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Scientific Abstracts > Acute Pain

## Addition of Liposomal Bupivacaine to Adductor Canal Block for Post-operative Pain Following Knee Arthroplasty

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### Introduction

Because of advances in analgesia, length of stay (LOS) for Total Knee Arthroplasty (TKA), has decreased from multiple days to where Same Day Discharge (SDD) is possible.

Analysis from our Web Based Self-Reporting Portal (WBRP) has shown the most significant post-operative pain occurring on POD#2. Many of the Multi-Modal Analgesia (MMA) modalities used so successfully while patients are hospitalized are no longer available after discharge.

We recently added to our WBRP the ability to query post-op daily MMA medication use and subsequent necessity for supplemental narcotics. We could now make adjustments to our MMAP and track effectiveness.

At ASRA 2018, we presented a case report using Liposomal Bupivacaine (LB) for ACB and iPACK (LB-ACB/iPACK) for a complex TKA revision in a patient on significant pre-op chronic narcotics<sup>1</sup>. He had marked pain relief extending 5-6 days. (LB use for ACB is considered off-label at this time but is being done by many practitioners<sup>2</sup>). Shortly thereafter, we began using LB-ACB/iPACK as protocol for our complex TKA revisions. After continued positive experiences, we proposed adopting this as standard protocol for primary TKAs. As we now have the ability to query post-op pain metrics, we can quantify the efficacy of our Standard-MMAP and measure effectiveness of the LB-ACB/iPACK adjustment. After establishing baseline data on 130 patients, we began LB-ACB/iPACK as protocol for primary TKAs for the group of four arthroplasty surgeons who share the WBRP.

### Materials and Methods

From May through November 2019 medication use (narcotic and non-narcotic), pain levels, pain satisfaction and patient data were collected daily for POD 0-7 using our WBRP. IRB Waiver was obtained for this data analysis. This data, patient reported feedback and contemporary physical therapist insights were used to analyze post-operative analgesia and function. This resulted in unanticipated modifications to our LB-ACB/iPACK formulation.

Our Standard MMAP for TKA is: (adjusted for medical condition)

Pregabalin 150 mg po, Acetaminophen 1000 mg iv, Ketoralac 30 mg iv, Dexamethasone 0.15 mg/kg iv, Ketamine 0.25 mg/kg iv

ACB - 15 ml Bupivacaine 0.25%

iPACK - 20 ml Bupivacaine 0.25% w epi

Done by anesthesiologist pre-op<sup>3</sup>

Periarticular Injection - 30ml Bupivacaine 3/8%+Methylprednisolone 80ml+ketoralac 30mg

Done by surgeon intra-op.

Anesthesia is provided with Isobaric Spinal Mepivacaine<sup>4</sup> 39-50 mg. Intra-operative sedation is primarily propofol.

Unless patient is on chronic narcotics, narcotics are specifically held until recovery.

Once discharged, we continue MMA with:

Acetaminophen 1000 mg po TID, Ibuprofen 600-800 po TID , Gabapentin 300 mg po QHS

Oxycodone 5 mg po PRN pain not adequately controlled with the above.

We collected baseline data on 130 patients.

On July 15, 2019, we modified our Standard MMAP to include LB added as follows:

**LB#1-**

ACB = 15 ml **LB** + 5 ml Bupivacaine 0.5 %

iPACK = 5 ml **LB** +15 ml Bupivacaine 0.25%.

After collecting data on 70 patients our feedback showed:

Statistically significant decrease in daily narcotics required each POD 1-7

However, we also had:

10 patients with episodes of Saphenous distribution numbness persisting 7-10 days (with complete resolution)

5 episodes of "Proprioceptive Loss" lasting several days where there was such profound analgesia of the knee joint that we felt patient was at risk for hyperextension, knee damage or falls due to lack of perception of knee position. We see this occasionally with our standard MMAP where it typically resolves in 12 hours.

Our assessment was that the knee was "too numb." On August 11, 2019 we made adjustments, decreasing the LB in the ACB and removing it from the iPACK.

**LB#2-**

ACB - 10 ml **LB** + 5 ml Bupivacaine 0.5%

iPACK - 20 ml Bupivacaine 0.25% w epi

We collected data on 161 patients.

With **LB#2**, the prolonged saphenous numbness and proprioceptive loss resolved. We did, however, have 16 patients (10%) with excessive quad weakness, 7 of which required Knee Immobilizer (KI) and two required overnight admission. Quad weakness resolved in less than 24 hours and was felt to be due to excess free bupivacaine in the ACB.

On October 1, 2019 we again made adjustments, decreasing the free bupivacaine in the ACB.

### **LB#3-**

ACB = 10 ml **LB** + 5 ml Bupivacaine

0.25%

iPACK = 20 ml Bupivacaine 0.25% w epi

We collected data on 132 patients.

With **LB#3**, we had minimal quad weakness, no prolonged saphenous numbness nor significant proprioceptive loss.

## Results/Case Report

Our Post-op Standard MMAP was already very effective with minimal rescue narcotic use POD 1-7:

1.05 average daily use of Oxycodone 5 mg pills POD 1-7

7.48 total Oxycodone 5 mg pills over the 8-day period of POD 0-7

25% of patients used ZERO narcotics through the entire POD 1-7

While **LB#1** and **LB#2** had decreased postoperative narcotic consumption, prolonged saphenous numbness and proprioceptive loss and increased incidence of quadriceps weakness required adjustments.

**LB** 10 ml added to 5 mL of 0.25% bupivacaine (**LB#3**) for ACB gave best results and improved analgesia demonstrated by:

44% decrease in average daily use of Oxycodone 5 mg pills POD 1-7

(1.05 decreased to 0.59 pills / day)  $p < 0.01$

43% decrease in average total Oxycodone 5 mg pills over the 8-day period of POD 0-7

(7.48 decreased to 4.25 pills / POD 0-7)  $p < 0.01$

Increase from 25% to 38% of patients taking ZERO narcotics entire POD 1-7

There was no difference in patient satisfaction (94%) nor 12-week postoperative Knee injury and Osteoarthritis Outcome Score (KOOS) Jr. ( $p=0.39$ ), Veterans Rand 12 (VR-12) Physical Component Score ( $p=0.10$ ) or VR-12 Mental Component Score ( $p=0.12$ ).

## Discussion

As Total Knee Arthroplasty moves to SDD, it will become even more important and challenging to control pain post-discharge. This needs to be done while decreasing reliance on narcotics.

Compared to our already very low use of post-op narcotics with our Standard MMAP, the addition of **LB** 10 ml to the ACB accomplished an even further reduction with 43% less in narcotics used POD 1-7 and an increase from 25% to 38% of patients who required ZERO narcotics POD 1-7.

## References

1. Multi-Modal Anesthesia for Total Knee Revision in a Patient on Chronic Narcotics Mark Hamilton, MD, ASRA 17<sup>th</sup> Annual Meeting, November 2018
2. Improved pain control with adductor canal block using liposomal bupivacaine after total knee replacement: a retrospective cohort study. Akshay Lakra, MD. Arthroplasty Today, Sept 2019, Vol 5, issue 3, 325-328
3. Addition of Infiltration Between the Popliteal Artery and the Capsule of the Posterior Knee and Adductor Canal Block to Periarticular Injection Trial, Kim, David H. MD Anesthesia & Analgesia: August 2019 - Volume 129 - Issue 2 - p 526-535
4. Mepivacaine Spinal Anesthesia Facilitates Rapid Recovery in Total Knee Arthroplasty Compared to Bupivacaine, M.Chad Mahan. Journal of Arthroplasty June 2018, V 33, issue 6 Pgs 1699-1704 (Both drugs are off label for spinal use but are uncommon use in the US)

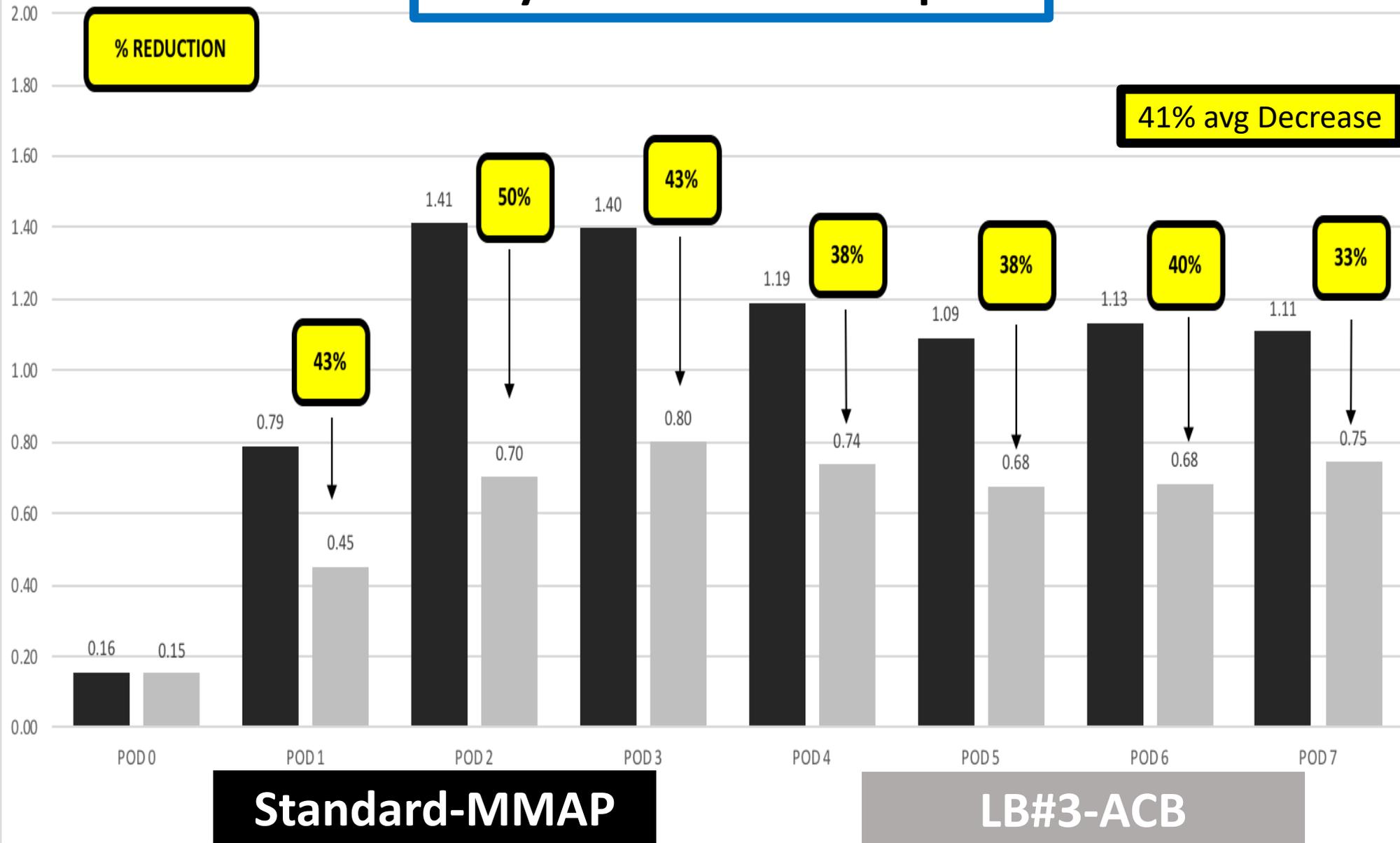
## Disclosures

Yes

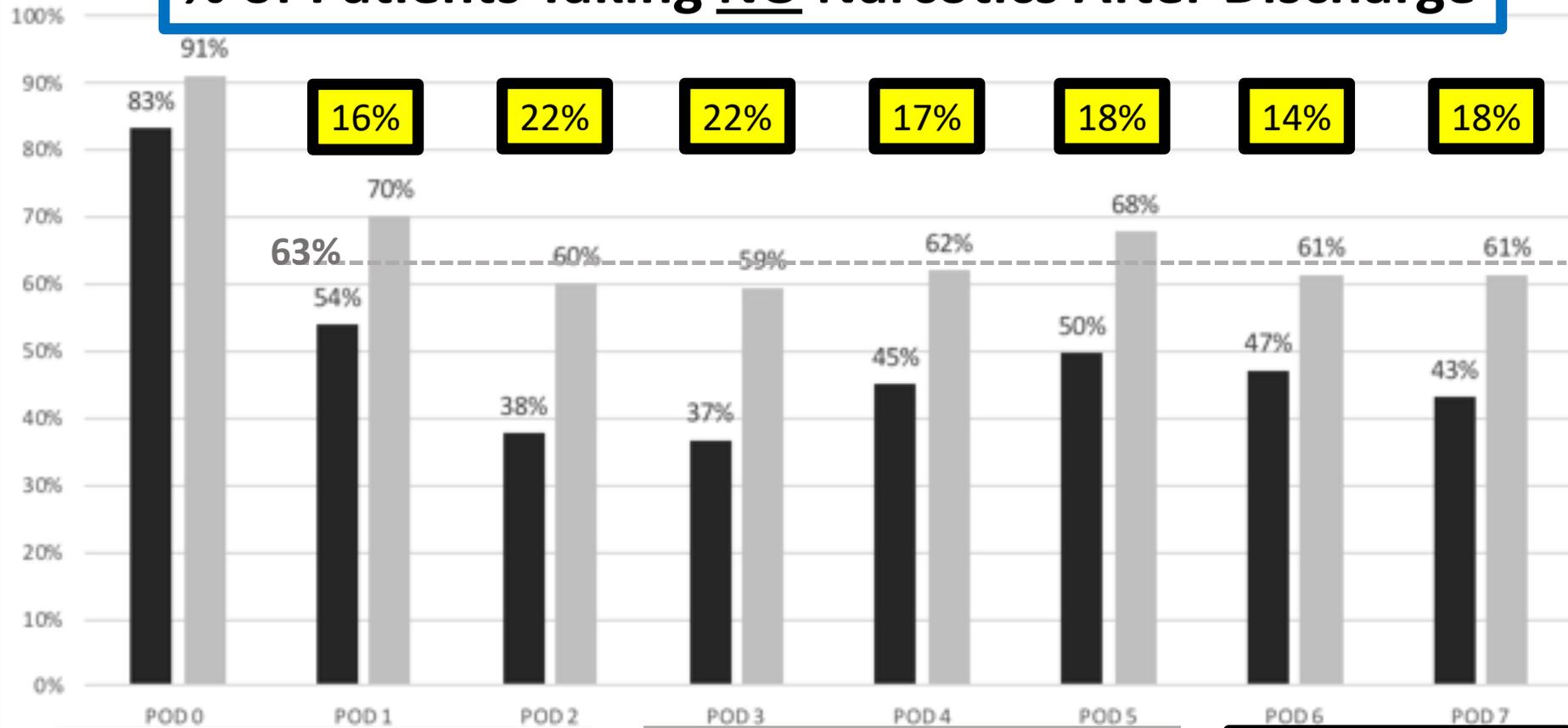
## Tables / Images

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# Daily Narcotic Consumption



# % of Patients Taking NO Narcotics After Discharge



16%

22%

22%

17%

18%

14%

18%

63%

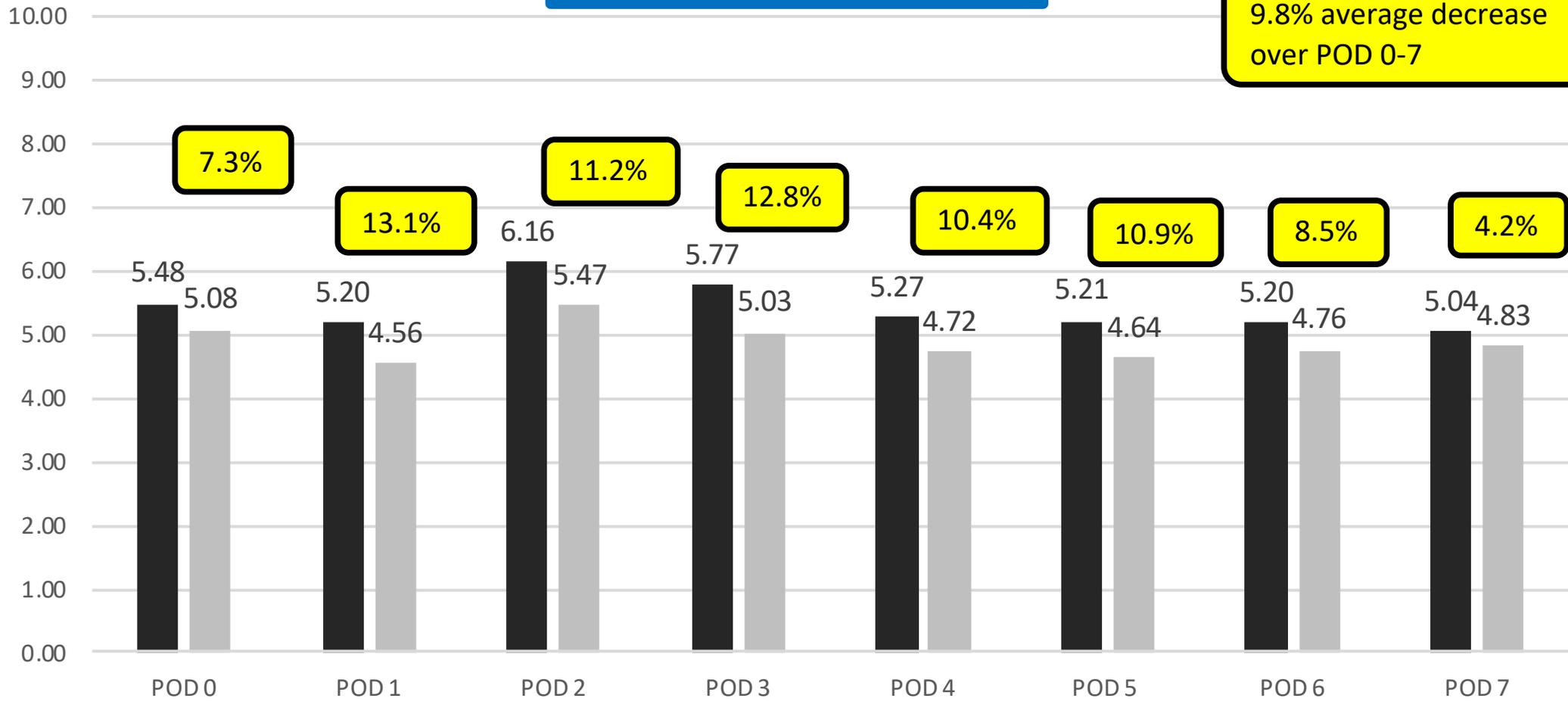
Standard-MMAP

LB#3-ACB

18% avg Increase

# VAS Pain Scores

9.8% average decrease over POD 0-7



**Standard-MMAP**

**LB#3-ACB**