# Impact of Counseling and Education on Opioid Consumption after Anterior Cruciate Ligament Reconstruction (CARE): A Randomized Controlled Trial

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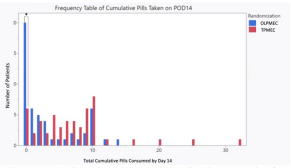
INTRODUCTION: Previous research has suggested that preoperative patient opioid education can reduce postoperative opioid usage. Yet, there have not been any RCTs investigating the effect of pre and postoperative patient education on both pain control and opioid use after knee or arthroscopic surgery. The primary objective of this study was to determine if opioid-limiting perioperative pain management education and counseling (OLPMEC), versus traditional perioperative pain management education and counseling (TPMEC), would decrease postoperative opioid consumption after anterior cruciate ligament reconstruction (ACLR) surgery. The secondary objectives were to determine if, compared to TPMEC, OLPMEC 1) improves pain control as measured by a daily Pain Numeric Pain Scale (NPS); 2) reduces the number of opioid prescription refills; 3) improves patient surgical satisfaction; 4) improves patient-reported outcomes. Our hypothesis was that OLPMEC would lower postoperative opioid consumption, shorten the time to opioid cessation, and reduce postoperative pain compared to TPMEC.

METHODS: This is a single-center, prospective randomized controlled trial of 121 participants who underwent ACLR. Eligible and consenting participants were randomized to receive one of the two perioperative pain management education and counseling strategies, 1) OLPMEC: Instructed to take oxycodone only as a 'last resort' if the pain became unbearable with the goal of taking as little oxycodone as possible; 2) TPMEC: instructed to take oxycodone as needed for severe pain and to 'stay ahead of the pain.' A computer randomized program was used for group assignments. All aspects of care were otherwise identical for both groups, including identical postoperative prescriptions for acetaminophen, ibuprofen, aspirin, and 10 tablets of oxycodone 5 mg. Patient's opioid use was tracked via daily text messages for the first two weeks after surgery. Patient's sleep quality and overall pain were assessed via twice daily text messages (one in the morning and one at night, respectively) on a 0-10 scale. Patient-reported outcome measures such as Patient-Reported Outcome Measurement Information System (PROMIS) in six domains, International Knee Documentation Committee (IKDC) Subjective Knee Form, Numeric Pain Scale (NPS) at operative knee and whole body, Surgical Satisfaction (SSQ-8), and Musculoskeletal Outcomes Data Evaluation and Management System Preoperative Expectations and Met Expectations domains were assessed at baseline and at 2 weeks, 6 weeks, and 3 months postoperatively. Continuous variables were analyzed with Wilcoxon Rank-Sum test and categorical variables were analyzed with Chi-Squared test.

RESULTS: There were no significant differences in baseline demographics and operative factors between groups. Patients randomized to the OLPMEC group had significantly lower baseline PROMIS Depression and Anxiety scores than the TPMEC group. Patients randomized to the OLPMEC group consumed significantly fewer number of oxycodone tablets and less milligram morphine equivalents (MMEs) at all timepoints postoperatively ($p<0.01$), with no significant differences in reported pain, sleep quality, or side effects between groups (Table 1). By day 14, OLPMEC patients had consumed less than half the MMEs as TPMEC patients on average (Table 1, OLPMEC 5.0 MME vs. TPMEC 10.6 MME, $p<0.001$). There were no differences in number of patients who refilled their oxycodone prescription within 14 days after surgery between groups (OLPMEC: 2 patients (3.9%); TPMEC: 5 patients (9.1%); $p=0.44$). There were no additional refills in either group after postoperative day 14. Patients in the OLPMEC group had better PROMIS Anxiety and Social Satisfaction at two weeks postoperatively and better PROMIS Depression at 3 months postoperatively (Table 2, $p<0.02$). There were no differences in any other patient-reported outcome measures at 2 weeks, 6 weeks, or 3 months postoperatively between the groups. At postoperative day 14, the OLMPEC group had significantly greater number of patients that consumed 0 oxycodone tablets compared to the TMPEC group (Figure 1, OLPMEC: 20 patients (39.2%) vs. TPMEC: 6 patients (11.5%), $p=0.001$).

DISCUSSION AND CONCLUSION: Patient counseling and education does reduce patient consumption of opioid medication after ACLR. The instruction to take oxycodone only as a last resort if the pain was unbearable resulted in less opioid use but was not associated with a significant difference in patient-reported postoperative pain and sleep quality. Patient counseling may be an effective method of minimizing the amount of opioid taken postoperatively after ACL reconstruction, without jeopardizing patient pain control and patient-reported outcomes measures.

**Figure 1.**




*At postoperative day 14, the OLPMEC group had significantly greater number of patients that consumed 0 oxycodone tablets compared to the TPMEC group (OLPMEC: 20 patients (39.2%) vs TPMEC: 6 patients (11.5%), p=0.001).

**Figure 2.**

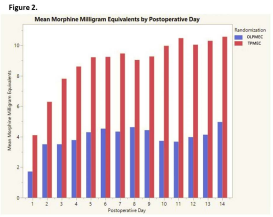



**Table 1. Postoperative Day 1, 3, 5, 4, 7, 14 Sleep Quality, Pain, and MME by Randomization**

| Outcome Measurement | Postoperative Day 1 OLPMEC Mean ± SD or N(%) | Postoperative Day 1 TPMEC Mean ± SD or N(%) | p-value | Postoperative Day 2 OLPMEC Mean ± SD or N(%) | Postoperative Day 2 TPMEC Mean ± SD or N(%) | p-value | Postoperative Day 3 OLPMEC Mean ± SD or N(%) | Postoperative Day 3 TPMEC Mean ± SD or N(%) | p-value |
|---|---|---|---|---|---|---|---|---|---|
| Sleep – Worst Pain | 4.6±2.9 | 4.7±2.8 | 0.89 | 6.1±3.4 | 5.6±2.4 | 0.25 | 4.7±2.2 | 4.9±2.5 | 0.83 |
| Sleep – Pain Right Now | 5.0±3.2 | 5.7±3.5 | 0.94 | 4.0±3.2 | 4.2±3.4 | 0.90 | 3.3±2.0 | 3.0±2.2 | 0.24 |
| Sleep Quality | 4.9±2.6 | 4.9±2.6 | 0.94 | 4.7±2.4 | 5.2±2.5 | 0.24 | 5.7±2.2 | 5.9±2.0 | 0.67 |
| NPS – Worst Pain | 5.9±2.5 | 5.6±2.5 | 0.61 | 5.8±2.3 | 5.6±2.1 | 0.41 | 4.5±2.1 | 4.7±2.3 | 0.88 |
| NPS – Pain Now | 4.5±2.5 | 3.8±3.0 | 0.52 | 3.4±1.7 | 3.4±1.8 | 0.58 | 2.9±2.0 | 2.9±2.2 | 0.87 |
| Cumulative Pill Count | 1.1±1.7 | 1.7±2.2 | **<0.001*** | 2.3±3.0 | 4.2±3.0 | **0.0013*** | 2.3±3.1 | 5.2±3.2 | **<0.001*** |
| MME | 1.7±2.5 | 4.1±3.4 | **<0.001*** | 3.5±4.5 | 6.3±4.5 | **0.0013*** | 3.5±4.7 | 7.8±4.8 | **<0.001*** |
| Side Effects | 3 (6.1) | 8 (16.7) | 0.20 | 2 (4.3) | 5 (18.4) | 0.05 | 3 (6.0) | 11 (22.9) | **0.02*** |

| Outcome Measurement | Postoperative Day 4 OLPMEC Mean ± SD or N(%) | Postoperative Day 4 TPMEC Mean ± SD or N(%) | p-value | Postoperative Day 7 OLPMEC Mean ± SD or N(%) | Postoperative Day 7 TPMEC Mean ± SD or N(%) | p-value | Postoperative Day 14 OLPMEC Mean ± SD or N(%) | Postoperative Day 14 TPMEC Mean ± SD or N(%) | p-value |
|---|---|---|---|---|---|---|---|---|---|
| Sleep – Worst Pain | 4.0±2.3 | 4.7±2.5 | 0.49 | 3.1±2.0 | 3.7±2.0 | 0.47 | 2.1±2.0 | 2.2±2.1 | 0.77 |
| Sleep – Pain Right Now | 2.6±2.1 | 2.5±2.0 | 0.78 | 2.2±2.0 | 2.3±2.1 | 0.92 | 1.6±1.9 | 1.6±1.8 | 0.87 |
| Sleep Quality | 5.8±2.1 | 6.0±2.0 | 0.77 | 5.5±2.4 | 5.7±2.1 | 0.88 | 6.1±2.5 | 6.4±2.1 | 0.59 |
| NPS – Worst Pain | 4.0±2.0 | 4.3±2.4 | 0.85 | 3.7±2.3 | 3.7±2.0 | 0.65 | 2.3±2.1 | 2.4±2.4 | 0.88 |
| NPS – Pain Now | 2.5±2.1 | 2.4±2.3 | 0.75 | 2.3±2.0 | 2.0±2.3 | 0.39 | 1.6±1.9 | 1.4±2.2 | 0.22 |
| PIQ Count | 2.5±5.5 | 5.7±4.0 | **<0.001*** | 2.9±5.9 | 6.3±4.7 | **<0.001*** | 5.3±6.1 | 7.0±6.1 | **<0.001*** |
| MME | 3.8±5.0 | 8.6±6.0 | **<0.001*** | 4.3±5.8 | 9.5±7.1 | **<0.001*** | 5.0±6.2 | 10.6±5.1 | **<0.001*** |
| Side Effects | 8 (16.0) | 7 (13.5) | 0.78 | 1 (2.4) | 4 (8.2) | 0.37 | 1 (2.2) | 1 (2.1) | 1.0 |
| Received Refill | -- | -- | -- | -- | -- | -- | 2 (5.9) | 5 (9.1) | 0.44 |
| Total Number of Refills | -- | -- | -- | -- | -- | -- | 0.04±0.2 | 0.13±0.5 | 0.28 |

**Table 2. 2 week, 6 week, and 3 month PROs by Randomization**

| Outcome Measurement | 2 weeks OLPMEC Mean ± SD or N(%) | 2 weeks TPMEC Mean ± SD or N(%) | p-value | 6 weeks OLPMEC Mean ± SD or N(%) | 6 weeks TPMEC Mean ± SD or N(%) | p-value | 3 month OLPMEC Mean ± SD or N(%) | 3 month TPMEC Mean ± SD or N(%) | p-value |
|---|---|---|---|---|---|---|---|---|---|
| PROMIS PF | 31.8±6.3 | 29.5±6.6 | 0.12 | 39.2±6.0 | 39.7±6.7 | 0.78 | 45.2±5.4 | 44.7±4.6 | 0.69 |
| PROMIS PI | 54.8±6.5 | 50.8±6.9 | 0.01 | 52.1±7.8 | 51.9±6.2 | 0.98 | 49.5±6.4 | 51.7±6.8 | 0.07 |
| PROMIS Fatigue | 53.1±5.8 | 56.8±6.5 | 0.08 | 47.8±7.3 | 50.4±9.5 | 0.22 | 47.2±7.2 | 49.2±7.5 | 0.14 |
| PROMIS SS | 39.5±7.8 | 35.3±8.3 | **0.02*** | 46.3±6.7 | 46.2±9.1 | 0.64 | 52.1±7.2 | 49.3±8.4 | 0.13 |
| PROMIS Anxiety | 51.9±8.2 | 57.8±8.2 | **0.01*** | 47.9±8.8 | 50.4±9.1 | 0.41 | 47.1±9.8 | 51.4±7.8 | 0.14 |
| PROMIS Depression | 49.6±6.8 | 51.5±9.3 | 0.08 | 45.5±8.1 | 48.1±8.5 | 0.23 | 44.9±8.8 | 50.3±8.0 | **0.01*** |
| Tegner Activity Scale | 1.2±1.6 | 0.8±1.0 | 0.31 | 1.8±8.7 | 2.2±1.7 | 0.59 | 3.7±1.1 | 2.9±1.2 | 0.69 |
| Numeric Pain Score – Operative Knee | 2.4±1.4 | 3±2.8 | 0.84 | 1.2±1.6 | 1.8±1.8 | 0.15 | 1.1±1.3 | 1.5±1.9 | 0.80 |
| Numeric Pain Score – Whole Body | 0.8±1.5 | 1.1±1.7 | 0.36 | 0.1±0.6 | 1.0±1.9 | 0.29 | 0.1±0.5 | 0.4±1.1 | 0.67 |
| SAQB | 77.0±11.8 | 70.3±14.4 | 0.10 | 81.5±9.0 | 80.2±15.2 | 1.00 | 83.8±11.1 | 77.6±11.9 | 0.06 |
| MOOMS | 58.7±20.9 | 58.9±30.4 | 0.76 | 66.0±21.5 | 74.8±25.8 | 0.08 | 71.6±23.7 | 77.4±17.6 | 0.47 |
| Postoperative Met Expectations | | | | | | | | | |
| WOC | -- | -- | -- | -- | -- | -- | 53.0±7.8 | 52.0±14.8 | 0.52 | 59.6±10.3 | 58.2±12.9 | 0.80 |