSCE intervention groups increased their practice of pill counts at eight-month follow-up, with a greater improvement among the immediate OSCE (1.13) group than the delayed OSCE (0.50) group. Whereas both the didactic and control groups demonstrated fewer pill counts at follow-up, the didactic group decreased the most in this practice (-0.28). The control decreased (-0.11) at follow-up.
Table 5. Change in Self-Reported Practice in Safe Opioid Prescribing

<table>
<thead>
<tr>
<th>Use controlled substance agreement</th>
<th>Baseline Mean [SD]</th>
<th>8-mo Mean [SD]</th>
<th>Mean Change</th>
<th>D+O Immediate OSCE N=8</th>
<th>D+D OSCE Delayed OSCE N=6</th>
<th>D Didactic N=11</th>
<th>Control N=9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect UDTs</td>
<td>2.88 [1.46]</td>
<td>3.88 [1.25]</td>
<td>+1.00</td>
<td>3.17 [1.72]</td>
<td>3.50 [1.38]</td>
<td>2.64 [1.43]</td>
<td>3.27 [1.56]</td>
</tr>
</tbody>
</table>

Mean Change

Legend: 1-never/rarely; 5-always
In examining the change in practices at follow-up within the intervention groups, the immediate OSCE group had a 1.04 change in practices, which marked a significant \((p=0.035)\) improvement. The delayed OSCE intervention group also appeared to improve at follow-up, with a total increase of 0.44, but this change was not statistically significant \((p=0.431)\). Additionally, both the didactic and control groups increased their practices only slightly with a total increase of 0.22 and 0.19 points for the respective groups. These practice results were not statistically significant for either the didactic or control group, with their respective \(p\)-values \((p=.657)\) and \((p=.425)\). When comparing the mean summary eight month change in practice compared to the control group, no changes between groups were statistically significant.
**Figure 3.** Combined within group changes in 3 safe opioid prescribing practices (n=34)  
*p*<0.05

**OSCE Participant Evaluation**

Written survey evaluations were reviewed and summarized from both immediate and delayed OSCE groups. Resident learners felt least positive about their exposure to the case #3 (stopping opioids) and that the content of that case was a bit too difficult. Residents felt that the educational value was high for all three cases. Residents also identified several benefits to the OSCE activity citing that it helped them identify strengths and weaknesses, stimulated learning and gave valuable feedback about safe opioid prescribing. One resident explained,
“This was an excellent experience. It was very helpful to have lectures… [and] to be able to practice the techniques discussed in Thursday’s talk really solidified the learning points and gave me skills and a better way to approach these patients, which I can use in my own clinic.”

Comments from the group feedback session was also reviewed where residents reported that they preferred or would have preferred receiving the OSCE intervention immediately after the didactic session. One resident from the immediate OSCE intervention group explained, “I would not have felt comfortable with my skills without having had the noon conference immediately before.” Additionally, one resident from the delayed OSCE intervention group explained that “the [didactic session] was helpful at the time… it contributed to the overall feeling of being prepared, but would have been helpful if more recent (to the OSCE).”

Participants that completed were also asked about what would be helpful going forward if this intervention was to be delivered to future residents. Results were mixed as to what the ideal year (PGY-1, PGY-2, or PGY-3) would be best to receive this intervention.
DISCUSSION

A safe opioid prescribing educational program that includes a didactic presentation followed by an OSCE improves internal medicine residents’ safe opioid prescribing for chronic pain knowledge, confidence and self-reported practices. Compared to a delayed OSCE experience, those that participated in the OSCE immediately following the didactic session had the greatest improvements. The greatest improvements were in self-reported practices that included difficult conversations regarding aberrant medication taking behavior and unexpected urine drug test results.

All groups reported increases in their confidence in safe opioid prescribing skills at eight month follow-up; however, the immediate OSCE intervention group was the only one with a significant increase in safe opioid prescribing skill confidence at eight months when compared to the control group. Knowledge also improved for all groups. The didactic group had the lowest baseline knowledge score and was the only group that demonstrated significant knowledge improvement at follow-up.

Consistent with our eight month follow up survey findings, OSCE participants highlighted that the timing of OSCE participation was important. Many OSCE participants from both immediate and delayed OSCE groups stated it was ideal to have the OSCE administered as close to the didactic session as possible to reinforce their skills. Additionally, OSCE participants found the OSCE
a valuable educational tool, with some variation in what year this experience should be incorporated into residency training.

Exploring the barriers to safe opioid prescribing is important to understand the complexities of this issue and better contextualize the impact of this study. First, there is a lack of consensus for internal medicine residents’ pain management competencies. This pain management gap for junior physicians only promotes decreased awareness and ability to care for this patient population. Specialty pain management guidelines\(^{34}\) have begun to illustrate the complexities of pain assessment and management, although this specialty-focused consensus does not substitute as guidance for generalist clinicians.

Second, although safe opioid prescribing guidelines for chronic pain patients’ exist\(^{8,35–38}\) there is a limited evidence basis for these guidelines,\(^{8}\) which promotes wide variation in practice that may affect faculty and resident learners alike. Additionally, the lack of evidence for these guidelines has resulted in controversy over the use of opioids for chronic pain, known as ‘opiophobia’\(^{39}\), which may further contribute to inadequate pain management.

Third, when treating chronic pain patients there is a lack of specialists for internal medicine residents to consult with. Traditionally resident learning comes from interaction with various consultation services. The lack of pain or addiction medicine consult services creates many frustrated residents who are unable to receive guidance to appropriately manage their patients with chronic pain.

Fourth, faculty lack knowledge and skills to implement safe opioid
prescribing in generalist settings. Furthermore, there is a lack of faculty mentors who can successfully model and co-manage these patients with residents. If a faculty member is uncertain or has resistance to implementing safe opioid prescribing practices, it is difficult for the resident to circumvent that opposition.

Fifth, residents are often managing patients who are some of the most complicated cases from previous providers. Residents may feel pressure to continue the previous opioid regimen and may face resistance from the patient when they want to institute monitoring that might not have been done previously.\(^40\) Additionally, lack of faculty or consult service support may increase the difficulty of managing inherited patients.

Lastly, systems need to be in place to support the implementation of individual residents safe opioid prescribing skills in practice. These include help developing the initial opioid management agreement, processing and interpreting urine drug test results, and support with performing pill counts.

Despite all of these barriers, this study improved safe opioid prescribing outcomes. Previous studies\(^{33,41}\) have demonstrated the benefits of using OSCEs to assess residents’ addiction medicine skills and knowledge, however this study used the OSCE as a unique educational intervention tool to develop residents’ safe opioid prescribing skills and assess them 4 or 8-months after the OSCE intervention.

Turner and Dankoski\(^{42}\) highlight some of the “hidden benefits” of OSCEs including the phenomena of “teaching to the test” which may led to an increased
awareness and acquisition of OSCE-related practical skills (e.g., physical exam, communication skills). They also highlight how OSCEs are an opportunity to remind learners they are practitioners providing patient-focused clinical care, which re-emphasizes the human aspect of medicine. OSCEs provide an opportunity for learners to practice and assess their skills, with the hope of integrating these skills into clinical practice.

Another core component of the OSCE as an education tool is faculty feedback. This provides immediate and specific guidance to their learner regarding their OSCE performance that hopefully will be integrated into their future clinical practice. Hodder and colleagues found immediate faculty feedback significantly improved OSCE assessment outcomes more than individuals spending more times at OSCE stations or repeating the stations more than once.

Previous studies utilized OSCEs to assess residents’ clinical and communication skills, including those related to substance use. Parish and colleagues work with OSCEs to demonstrate gaps in practice as well as highlight individual resident’s improvement during the duration and completion of the OSCE stations. Their work demonstrates residents’ difficulty assessing and managing substance use clinical cases, including patients in various stages of change and high-risk behaviors, and reiterating the importance of faculty feedback.

There also have been some educational interventions to improve
prescribing skills\textsuperscript{46} and one group\textsuperscript{47} utilized an OSCE to develop these skills in medical students. Scobie and colleagues\textsuperscript{47} implemented OSCEs to medical students, with or without structured teaching sessions that focused on a variety of prescribing skills (i.e., anticoagulation management). They found students who completed the OSCEs with previous structured teaching had significantly higher performance and confidence after the OSCE. In addition to demonstrating the ability of OSCEs to assess and improve prescribing skills, Scobie and colleagues highlight the importance of coupling the OSCE with a didactic session, which was incorporated into this educational intervention design.

Efforts have shifted the use of OSCEs from an evaluation to a teaching tool\textsuperscript{48,49} as OSCEs provide a unique opportunity for the resident to learn and then practice challenging skills that are not appropriately addressed in medical education and residency training. One previous study\textsuperscript{49} utilized OSCEs as an education tool for medical students, which utilized a similar model. This study randomized students to either an alcohol (intervention) or depression (control) didactic session prior to an OSCE, and found the intervention group had significantly improved outcomes at four months.\textsuperscript{49} This study, as with our own, demonstrated improved outcomes some time after the educational intervention was delivered, which highlights the lasting impact of an OSCE intervention.

Technology also has broadened the scope of OSCE delivery. Chan and colleagues\textsuperscript{50} developed a remote-OSCE to connect remotely located medical students the opportunity to complete an OSCE by virtually interacting with SPs
and faculty.\textsuperscript{50} This method may be advantageous to connect faculty and students from a variety of institutions, which may help mitigate potential barriers in recruiting and engaging knowledgeable faculty. Chan and colleagues found the remote-OSCE to be equally effective as in-person OSCEs in developing medical students skills.\textsuperscript{50} However remote OSCEs may have additional costs and some remote OSCEs have not demonstrated equal outcomes for distance v. on-site learners.\textsuperscript{51}

While the OSCE with a SP model improved outcomes over a didactic only intervention, it begs the question if there are other options to delivering skill-practice learning experiences that may be less resource intensive. While trainees generally respond favorably to the use of SPs,\textsuperscript{52–54} SPs may be costly.\textsuperscript{52,55} There are a variety of alternative skills-based teaching methods including peer-based role-playing, virtual patients and unannounced standardized patients that are important to consider substituting into a similar OSCE model.

Compared to the use of SPs in OSCEs, peer role-playing is less realistic but less resource intense. Role-playing involves a peer-to-peer model in which one learner takes on the role of a patient and the other learner acts as the clinician, and then the roles are reversed.\textsuperscript{52} In this peer-based model learners may feel that the interaction does not mimic authentic clinic scenarios.\textsuperscript{52,56} However in a randomized control trial comparing the effectiveness of SP versus role-playing in developing medical students’ patient communication skills, both SP and role-playing were effective in improving performance scores, with role-
playing facilitating a more significant change. Bosse and colleagues highlight that in role-playing by taking on a patient role, learners may develop a deeper sense of empathy than learners working with a SP method. Factors that help facilitate effective use of role-playing can include clear learning objectives, incorporating assessment and providing faculty feedback.

The use of virtual patients has become a more popular method of skills development. This method often requires an initial high cost to develop the virtual infrastructure, but once established may become much less resource intense and provide easily accessible and adaptable teaching models. One study showed that the use of a virtual patient was particularly useful in improving primary care residents' diabetes management skills, practices and knowledge.

Unannounced SPs are likely the most realistic and resource intensive of the skills practice methods. Unannounced SPs are a form of SPs in which trained actors enter clinic as a patient and then provide feedback after the encounter. They provide a way to assess clinicians’ clinical practice skills in a real-world clinical setting. Unannounced SPs have been useful in measuring real practice changes after educational interventions but may have some technological and cost limitations.

Our educational program evaluation has several limitations worth considering. This was a non-random distribution of residents across groups, which could have led to confounding especially since the residents that participated in the OSCE were more likely to favor a career in primary care.
Another limitation is the overall small sample size, which makes it difficult to identify differences within, as well as between, groups. Nevertheless, some results did reach statistical significance. Next, it is possible that, due to the self-reported nature of the data, some of the findings may be attributed to social desirability biases. However, to mitigate this bias, participant surveys were returned to an independent evaluator and participants were told that faculty and staff would only see de-identified aggregate data.

While we found improvement in knowledge, confidence and self-reported practice, we were unable, by study design, to detect if these improvements impacted patient-level outcomes. Future research on this educational program might include chart review or patient interviews to assess patient outcomes. It also could incorporate the use of unannounced SPs to further assess providers’ skills in practice. Additionally, the practice changes (i.e., agreements, urine drug testing, pill counts) required existing systems to be in place, which they were at the institution in which this study was conducted. This may limit the generalizability of our study findings, as it may be harder for residents at institutions where agreements, urine drug testing and pill counts are not routinely done.

In summary, safe opioid prescribing education that includes a didactic session followed by immediate OSCE can change residents’ knowledge, confidence and practices. The use of an OSCE as an education tool relies on faculty feedback and can utilize a variety of alternative skills-based teaching
methods to accommodate institution’s needs and budgets. Developing adequate faculty training on this topic is also critical to facilitate and support the development of residents’ skills in clinical practice.
REFERENCES


31. Alford D.P. JAH. Presentation presented at: Annual Meeting of the Society of General Internal Medicine 2010; Minneapolis, MN.

32. Alford D.P. JAH. Presentation presented at: Association for Medical Education and Research in Substance Abuse 2010; Bethesda, MD.


VITA

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EDUCATION

Boston University School of Medicine
Candidate, M.S. in Medical Sciences
Boston, MA
8/13 – present

Assumption College
B.A. in biology and a minor in Spanish
Worcester, MA
8/06 – 12/09

EXPERIENCE

MASBIRT Training & Technical Assistance Program • Boston Medical Center
Program Coordinator
Boston, MA
11/14 – present

- Works with program and training management staff to implement the MDPH-BSAS funded state SBIRT program. The program’s focus is to provide institutional and individual screening, brief intervention and referral to treatment (SBIRT) trainings, as well as SBIRT implementation support to a variety of organizations across the state
- Contribute to the development and delivery of SBIRT trainings
- Support overall program implementation including accounts payable, curriculum development, and program logistics

Continuing Medical Education Office • Boston University School of Medicine
Medical Writer
Boston, MA
1/14 – present

- Contributes to the grant writing for continuing medical education proposals on a variety of medical topics

Clinical Addiction Research & Education (CARE) Program • Boston Medical Center
Program Coordinator
Boston, MA

Chief Resident Immersion Training (CRIT)/Fellow Immersion Training (FIT) Program
10/11 – 8/13

- Worked collaboratively with program directors and faculty to implement the annual, national CRIT/FIT Program in Addiction Medicine. The program’s focus is to improve clinical, teaching and research skills in addiction medicine
• Contributed to the development of program curriculum and evaluation, including: a model morning report video, course materials, program schedule, grant progress reports and manuscript preparation
• Managed overall program implementation including marketing materials, budget, accounts payable, and program logistics including communicating with program faculty, vendors and supervising 1–2 junior program staff
• Participated in the interviewing and hiring process for staff members

**Boston University Addiction Medicine Fellowship Program** 3/12 – 8/13

• Worked with program directors and fellows to facilitate program administration including contributing to fellowship protocols and scheduling. The program is one of twenty programs nationally that provide subspecialty training in addiction medicine
• Acted as a liaison with off-site clinical rotations and assisted with curriculum and clinical program development, grant reporting requirements and contributed to the creation of a physician education module
• Helped coordinate monthly clinical case conferences in addiction medicine including organizing Continuing Medical Education (CME) certification offered during the sessions
• Responsible for a $31,250/year budget

**Research in Addiction Medicine Scholars (RAMS) Program** 4/12 – 8/13

• Worked with program directors to develop and facilitate overall program implementation. This program develops skills in addiction medicine research among addiction medicine and psychiatry fellows
• Coordinated program retreats as well as facilitated program publicity and curriculum development
• Collaborated with program faculty and national advisory committee members to develop and implement programmatic content including retreats, mentoring and ongoing webinar sessions

**MASBIRT Program • Boston Medical Center** Boston, MA

**Program Coordinator** 5/11 – 3/12
**Research Assistant** 4/10 – 5/11

• Contributed to grant preparation and reporting, as well as programmatic data collection and evaluation measures for the Massachusetts Screening, Brief Intervention and Referral to Treatment (MASBIRT) Program which provided universal screening for unhealthy alcohol and substance use in healthcare settings
• Oversight of programmatic follow-up efforts for a proportion of patients with unhealthy alcohol use
• Implemented programmatic and research protocols as well as coordinated a brief treatment/referral to treatment group to assist providing patients with outpatient specialty treatment
• Participated in the writing of an IRB protocol, survey instruments, and manuscript preparation
• Employed medical record review, HIPPA sensitivity and confidentiality measures

**Benjamin Insurance Agency** Sutton, MA

**Administrative Assistant** 1/09 – 3/10

• Provided customer service, data entry, and accounts payable activities for a small, private insurance company
UMass Memorial
Patient Care Assistant
8/07–1/08
• Worked as a nursing assistant on a telemetry floor and gained clinical and patient experience, including taking/recording vital signs and EKGs

OBSERVERSHIPS

Pediatric Pain Rehabilitation Center • Children’s Hospital Boston
Undergraduate Thesis Internship
Waltham, MA
5/09 – 12/09
• Accumulated, analyzed, and interpreted data relative to pediatric Complex Regional Pain Syndrome (CRPS)

Norton Medical Center
Physician Shadowing Experience
Norton, MA
10/09 – 12/09
• Shadowed a family practice physician to gain experience and perspective of a family practice physician

UMass Memorial
Physician Shadowing Experience
Worcester, MA
10/09 – 12/09
• Shadowed a family practice/sports medicine physician to gain a perspective of sports medicine

PUBLICATIONS


ACHIEVEMENT

Undergraduate Honors Thesis
Examining demographical characteristics and functional changes in a pediatric population with complex regional pain syndrome
Assumption College

Honors Program Certificate
Deans List
Assumption College

SKILLS

• Analytical, organizational, detailed qualitative and quantitative abilities coupled with exceptional written and verbal communication strengths
• Proficient level Microsoft office suite including Microsoft Word, Excel, Powerpoint
• Intermediate level in Citrix applications such as Logician, Sunrise Clinical Manager as well as New Innovations
• Proficient in Endnote, Refworks and Zotero literature management software
• Proficient in Wordpress website design software
• Strong patient relationship abilities with vital sign acquisition and recording knowledge
• Proficient knowledge and application of the Spanish language
• BNI-Art Institute, April 2010: Trained in Brief-Negotiated Interviewing
• American Red Cross, May 2007: Nurse assistant and home health aide certification