### Introduction and Objective

In recent years, there have been significant increases in mortality associated with opioid medications. Rates of opioid sales, overdoses and addiction treatment have more than tripled since the early 2000s and over 40 people die each day related to prescription opioid overdose. There are a number of factors contributing to these alarming statistics, but among those is physician overprescribing. This leads to large quantities of leftover opioids, which 73-75% are stored in an unlocked location, contributing to the risk of non-medical opioid use and abuse. In fact, studies have shown that an initial prescription of a 30-day supply of opioids is associated with a 35% risk of continued opioid use at 1 year, whereas an initial 3-day supply only equates to 5% risk of continued use. Working in an inherently painful specialty, orthopedic surgeons are among the top three prescribers of opioids, accounting for 8% of all prescribed opioids in 2009, making this patient population particularly at risk for opioid misuse.

A number of efforts have been made to curb the shocking opioid prescribing trends including identifying at-risk patients using risk-assessment tools, state prescription drug monitoring programs, hospital prescribing and dispensing protocols and patient education. While a number of these strategies have been adopted by hospitals across the country, patient education has not been widely instituted. This study sought to examine the utility of preoperative patient counseling in decreasing postoperative opioid use following a variety of outpatient orthopedic surgeries.

### Methods

With institutional review board approval, a prospective trial was conducted in the greater Philadelphia area in which patients undergoing outpatient orthopedic surgery were randomized to a counseling group or a control group by a simple birth year scheme, with even birth years corresponding to a counseling group. Exclusion criteria included all patients 18-89, outpatient procedure at one of four locations and surgery performed by one of ten participating, board-certified orthopedic surgeons. Exclusion criteria included recent surgery and patients on chronic opioid therapy.

While in the preoperative holding area, the counseling group watched a short multimedia presentation (Figure 2) aimed at educating the patient on opioid medications, strategies for pain management and the opioid epidemic in general. All patients were instructed to make note of their daily postoperative opioid consumption, pain experience, any adverse events and any non-opioid pain medication use. All data was formally collected (Figure 3) at patients’ first postoperative appointment and analyzed using a variety of continuous and categorical methods. Statistical analysis was performed for categorical values and Student t test for continuous variables, with significance placed at a P value less than 0.05.

### Results

Over the course of three months, a total of 367 patients were approached, enrolled and randomized, of which 39 were lost to follow up or subsequently excluded based on the criteria above. The average age of the patients in the counseling and control group was 50 and 52, respectively (Table 1). The counseling group contained 74 females (49%) and the control group had 107 (58%), although this difference was not found to be significant (p = 0.086). Patients underwent a variety of bone and soft tissue surgeries performed by 10 different board-certified orthopedic surgeons, encompassing four major anatomic regions: hand/wrist, elbow/shoulder, knee/leg and foot/ankle. Surgeries were performed using a number of anesthetic techniques, with general anesthesia being the most common method, accounting for 41% and 43% of cases in the counseled and control groups, respectively (Table 1).

Data was formally collected from patients at their first postoperative appointment, which was typically scheduled 2 weeks after their date of surgery. Patients in the control group reported their total opioid consumption to be 9.43 pills (Table 2), nearly 2.5 more pills than to their counseled group counterparts, who reported 7.15 pills (p = 0.0097). There was no difference in the number of opioids prescribed to the two groups (22.0 vs 21.7 pills). Over the first postoperative day, there was no difference in opioid consumption among counseled and controlled patients (Figure 4). A significant difference arose on the 5th postoperative day, with counseled patients reporting 4.50 pills and control patients taking 7.75 pills (p = 0.0499). Across these days, patients reported similar Visual Analogue Scale (VAS) pain scores (Figure 5).

### Conclusions

Opioid consumption following orthopedic surgery is decreased in patients who receive preoperative counseling. Patients in the counseled and control group experienced similar postoperative pain levels (Figure 4), suggesting the difference in consumption was related to the counseling. Statistically significant differences in reported opioid consumption were seen on postoperative day 5 and in the total, but not in the first four postoperative days. This indicates that patients in the counseled group still utilized opioids to manage their pain, but were quicker to stop taking their prescribed medication, a factor that strongly influences likelihood of continued opioid consumption at one-year post surgery. Patients in the counseled group overall found the videos were helpful and more than 90% thought that all patients should be required to watch the opioid counseling video prior to surgery, showing patient interest and concern for decreasing opioid misuse. Altogether, this provides strong evidence that counseling could be further incorporated into the preoperative guidelines provided to patients in order to curb non-medical opioid use and abuse.

Over the course of this study, 63% of patients’ opioid prescriptions, greater 4,100 pills, were left unused. Physicians overprescribed opioids by a ratio of about 2.3-1, resulting in thousands of leftover pills, creating the potential for addiction, abuse and overdose. Studies such as this one could be used to create prescribing guidelines for physicians that take factors like surgery type, anesthetic technique and age into consideration in order to prescribe a more appropriate number of pills.

Although this study has shown significant differences in opioid consumption patterns in counseled versus control group patients, it is limited by recall bias. Patients may not have a perfect recollection of their daily pain and opioid consumption, which could easily skew the data. Additionally, patients may have taken more or less opioids knowing that they had consented to be a part of a study on the subject. Additional studies should elucidate the differences in opioid consumption, if any, between bone and soft tissue procedures, various anesthetic techniques and age. It will also be important to determine the most effective methods of delivering preoperative counseling, possibly by comparing the multimedia presentation to a paper form, posters in the preoperative area and simple verbal instruction.

### Acknowledgements

I would like to thank my co-investigators, Taylor Paskey, Lizzy Critchlow, Erica Mann, Talia Chapman MD, Kristin Sandrowski MD, Asif Ilyas MD, MD, Jack Abboudi MD, Christopher Jones MD, David Pedowitz MD, Christopher Dodson MD, William Emper MD, Kevin Fredman MD, Surena Nandani MD, Chris Aland MD, William Fitzpatrick MD, and my research mentor, Dr. Smook.

### References