# Evaluation of Opioid Use Following Total Knee and Hip Arthroplasty in Patients Prescribed Scheduled Acetaminophen Plus As-Needed Opioids Versus As-Needed Opioids for Pain Management

## Background
Total knee and hip arthroplasty (TKA/THA) are the most commonly performed orthopedic surgeries; they are also considered the most painful. In efforts to reduce opioid use, this study compares total opioid use within the first 48 hours following elective TKA/THA between patients prescribed a scheduled high-dose acetaminophen regimen versus a scheduled low-dose acetaminophen regimen versus as-needed opioids.

## Methodology
This IRB-approved, single center, retrospective chart review assessed all patients admitted for an elective TKA/THA between January 2018 and December 2019. The primary outcome is total dose of opioids in intravenous morphine milligram equivalents taken within the first 48 hours following surgery. Secondary outcomes include total daily acetaminophen use, time to first opioid dose, length of hospital stay and adequate pain control.

## Results
A total of 315 patients were included in this study: 146 in the high-dose acetaminophen group, 47 in the low-dose acetaminophen group and 122 in the as-needed opioid group. This study found a statistical significant difference in the median amount of opioids taken within 48 hours post-surgery between the three groups (p<0.001). There was a statistically significant difference in daily amount of acetaminophen use (p<0.001), time to first opioid dose (p=0.008), length of hospital stay (p<0.001) and adequate pain control (p<0.001) between the three groups.

## Conclusions
This study suggests using a scheduled acetaminophen regimen within the first 48 hours following elective TKA/THA allows for opioid sparing during post-surgery pain management, a shorter hospital stay, and longer periods of adequate pain control compared to as-needed opioid regimens.
### Abstract Title
Impact of the new Florida regulatory requirement on opioid prescribing in selected postsurgical procedures

### Background
The misuse of opioids has led to addiction, overdoses, and deaths, creating an opioid epidemic in this country. Effective July 1st, 2019, the Florida Controlled Substances Prescribing Statute was amended, requiring prescribers to educate patients about non-opioid alternatives prior to prescribing, ordering, dispensing and administering Schedule II controlled substances. A Phase I performance improvement project was previously conducted to assess opioid prescribing patterns in the three most common types of surgeries performed at a community hospital. The purpose of this study was to examine the impact of the change in regulation on opioid prescribing and utilization.

### Methodology
A retrospective review of patients receiving opioids to manage pain after gastrointestinal (GI), orthopedic, or C-section surgeries was conducted. The impact of the amended statute on opioid utilization was evaluated from July 2019 to December 2019. The following information was collected: age, gender, type of surgery, principal procedure, pain management medications used, pain scale score, total morphine milligram equivalents (MME) received 48 hours post-surgery, number of opioid and non-opioid doses administered, and prevalence of adverse effects (decreased respiratory rate (RR), GI side effects and/or use of opioid reversal agent). Lastly, the electronic health record was reviewed to determine if education of non-opioid alternatives was documented. Phase I results were utilized as a baseline for comparison.

### Results
A total of 120 patients (74 female, 46 male) with an average age of 40.9 years receiving opioids post-surgically were evaluated. Surgical procedures reviewed included arthroplasty replacement, open reduction of hip, laparoscopic cholecystectomy and appendectomy, and C-section. Non-opioid alternative education was documented in 98% of patients. Compared to Phase I, the average number of opioid doses administered within 48 hours post-surgery, decreased in orthopedic patients from 2.9 to 0.83 and in C-section from 3.4 to 2. Whereas, for GI procedures there was a slight increase from 1.8 to 2. For orthopedic and GI surgeries, use of non-opioids was decreased from 3.1 to 0.2 and from 1.6 to 1.5 respectively; and in C-section there was an increase in non-opioid use from 3.9 to 5.2. The MME was calculated for the total amount of opioids administered within a 48-hour period post-surgery. MME decreased for all surgeries as compared to pre-amendment as follows: orthopedic from 13.4 to 1.8, GI from 18.4 to 8.2, and C-section from 34.5 to 21. Patients undergoing GI procedures received lower opioid doses more frequently, resulting in a lower total MME usage. Intravenous (IV) hydromorphone was the most common opioid used for orthopedic and GI surgeries, whereas for C-section, oral oxycodone/acetaminophen was used most often. Conversely, IV acetaminophen, IV ketorolac, and oral ibuprofen were the most commonly used non-opioid analgesics. Patients who received opioids had an average pre-dose pain level above 6, versus 4 to 5 for those who received non-opioid medications. Post administration, average pain scores decreased and ranged between 1 to 4 for opioids, and for non-opioids, between 1 to 2. The most common side effects were nausea or constipation (n = 35) and no use of opioid reversal agents was documented.

### Conclusions
In conclusion, opioid utilization within 48-hours post-surgery, as measured by MME, decreased for all surgeries after the implementation of the new Florida regulation amendment. Possible interventions can be implemented to further educate providers on the use of opioids.
**Abstract Title**
Impact of Pain Initiatives on Overall Opioid Utilization

**Background**

Pain management is a complex therapeutic decision making process that should consider treatment options and patient specific factors. One of the barriers to making appropriate treatment selections include prescriber knowledge regarding agents and dosages. Lakeland Regional Health’s (LRH) pharmacy pain management team suspected that prescribing education may be warranted after noticing trends in unintentional non-equivalent dosing. The outcomes of a 2014 medication use evaluation (MUE) of opioid prescribing in post-surgical patients indicated that patients prescribed hydromorphone received over twice the amount of morphine milligram equivalence (MME) compared to those who received morphine. Following the MUE, pharmacists provided education sessions to nurses and physicians covering a variety of topics including but not limited to opioid pharmacology and equipotent conversions. Despite educational efforts, continued prescribing trends lead to implementation of sub-phase pain management order sets imbedded into all medical admission order sets to provide guidance and options.

**Methodology**

This was a retrospective chart review conducted at LRH including medical patients admitted with acute lower back pain. Subjects were divided into pre- and post- pain initiative implementation. Data was obtained from May 1, 2014 to October 31, 2014 and February 1, 2017 to August 31, 2017 for pre and post groups, respectively. All data was obtained from the electronic medical record. The primary outcome was the comparison of average daily MME usage. Secondary outcomes included proportion of order set utilization, length of stay, and adjuvant use.

**Results**

Of the 730 patients screened, a total of 136 patients were included resulting in equal distribution with 68 patients in each group. Overall, majority of patients were middle aged females. Less than 30% of patients in each group had an opioid listed on home medication list. In both groups, the most common comorbidity included type 2 diabetes mellitus and chronic obstructive pulmonary disease (COPD). Upon hospital admission, a significantly higher number of patients were assigned as NPO (59%). Throughout the course of stay, the median average daily MME utilization did not significantly differ between the pre- and post-implementation groups 22.5 vs 21.5 (p = 0.67), respectively. In both groups, the median average daily MME without the strict use of the order set was lower. The utilization of MME was 22 without the strict use of the order set vs 26.3 with the order set in the pre group (p = 0.63) and 19.2 vs 40.5, respectively, in the post group (p = 0.02). Additionally, there was no significant difference in the length of stay or use of adjuvant agents.

**Conclusions**

This evaluation demonstrates that in patients with lower back pain, the use of multivariable pain initiatives did not significantly decrease the average daily MME usage. When MME utilization was broken down by use of order set, there was a significant difference in MME utilization in the post group without strict use of the order set.
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<td><strong>Practice Site</strong></td>
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<td><strong>Abstract Title</strong></td>
<td>Burn pain management in a tertiary hospital: a retrospective analysis</td>
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### Background
Due to limited data regarding burn pain management, the clinical experience of physicians and facility preference often guide the utilized regimens. Implementing protocols to guide proper use of multimodal pain medications ensures evidence-based medicine is practiced, improving patient care. Targeting multiple types of pain with different modalities of agents provides better pain management as well as prevents untoward effects of opioid use, like tolerance and hyperalgesia. Additional factors to consider when treating burn pain include the depth, size, and severity of the burn. However, before creating a protocol, the current processes must be evaluated to identify areas of improvement. As Blake Medical Center works toward becoming a certified burn center, this project serves to retrospectively analyze burn pain management in an effort to create a safe and effective multimodal pain protocol for a selective patient population.

### Methodology
This retrospective review examined the utilization of different pain modalities in burn patients admitted to a tertiary, level 2 trauma hospital between July 1, 2018 and July 1, 2019. Patient data was collected via Blake Medical Center’s electronic health record, medication management portal, and a national burn registry system. The primary objective was to analyze the management of burn pain at Blake Medical Center. Secondary objectives included evaluating the use of reversal agents to gauge appropriate management, assessing the frequency of as needed medications as an indirect measure of under-treating pain, and examining discharge pain medication regimens.

### Results
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### Conclusions
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<td><strong>Abstract Title</strong></td>
<td>Perioperative management of acute pain in patients on maintenance doses of buprenorphine</td>
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**Background**
Perioperative management of acute pain in patients maintained on buprenorphine is known to be a challenge due to the complex pharmacology of the drug. Recent literature has suggested that low-to-moderate doses of buprenorphine (up to 16 mg per day) can be continued during the perioperative period and adequate pain control can be achieved. At our institution, an algorithm was developed and implemented to guide perioperative buprenorphine management and minimize variability in practice. The goal of this study was to evaluate the impact of an institutional algorithm for perioperative pain control in patients on maintenance buprenorphine therapy.

**Methodology**
This IRB-approved, single center, retrospective pre/post study compared patients before and after the implementation of an institutional algorithm for perioperative buprenorphine management. Adult patients who were greater than 18 years old on maintenance buprenorphine therapy who underwent a surgical procedure were included in the study. The pre-intervention group included patients admitted between January 2019 and March 2019, and the post-intervention group were admitted between January 2020 and March 2020. Patients were excluded if they refused greater than 50% of buprenorphine doses or underwent emergent surgery. The primary endpoint was 24-hour postoperative morphine milliequivalents utilized by patients. Secondary endpoints included use of adjunct analgesics, median 24-hour post-operative pain score, and adherence to the algorithm. Descriptive and inferential statistics were used to evaluate primary and secondary outcomes.

**Results**
Eight patients met inclusion criteria for the pre-group and ten for the post-group. The most common surgical procedures performed were incision/drainage and obstetrics procedures. The median morphine milliequivalents (MME) used within the first 24 hours of surgery was lower in the post-group compared to the pre-group (10 MME vs 56 MME). Median pain scores were lower in the post group compared to the pre-group (3.5 vs 4.25). Use of adjunctive pain medications was consistent in both groups; most common agents include NSAIDS, acetaminophen, and regional/topical analgesics. Compliance to the algorithm was met in 8/10 (80%) of post-group patients.

**Conclusions**
The results of this study show a potential reduction in MME with the use of a standardized buprenorphine algorithm. Limitations of the study included its retrospective nature, small patient sample, and the use of a subjective pain score. We also included patients undergoing procedures with varied anticipated levels of pain post-procedure which may confound the results.
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<tr>
<td>Abstract Title</td>
<td>Retrospective comparison of postpartum oral morphine equivalent (OME) requirements in pregnant individuals treated with buprenorphine or methadone for opioid use disorder (OUD)</td>
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<tr>
<td>Background</td>
<td>The American College of Obstetrics and Gynecology recommend methadone or buprenorphine for Medication Assisted Therapy (MAT) in pregnant mothers with Opioid Use Disorder (OUD). Methadone historically was the standard of care, however newer evidence suggests buprenorphine's superiority regarding Neonatal Abstinence Syndrome (NAS) severity and duration. Additionally, buprenorphine prescribing for Medicaid-enrolled pregnant women with OUD continues to increase. However, data comparing postpartum oral morphine equivalent (OME) requirements between both MAT options remains limited. Current studies with small sample sizes indicate similar postpartum OME requirements in mothers receiving methadone or buprenorphine for OUD, in vaginal or caesarian delivery. However, no trial to date, has conducted a comparison of postpartum OME requirements in mothers receiving buprenorphine or methadone in including both vaginal and caesarian delivery. The purpose of this study was to compare 48-hour postpartum OME requirements amongst both vaginal and caesarian deliveries in pregnant individuals receiving buprenorphine or methadone for OUD.</td>
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<td>Methodology</td>
<td>This IRB approved single-center retrospective chart review includes pregnant individuals admitted on oral buprenorphine or oral methadone who delivered from October 1, 2015 to August 1, 2019. The primary outcome is to determine the impact of buprenorphine and methadone on postpartum OME requirements within 48 hours, with the secondary outcome comparing pain scores in the two groups.</td>
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<td>Results</td>
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<tr>
<td>Abstract Title</td>
<td>Impact of a standardized multimodal pain regimen on opioid consumption in patients undergoing spinal procedures</td>
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**Background**

Opioid medications have played a central role in pain management after spine surgery, however, current research increasingly supports the use of multimodal analgesia (MMA) for pain control. MMA has been shown to reduce opioid consumption and adverse effects associated with their use. At our institution, a multidisciplinary initiative with the use of a standardized, multimodal pain pathway was implemented to improve pain management, decrease opioid consumption, improve clinical outcomes, and decrease length of stay. The purpose of this study is to evaluate whether the implementation of the standardized multimodal pain regimen in spinal procedures reduces opioid consumption during the hospital stay.

**Methodology**

Retrospective cohort, IRB approved study including patients at least 18 years old who underwent an elective spine procedure at Morton Plant Hospital in Clearwater, Florida. Patients were categorized into two different groups. Group 1 consists of patients who were not treated with a standardized multimodal pain regimen following a spine procedure from September 1, 2018 to May 31, 2019 and group 2 consists of patients who were treated with a standardized multimodal pain regimen following a spine procedure from September 1, 2019 to May 31, 2020. The primary outcome is 72-hour post-operative opioid consumption, measured in morphine milligram equivalents (MME). Secondary outcomes are the incidence of acute kidney injury, pain scales, length of stay, discharge disposition, time to first opioid dose, and the incidence of post-operative bleeding.

**Results**

A total of 150 patients were evaluated, with 75 patients in group 1 and 75 patients in group 2. There were no significant differences in baseline demographics between the two groups. For the primary endpoint, there was a statistically significant reduction in required MME (90 vs 75 MME, median, p = 0.028) favoring the use of the standardized multimodal pain regimen. For secondary endpoints, there was a statistically significant reduction in length of stay (3 vs 2 days, p < 0.0005), an improvement in average patient-reported pain score for the length of stay (5 vs 4.5, p = 0.024), and a statistically significant reduction in the time to first opioid dose (3.5 vs 2.5 hours, p = 0.037). There were no statistically significant differences in the other secondary endpoints of discharge disposition, incidence of acute kidney injury, or incidence of post-operative bleeding.

**Conclusions**

Implementation of an evidence-based, multidisciplinary quality improvement initiative with the use of a standardized, multimodal pain pathway was shown to reduce opioid consumption, improve pain management, and decrease hospital length of stay. It is important to acknowledge several limitations of this study. Non-standardized intraoperative analgesia and the slight variation among choice of pain medications within the protocol may confound results. Despite growing evidence for the use of MMA, the use of perioperative NSAIDs for pain control continues to be a controversial topic, particularly in the spinal fusion setting. Future research adequately powered to detect a difference in post-operative bleeding events associated with the use of ketorolac may be warranted.
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<td>Abstract Title</td>
<td>Effect of intra-articular liposomal bupivacaine versus intra-articular &quot;pain cocktail&quot; on pain control in postoperative total knee arthroplasty patients</td>
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<tr>
<td>Background</td>
<td>Patients with osteoarthritis can experience a reduced quality of life and decreased levels of physical activity associated with osteoarthritis-related knee pain. These patients typically undergo a total knee arthroplasty (TKA) but can experience uncontrolled postoperative pain which can lead to prolonged hospital stays, increased risk of infections, delayed mobilization and late rehabilitation. In this study we aim to assess the differences between intra-articular liposomal bupivacaine versus a pharmacy compounded pain cocktail and its effect on opioid use, recovery and length of stay in patients with a TKA.</td>
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<td>Methodology</td>
<td>This study is a multi-center, retrospective cohort study utilizing chart review to identify patients that have had a total knee arthroplasty and received either intra-articular liposomal bupivacaine or the pharmacy compounded pain cocktail intraoperatively. The electronic medical record (EMR) system was reviewed in reverse chronological order in increments of 3-month blocks, starting with September 1, 2019 through November 30, 2019. Patients meeting inclusion criteria were randomized through Minitab software until a minimum of 100 patients and a maximum of 250 patients were included in each arm. The following information will be collected: FIN, age, gender, weight, height, BMI, admission date, discharge date, length of stay, name and dose of intra-operative pain medication received, pain medications and doses given post-operatively, other pain modalities used, primary surgeon, active range of motion, and ambulation distance. The primary outcome of this study is patient opioid use in morphine equivalents per length of stay (mg/day). Secondary outcomes include ambulation distance (ft) for post-operative day 0 and 1, active range of motion (degrees) for post-operative day 0 and 1, and length of stay (days).</td>
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<td>Results</td>
<td>A total of 200 patients were included and analyzed in the study, with 100 patients in the Pharmacy Compounded Pain Cocktail group and 100 patients in the Liposomal Bupivacaine group. The primary endpoint of morphine equivalents per length of stay (ME/LOS) had a median of 31.12 mg/day in the Pain Cocktail group versus 54.02 mg/day in the Liposomal Bupivacaine group. This was a difference of 23.67 (95% confidence interval [CI], 17.11 to 30.12; P &lt; 0.001) between the two groups. Range of motion on Day 0 and Day 1 showed a difference of 5 (95% confidence interval [CI], 0 to 10; P = 0.038) and 7 (95% confidence interval [CI], 3 to 11; P &lt; 0.001), respectively. Ambulation on Day 0 and Day 1 showed a difference of 10 (95% confidence interval [CI], 0 to 20; P = 0.068) and -60 (95% confidence interval [CI], -100 to -30; P &lt; 0.001), respectively. Length of stay had a difference of -0.15 (95% confidence interval [CI], -0.64 to -0.018; P = 0.025).</td>
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<td>Conclusions</td>
<td>In patients undergoing a total knee arthroplasty, the use of the intra-articular pharmacy compounded “pain cocktail” required less opioid use post-operatively versus intra-articular liposomal bupivacaine. The liposomal bupivacaine group showed a wider range of motion on day 0 and day 1 and a shorter length of stay. In the pain cocktail group, a longer ambulation distance on day 1 was found, however a shorter ambulation distance on day 0 was found but was not statistically significant.</td>
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