Make Patients Feel More Comfortable After Outpatient Spine and Orthopaedic Surgery: What's New In Pain Management

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Disclosure Information

- Consultant
  - Stryker
  - Pacira

Future of Health Care

Why the shift to outpatient procedures ?

- For the appropriate procedures and patient, there is a need to provide quality care at a reduced price
  - Facilitated by improvements in surgical/anesthesia techniques
  - Increase patient satisfaction
  - Reduce overall costs
- More complex procedures are moving with to the outpatient setting.

Terminology

Outpatient

- Outpatient procedures are performed either in the hospital or ambulatory surgery center

Ambulatory Surgery Center

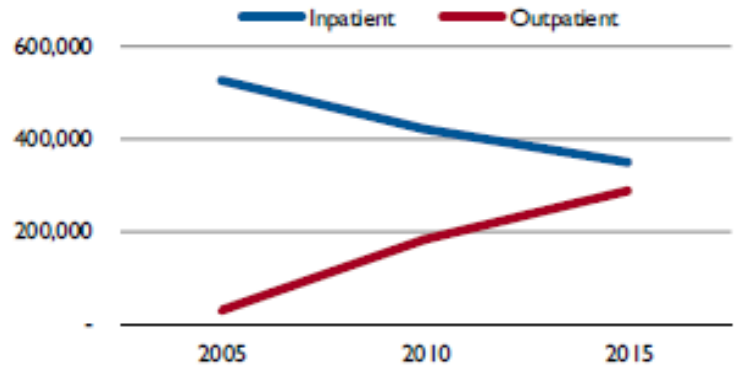
- Free standing facilities (not connected but may be affiliated with a hospital)
- Surgeons perform same day procedures .
- Some states require that patients are eligible for a procedure in the ASC have to be discharged home.

Ambulatory Spine Surgery

Spine Surgery Shift to Outpatient

- 2015 Shift of Spine to ASCs – 45%
- Driven by Technology, Anesthesia, Physician Mindset and Insurance Acceptance
- Society Ambulatory Spine Surgery – NASS launch 2011 – Goal 50% to ASC
- Insight from Spine Investments – MSP

Estimated Migration of Spine Surgery from Inpatient to Outpatient



Spine Surgery	2005	2010	2015	CAGR
Inpatient	523,629	417,770	348,150	-4.0%
Outpatient	27,559	179,044	284,850	26.3%
Total	551,188	596,814	633,000	1.4%
% Outpatient	*5.0%*	*30.0%*	*45.0%*	

Source: NeuroSource Inc. 2005

Procedural Trends in Outpatient Spine Surgery

Traditional

- Anterior Cervical Discectomy and Fusion (ACDF)
- Laminectomies
- Discectomies

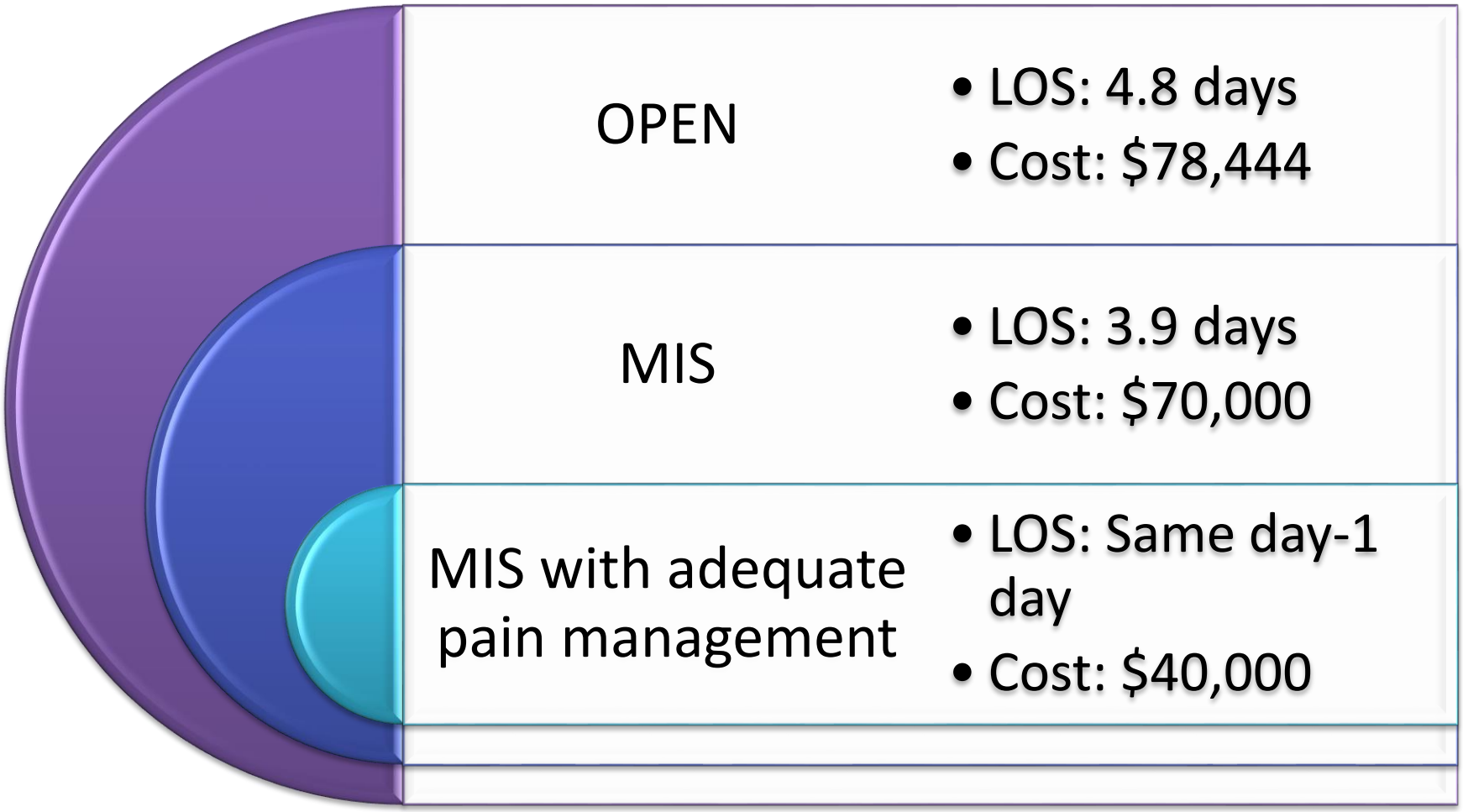
Trends

- MIS Transforaminal Lumbar Interbody Fusion
- MIS Posterior Lumbar Interbody Fusion
- Typically 1-2 levels

Minimally Invasive Techniques

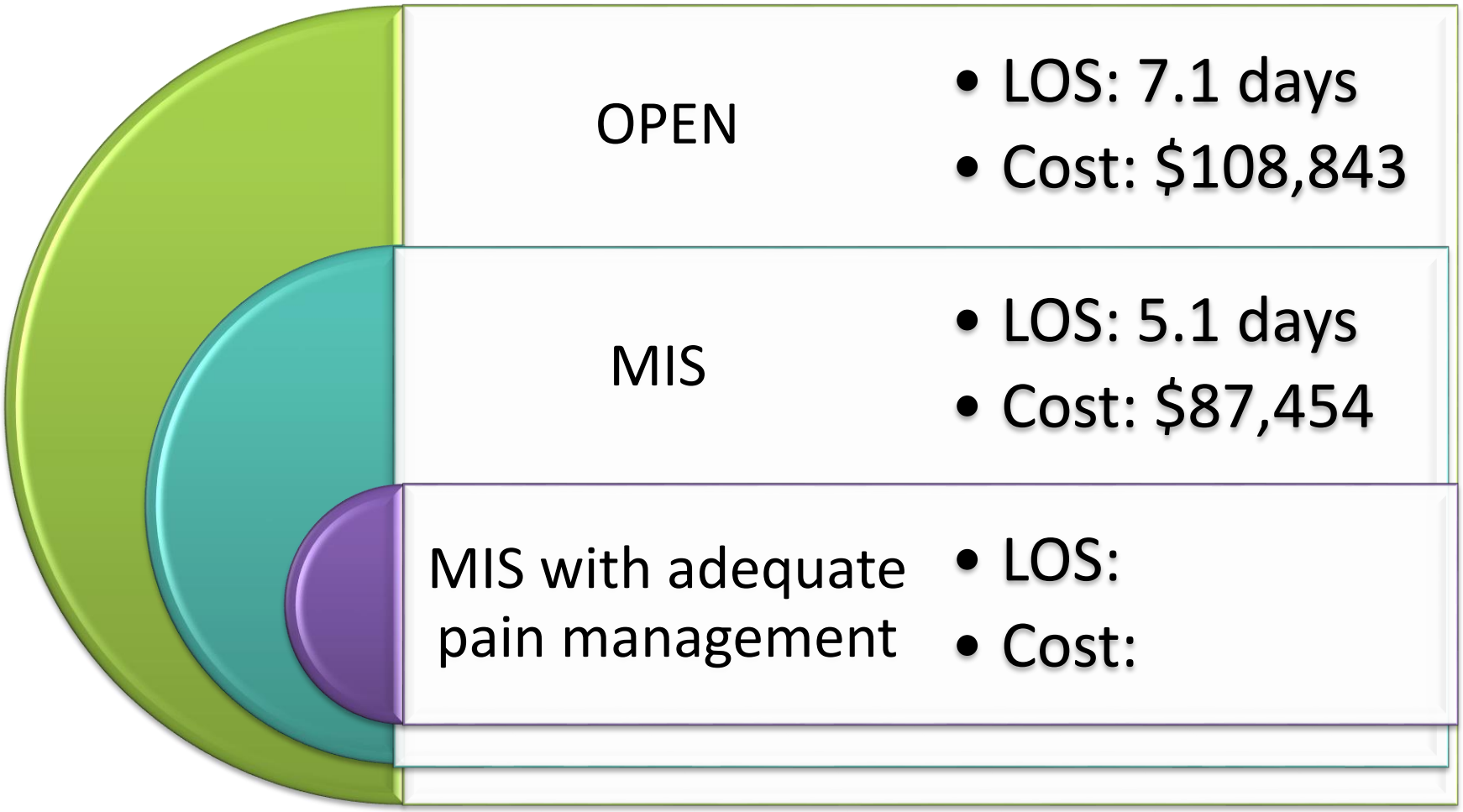
- Potential advantages
  - Avoids morbidity of open procedures
  - Decreased postoperative pain
  - Shorter hospital LOS
  - Reduced utilization of services
  - Improved functional and clinical outcomes
  - Increased patient satisfaction

Cost: Single Level Fusion



Wang M et al. An analysis of the differences in the acute hospitalization charges following minimally invasive versus open posterior lumbar interbody fusion. J Neurosurg Spine. 2010 Jun;12(6):694-9

Cost: Two Level Fusion



Wang M et al. An analysis of the differences in the acute hospitalization charges following minimally invasive versus open posterior lumbar interbody fusion. J Neurosurg Spine. 2010 Jun;12(6):694-9

Spine

SPINE Volume 39, Number 9, pp 761-768

HEALTH SERVICES RESEARCH

Causes and Risk Factors for 30-Day Unplanned Readmissions After Lumbar Spine Surgery

Andrew J. Pugely, MD, Christopher T. Martin, MD, Yubo Gao, PhD, and Sergio Mendoza-Lattes, MD

- Retrospective review of large multicenter clinical registry evaluating readmissions after lumbar spine operations
- 4.4% incidence of 30-day unplanned admissions (695/15,568 patients)

Spine

SPINE Volume 39, Number 9, pp 761-768

HEALTH SERVICES RESEARCH

Causes and Risk Factors for 30-Day Unplanned Readmissions After Lumbar Spine Surgery

Andrew J. Pugely, MD, Christopher T. Martin, MD, Yubo Gao, PhD, and Sergio Mendoza-Lattes, MD

- Most frequent reasons for readmission
  - Wound complications – 38.6%
  - Inadequate pain relief – 22.4%
  - Thromboembolic events – 9.4%
  - Systemic infections – 8.0%

11–18

Factors affecting hospital length of stay following anterior cervical discectomy and fusion

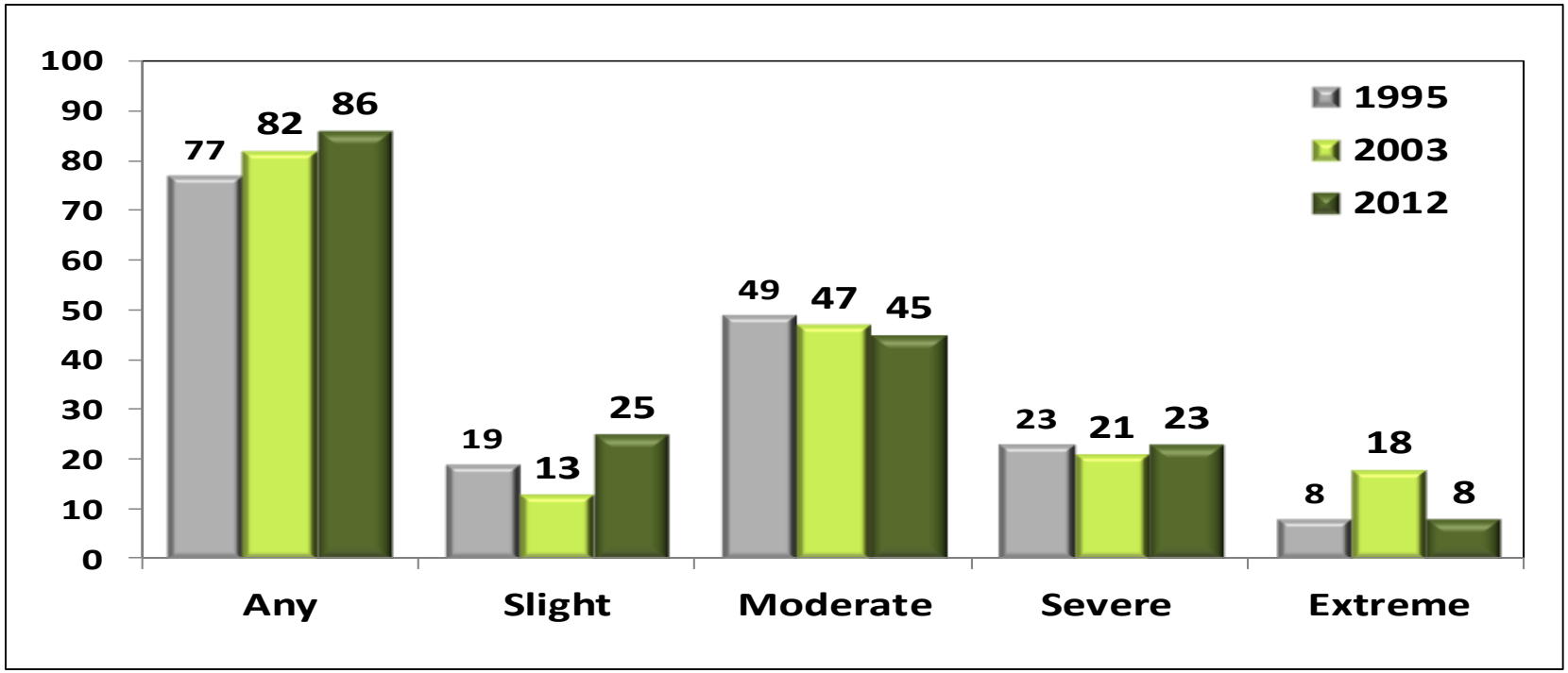
Authors Paul M Arnold[1], Lisa R Rice[2], Karen K Anderson[1], Joan K McMahon[2], Lynne M Connelly[3], Daniel C Norvell[4]

- Retrospective review of consecutive series of ACDF procedures intended to identify factors contributing to increased hospital LOS
- Most common complication – uncontrolled postoperative pain (13%)

Why is Managing Pain So Important?

More Patients are Reporting More Post-operative Pain

Despite countless technological & surgical advances designed to reduce surgical insult & improve postsurgical recovery, more patients than ever report experiencing postsurgical pain



Gan et al ASRA 2012

Consequences of Postoperative Pain

Patient Consequences:

- Prolonged patient suffering – physical and psychological
- Longer postsurgical recovery time[1]
- Delayed ambulation and daily functioning[1]
- Higher incidence of surgery-related complications[2]
- Increased length of stay (LOS) in the hospital[2]
- Hospital readmission[3]
- Unrelieved acute postsurgical pain is a predictor for chronic pain[3]

Hospital Implications

- Increased Cost
- Increased Length of Stay
- Less than Optimal HCAHPS Score
- Possible Increased Hospital Readmission Rates

1. Ashburn MA, Caplan RA. *Anesthesiology*. 2004;100(6):1573-81.
2. Agency for Healthcare Research & Quality (AHRQ). Acute Pain Management: Operative or Medical Procedures and Trauma. Available at: http://www.ahrq.gov/clinic/medtep/acute.htm. Accessed Sept 30, 2011.
3. Perkins FM, Kehlet, H. *Anesthesiology* 2000; 93:1123-33.

Pain and Patient Satisfaction (HCAPS)

- Pain management is the only clinical marker assessed: The HCAHPS survey contains 27 questions on 8 topics ranging from communication and cleanliness to staff responsiveness and pain management[1]
  - *How often was your pain well controlled?* (question 13)
  - *How often did the hospital staff do everything they could to help you with your pain?* (question 14)

- HCAHPS scores have a direct impact on reimbursement: 30% of a hospital's value-based incentive payment from CMS is determined by HCAHPS scores[2]

- Hospital HCAHPS performance is publically available: Results are reported online quarterly at[2]: http://www.medicare.gov/hospitalcompare

1. HCAHPS fact sheet. HCAHPS Website. http://www.hcahpsonline.org/files/HCAHPS%20Fact%20Sheet%20May%202012.pdf. Updated May 17, 2012. Accessed October 9, 2012.
2.Center for Medicare and Medicaid Services. Electronic presentation available at: http://www.hcahpsonline.org/Files/March%202013%20HCAHPS%20Intro%20Training%20Slides%20Session%20II_3-5-13.pdf Accessed May 6, 2013.

Pro's and Con's of Opioids

Benefit

- **Effective**
- **Low cost**

Con's

- **Side effects/associated costs**
- **Falls**
- **Adverse events over 10%**
- **Increased length of stay**
- **PCAs**
  - Dose errors
  - Monitoring
  - Risk of respiratory depression
- **Societal**

Opioid-Related Adverse Events

Common ORAEs	Incidence	Opioid-Related Risk Factors
Constipation	40%-95%[2]	• Can occur with a single dose of morphine[2]
Nausea & vomiting	≥50%[3,4]	• Patients receiving injectable opioids have ~5 times higher risk of requiring medications to treat nausea and vomiting[3] • Increases with cumulative opioid dose[5]
Urinary retention	18%-35%[2,6]	• Occurs most frequently with intrathecal morphine[2,5] • Risk increases in patients with benign prostatic hyperplasia[7]
Pruritus	30%->50%[5,8]	• Highest incidence associated with epidural administration[8]
Respiratory depression	1.1%[9]	• Different opioid regimens are associated with variations in incidences[9]

1. Oderda GM, et al. *J Pain Symptom Manage*. 2003;25(3):276-283.
2. Benyamin R, et al. *Pain Physician*. 2008;11:S105-S120.
3. Suh D, et al. *Clin J Pain*. 2011;27:508-517.
4. Oderda GM, et al. *Ann Pharmacother*. 2007;41(3):400-406
5. Barletta J, et al. *Ann Pharmacother*.. 2011;45(7-8):916-923.
6. Rathmell JP, et al. *Anesth Analg*. 2005;101:S30-S43

Relationship Between Potential Opioid-Related Adverse Effects and Hospital Length of Stay in Patients Receiving Opioids After Orthopedic Surgery

Laura T. Pizzi, Pharm.D., M.P.H., Richard Toner, M.S., Kathleen Foley, Ph.D., Erin Thomson, M.P.H., Wing Chow, Pharm.D., Myoung Kim, Ph.D., Joseph Couto, Pharm.D., Marc Royo, B.S., and Eugene Viscusi, M.D.

Random sample of 402 surgical patients undergoing orthopedic procedures

Number of ORAE's

- 54.2% experienced ≧ 1 adverse effects
- 25.6% experienced ≧ 2 adverse effects
- 7.2% experienced ≧ 3 adverse effects

Adverse events with significant increase in LOS (days)

- 36.1% – nausea and vomiting (+ 0.7)
- 6.5% – constipation (+1.4)
- 3.7% – confusion (+1.1)

Patient Populations at a Greater Risk of Experiencing ORAEs

- Elderly: Risk increases with age in patients 61+[1]
- Obese patients[1]
- Patients with Respiratory Disease[1]
  - Including Sleep Apnea and COPD
- Males[2]
- Chronic Opioid Users[3]

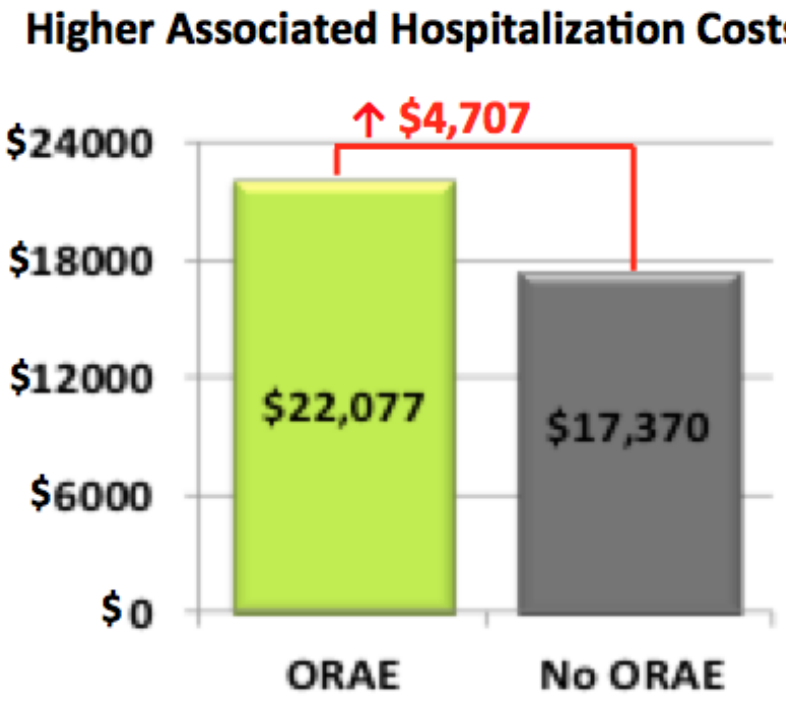
1. Adamson R, et al. *Hosp Pharm*. 2011;46 (6 Suppl 1):1-8.
2. 4. Andriole GL. Benign prostatic hyperplasia (BPH). The Merck Manual Home Health Handbook. http://www.merckmanuals.com/home/mens_health_ issues/prostate_ disorders/benign_prostatic_hyperplasia_bph.html. Updated October 2008. Accessed December 28, 2011.
5. Lewis NL, et al. *Crit Care & Pain*. 2005;5(4):127-129.

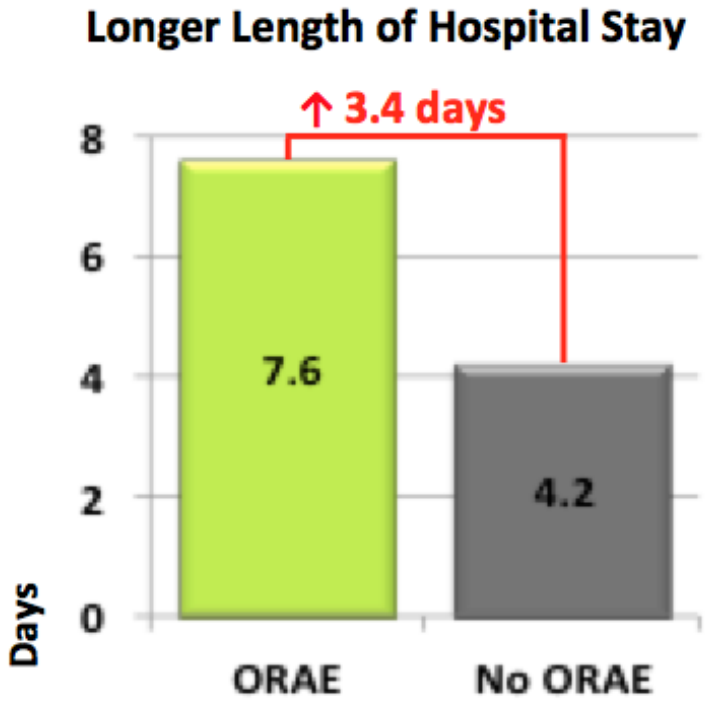
Factors affecting incidence of ORAEs[1-5]

- Route of administration
- Dose
- Tolerance
- Physical condition

1. Adamson R, et al. *Hosp Pharm*. 2011;46 (6 Suppl 1):1-8.
2. Barletta J, et al. *Ann Pharmacother*. 2011;45(7-8):916-923.
3. Zhao S, et al. *J Pain Symptom Manage*. 2004;28(1):35-46.
4. Andriole GL. Benign prostatic hyperplasia (BPH). The Merck Manual Home Health Handbook. http://www.merckmanuals.com/home/mens_health_ issues/prostate_ disorders/benign_prostatic_hyperplasia_bph.html. Updated October 2008. Accessed December 28, 2011.
5. Lewis NL, et al. *Crit Care & Pain*. 2005;5(4):127-129.

Opioid-Related Adverse Events Increases LOS and Hospital Costs





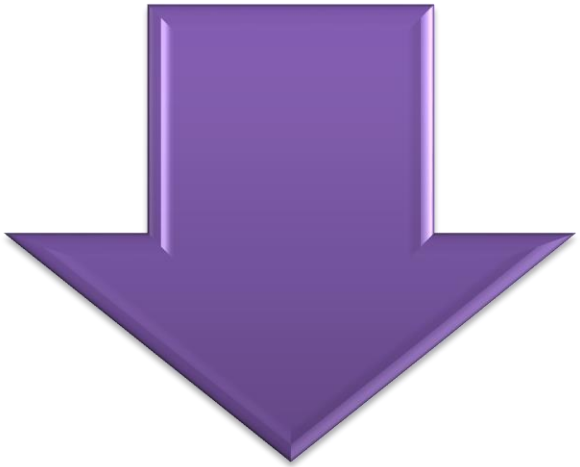
P<0.0001 for cost and LOS increases.

Goals for Pain Management

Improve outcomes and faster recovery

Increase efficiencies and improve care pathways

Improve pain scores and patient satisfaction



Reduce Costs and Readmission Rates

Reduce Opioids and ORAE

Reduce Falls, Infection Rates, and DVT

Decrease PACU Time and LOS

Decrease PCA and Pain Pumps

Performing Outpatient Spine Surgery

Patient Selection For Outpatient Spine Procedures

- Motivated Patient to Improve
- Compliant Patient
- Medical Clearance
- Low comorbidities
- Insurance

Preparing the Patient and the Staff

- Patient Expectations
  - Pain management (pre, intra, post-op) expectations
  - Therapy expectations
- Staff Preparation
  - Anesthesia
  - Nurses
  - Operating Staff
  - Therapist
  - Pharmacist

- Simulate the case with your staff
  - Especially for more complicated procedures (fusions)

Treating Postsurgical Pain in Outpatient Setting: Goals for Success

- Patient Selection
- Provide adequate analgesia
  - Local or general
- Easy to implement
  - Reduce complications and ensure there is consistency
- Minimal side effects
  - This can facilitate faster return to function
- Facilitate mobility
  - Compliance by patient and encouragement from therapist
- Ensure that it is cost-effective solutions
  - Track data
  - Ensure low to none readmission rates

Traditional Pain Management Techniques

NSAIDs

SPINE Volume 33, Number 2, pp 132–139

Effect of Parecoxib on Postoperative Pain After Lumbar Spine Surgery

A Bicenter, Randomized, Double-Blinded, Placebo-Controlled Trial

Kitti Jirarattanaphochai, MD,* Somboon Thienthong, MD,† Wimonrat Sriraj, MD, MS,† Surachai Jung, MD,* Aksorn Pulnitiporn, MD,‡ Somkid Lertsinudom, MD,§ and Thanit Foocharoen, MD§

Key Points

- Perioperative administration of parecoxib with PCA morphine resulted in significantly improved postoperative analgesic management compared with PCA morphine alone after lumbar spine surgery.
- Parecoxib 40 mg reduced the total amount of morphine required over 48 hours by 39% compared with placebo. Pain at rest was reduced by 30%. Ninety

NSAIDs

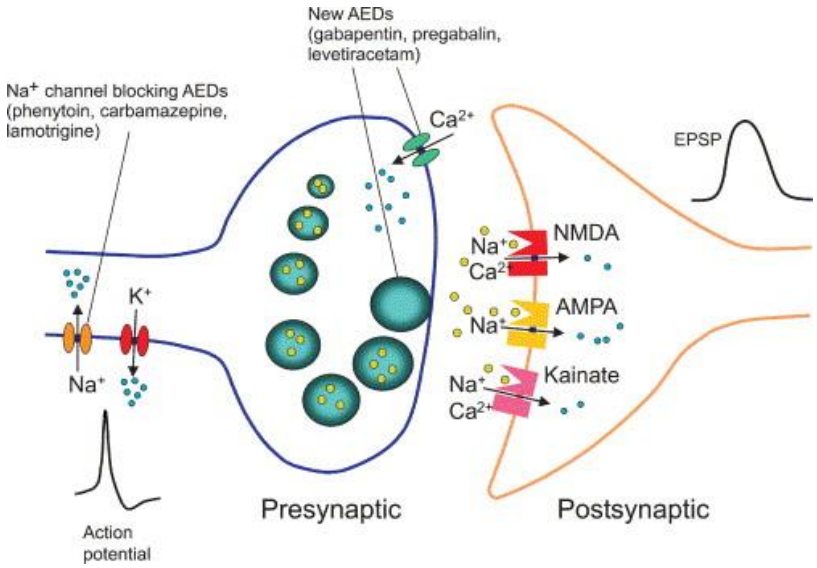
J Neurosurg Spine 9:22–31, 2008

Nonsteroidal antiinflammatory drugs for postoperative pain management after lumbar spine surgery: a meta-analysis of randomized controlled trials

KITTI JIRARATTANAPHOCHAI, M.D., PH.D., AND SURACHAI JUNG, M.D.

Conclusions. This meta-analysis provides evidence that the addition of NSAIDs to opioid analgesics in lumbar spine surgery provided better pain control than opioid analgesics alone. *(DOI: 10.3171/SPI/2008/9/7/022)*

Gabapentinoids



- Attenuate the nociceptive response by facilitating central desensitization
  - Bind to presynaptic calcium channels in nerve fibers
  - Inhibit release of excitatory neurotransmitters

Gabapentinoids

Spine

SPINE Volume 39, Number 6, pp E363-E368

RANDOMIZED TRIAL

Postoperative Pain and Long-Term Functional Outcome After Administration of Gabapentin and Pregabalin in Patients Undergoing Spinal Surgery

Gurjeet Khurana, MD,* Parul Jindal, MD,* Jagdish P. Sharma, MD,* and Krishan K. Bansal, MS, MCh†

➢ Key Points

- ❑ Perioperative administration of gabapentinoids reduces early static and dynamic pain.Findings of the study suggest that in postoperative pain management, gabapentin, and pregabalin are the preferred alternatives in multimodal analgesia.
- ❑ Gabapentinoids effectively reduce the opioid consumption and opioid-related adverse effects after surgery.

Epidural Local Anesthetics

Early Postoperative Analgesic Effects of a Single Epidural Injection of Ropivacaine Administered Preoperatively in Posterior Lumbar Interbody Spinal Arthrodesis

A Pilot Randomized Controlled Trial

Hyun Kang, MD, Ho Joong Jung, MD, Jae Sung Lee, MD, Jae Jun Yang, MD, Hwa Yong Shin, MD, and Kwang-Sup Song, MD

The results of our study provide evidence that a single epidural injection of 0.1% ropivacaine (10 mL) before one-level posterior lumbar interbody arthrodesis is effective and suitable for reducing early postoperative pain and opioid use without procedure-related complications. This appears to be a good component of multimodal pain management in lumbar spine surgery.

Epidural Steroids

SPINE Volume 27, Number 4, pp 343–346

Perioperative Use of Corticosteroid and Bupivacaine Combination in Lumbar Disc Surgery

A Randomized Controlled Trial

Hasan Mirzai, MD,* Idil Tekin, MD,† and Handan Alincak, MD†

In summary, we conclude that the perioperative use of bupivacaine and corticosteroids during lumbar discectomy maintains effective postoperative analgesia and decreases postoperative opioid usage without complications.

Epidural Steroids

SPINE Volume 32, Number 6, pp 609–616

Peridural Methylprednisolone and Wound Infiltration With Bupivacaine for Postoperative Pain Control After Posterior Lumbar Spine Surgery

A Randomized Double-Blinded Placebo-Controlled Trial

Kitti Jirarattanaphochai, MD,* Surachai Jung, MD,* Somboon Thienthong, MD,†
Wimonrat Krisanaprakornkit, MD, MSc,† and Chat Sumananont, MD*

Key Points

- Administration of methylprednisolone and bupivacaine was effective in reduction of morphine consumption and postoperative pain intensity after posterior lumbosacral spine surgery for discectomy, decompression, and/or spinal fusion.

Epidural Opioids

ELSEVIER

The Spine Journal 12 (2012) 646–651

THE SPINE JOURNAL

Clinical Study

Epidural fentanyl for postoperative analgesia after lumbar canal decompression: a randomized controlled trial

Mathew R. Guilfoyle, BSc, MBBCh, MRCS[a], Richard J. Mannion, PhD, FRCS[a], Patrick Mitchell, FRCS[b], Simon Thomson, FRCS[a,c,*]

Conclusion

Intraoperative bolus epidural fentanyl is a quick and simple technique that is effective at alleviating early post-operative pain after lumbar canal decompression without significant systemic side effects. This method of analgesia may be a useful adjunct in patients undergoing lumbar spine surgery.

PCA Pump

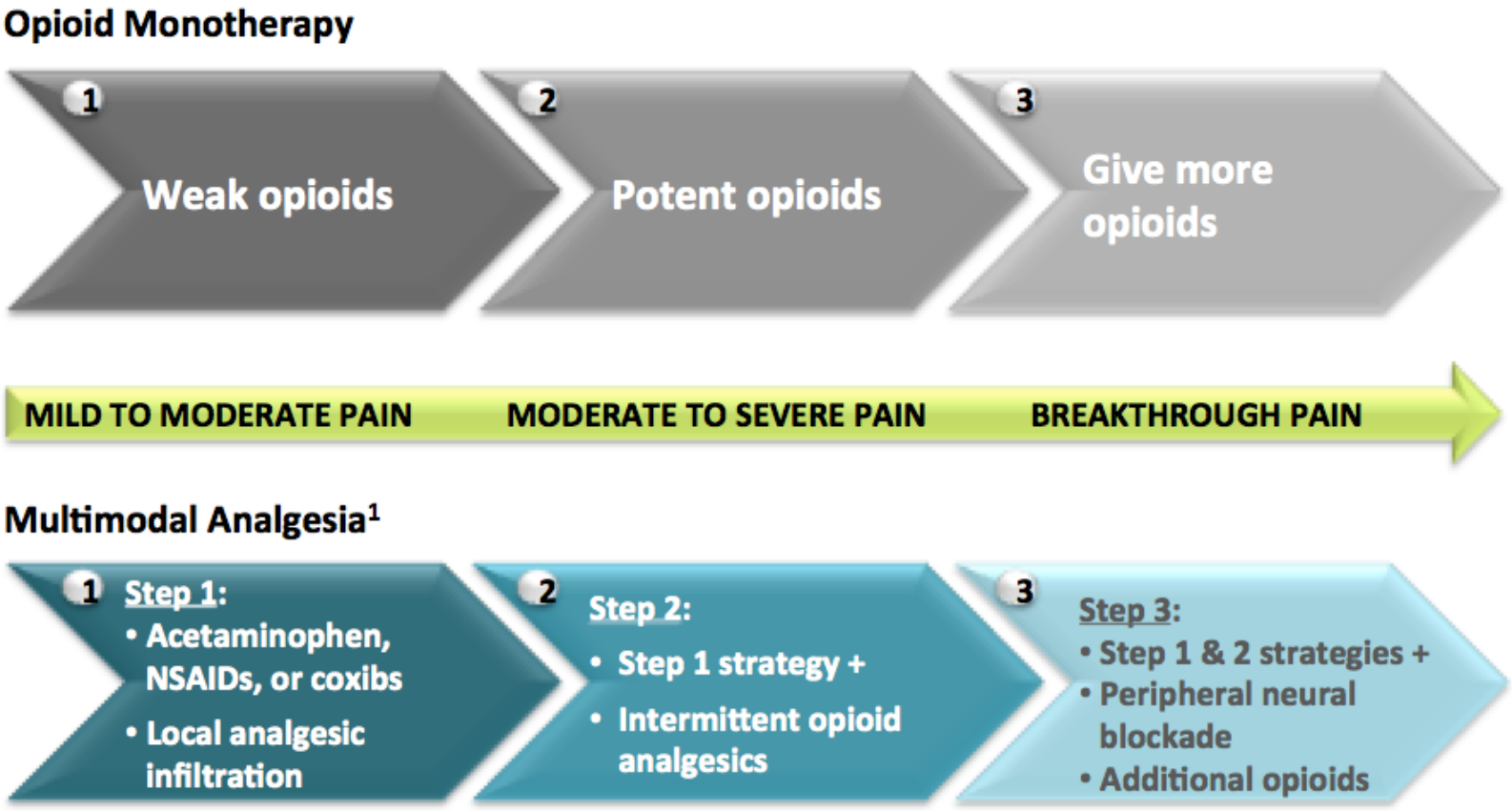
- Suboptimal efficacy
  - Analgesia
  - Duration
- Not staff- or patient-friendly
- Potential for complications
- Hinders rehabilitation
- Expensive

Novel Pain Management Techniques

Novel Strategies for Postsurgical Pain

- Medications
  - Route of administration – po, iv, epidural
  - Timing – preop, intraop, postop
  - Mechanism of action – NSAIDs, analgesics, gabapentinoids
- Injectable local anesthetics
  - Continuous infusion devices
  - Liposomal bupivicaine

Multimodal Analgesia



1. Crews JC, et al. *JAMA*. 2002;288:629-632.

Local Anesthesia for Spine Patients

- Although some patients with symptomatic spinal disease may benefit greatly from surgery, their multiple attendant comorbidities may make general anesthesia risky or contraindicated.
- Performing spinal surgery under local anesthesia is a safe and effective alternative when patient's major comorbidities preclude a general anesthetic.
- For all the seven patients studied, spinal surgery, performed under a local anesthetic, resulted in a statistically significant reduction in pain and improvement in function.

Surgical Neurology International

SNI: Spine, a supplement to *Surgical Neurology International*

OPEN ACCESS

For entire Editorial Board visit : http://www.surgicalneurologyint.com

Editor: **Nancy E. Epstein**, MD Winthrop University Hospital, Mineola, NY, USA

Thoracic and lumbar spinal surgery under local anesthesia for patients with multiple comorbidities: A consecutive case series

Muhammad Babar Khan, Rajesh Kumar, Syed Ather Enam

Multimodal Regimens

J Neurosurg 78:383–387, 1993

The perioperative use of corticosteroids and bupivacaine in the management of lumbar disc disease

RYAN S. GLASSER, M.D., ROBERT S. KNEGO, M.D., JOHNNY B. DELASHAW, M.D., AND RICHARD G. FESSLER, M.D., PH.D.

In summary, this study indicates that the perioperative use of bupivacaine and corticosteroids during lumbar microdiscectomy results in a reduction in postoperative pain, decreased narcotic analgesic use, and a shorter postoperative hospital stay, without complications. We suggest that the use of this combination can be a highly beneficial adjunct to lumbar microdiscectomy.

Multimodal Regimens

ELSEVIER

The Spine Journal 4 (2004) 261–264

THE SPINE JOURNAL

Preemptive analgesia for postoperative pain relief in lumbosacral spine surgeries: a randomized controlled trial

C. Sekar, MD, S. Rajasekaran, PhD, FRCS, M Ch Ortho, MS Ortho, DNB Ortho, D Ortho*, Rajesh Kannan, Diploma Anesthesiology, Shashidhar Reddy, DNB Ortho, D Ortho, T. Ajoy Prasad Shetty, MS Ortho, DNB Ortho, Yogesh K. Pithwa, MS Ortho, DNB Ortho, D Ortho

Conclusions

Preemptive analgesia with a single caudal epidural injection of bupivacaine and tramadol is a safe, simple and effective technique giving postoperative pain relief for a period

Multimodal Regimens

ORIGINAL ARTICLE

Comparison of Perioperative Oral Multimodal Analgesia Versus IV PCA for Spine Surgery

Sharad Rajpal, MD, Debra B. Gordon, RN, MS, FAAN,† Teresa A. Pellino, RN, PhD,‡ Andrea L. Strayer, RN, NP,§ Denise Brost, RN, NP,§ Gregory R. Trost, MD,§ Thomas A. Zdeblick, MD,‖ and Daniel K. Resnick, MD§*

Use of a perioperative oral multimodal analgesia protocol in spine surgery, including scheduled long-acting oral oxycodone, gabapentin, and acetaminophen with PRN dosing of short-acting oxycodone, seems to provide safe and effective pain control. Use of the oral protocol was well tolerated and associated with an opioid sparing effect, less nausea, and decreased sleep interference compared with patients who received conventional IV PCA.

Multimodal Regimens

SPINE Volume 30, Number 21, pp 2357–2361

A Prospective Randomized Study of Preemptive Analgesia for Postoperative Pain in the Patients Undergoing Posterior Lumbar Interbody Fusion

Continuous Subcutaneous Morphine, Continuous Epidural Morphine, and Diclofenac Sodium

Yasutsugu Yukawa, MD, Fumihiko Kato, MD, Keigo Ito, MD, Teruo Terashima, MD, and Yumiko Horie, MD

Key Points

- Diclofenac sodium was pretty effective immediately after surgery, but its effects did not continue so long. Diclofenac sodium group needed more supplemental analgesic drugs, and the time to first request of them was shortest.
- Continuous epidural morphine did not seem to be suitable for preemptive analgesia because of technical difficulty and high rates of adverse effects.
- Continuous subcutaneous morphine was recommended for preemptive analgesia because of its technical ease, moderate effects, and few complications.

Continuous Local Infusion Devices

SPINE Volume 33, Number 2, pp 210–218

Postoperative Continuous Paravertebral Anesthetic Infusion for Pain Control in Lumbar Spinal Fusion Surgery

James B. Elder, MD, Daniel J. Hoh, MD, and Michael Y. Wang, MD

Key Points

- After lumbar spine fusion procedures, continuous infusion of local anesthetic into the subfascial aspects of the wound resulted in lower postoperative pain scores and narcotic usage.
- Decreased use of narcotics and NSAIDs in the postoperative period may lessen the morbidities associated with their side effect profiles.
- Placement of a local anesthetic infusion pump represents a simple and safe technique for postoperative analgesia.

Continuous Local Infusion Devices

- Elastomeric pump with flow restrictor connected to catheter
- Allows for consistent delivery of medication into soft tissues
- Inserted following wound closure
- Patient may be discharged with device in place

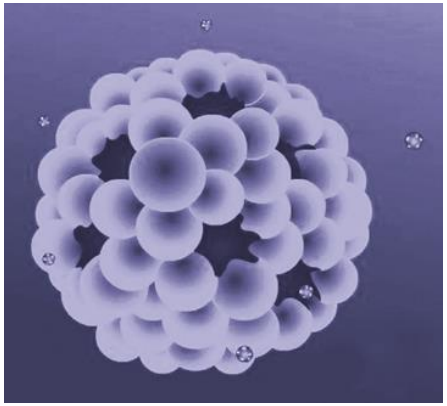
Continuous Local Infusion Devices

Injectable Liposomal Bupivicaine

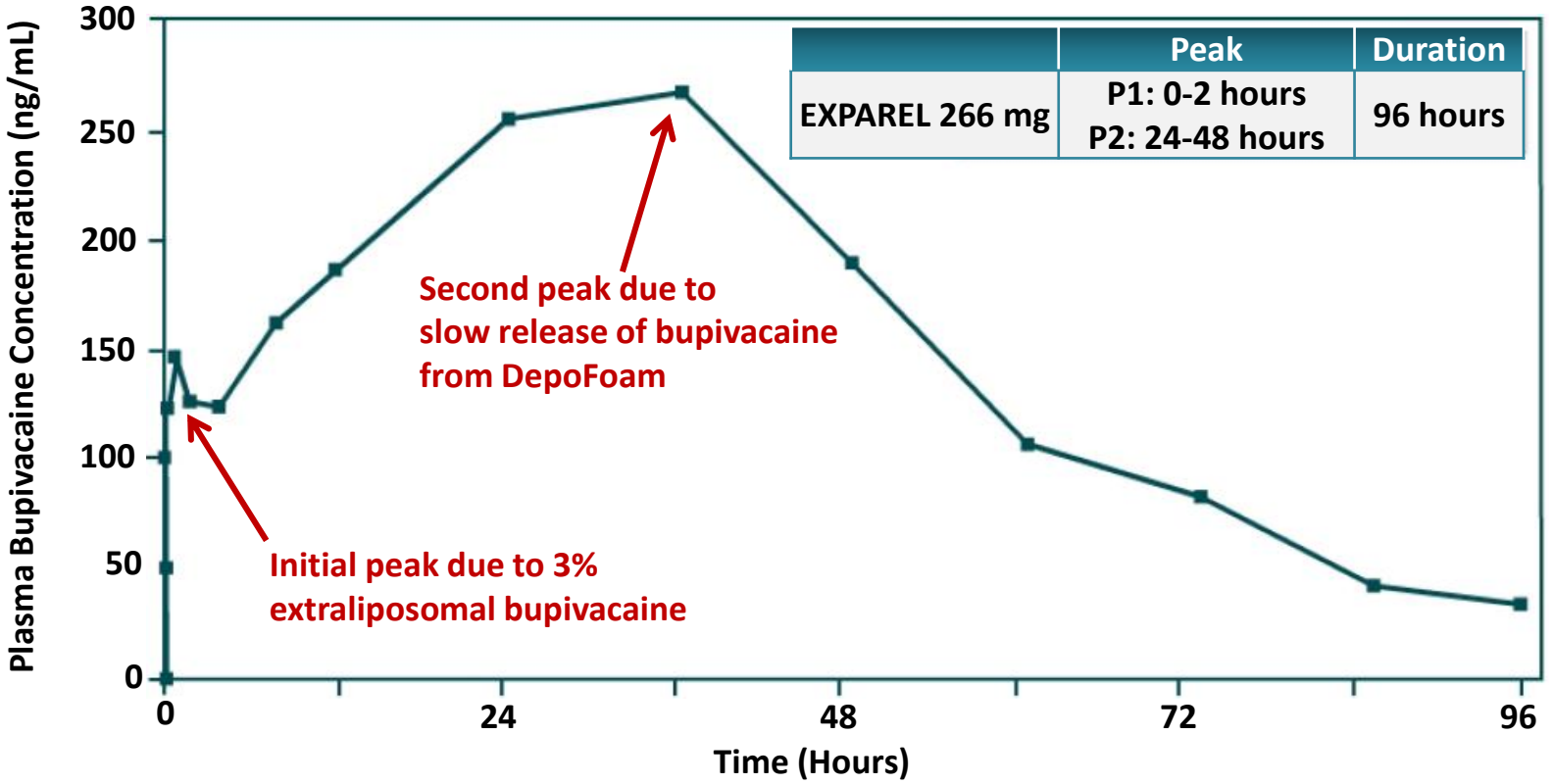
- Indicated for single-dose administration into the surgical site for postoperative analgesia
- Requires no catheter, pump, or additional device
- Shown to decrease pain and opioid consumption during the perioperative period

Injectable Liposomal Bupivicaine

- Mechanism of action[1]
  - DepoFoam – microvesicular liposomal carrier composed of natural membrane components that are biocompatible and biodegradable
  - Encapsulates drugs without altering their molecular structure
  - Allows for controlled release of bupivicaine over time



Injectable Liposomal Bupivicaine



	Peak	Duration
EXPAREL 266 mg	P1: 0-2 hours P2: 24-48 hours	96 hours

- **Other formulations of bupivacaine should not be administered within 96 hours following administration of EXPAREL®**
- **Systemic plasma levels of bupivacaine following administration of EXPAREL® are not correlated with local efficacy**
- **The rate of systemic absorption of bupivacaine is dependent upon the total dose of drug administered, the route of administration, and the vascularity of the administration**
- **This curve represents the pharmacokinetic profile from a TKA. The shape of curves consistently (across several surgical models and various doses) exhibited bimodal kinetics, with the first peak in the first hour or so and the second peak over hours 12-48**

Hu D, et al. *Clin Drug Investigation*. 2013;33:109-115.

Injectable Liposomal Bupivicaine

- Technique of administration
  - 20 mL single-use vial which may be expanded with sterile normal saline
  - May be stored for up to 4 hours at room temperature prior to injection
  - Size Needle: 22 gauge needle
    - Nothing smaller than a 25 gauge
  - Infiltration into soft tissues of surgical site for spine is in the paraspinals
  - 2 cm into the paraspinals
    - Below the fascia
    - Above the fascia
    - Subcutaneous tissue
    - You want to leave a stream of the drug (like caulking your bathroom)
    - Cover the area

Pre-incision vs. Post-incision: What you need to know?

Pre- incision

- May allow for PACU relief
  - Due to free bupivacaine
- If the liposomal bupivacaine leaks into the epidural space, irrigate it out.
- Just like regular bupivacaine, you don't want it in the epidural space.

Post-incision

- May need pre-emptive Marcaine to allow for PACU relief
- Just like regular bupivacaine, you don't want it in the epidural space.
- Just be a little careful with the needle and where you inject

Infiltration for MIS TLIF

- Technique
  - Facetectomy/annulectomy defect covered with fibrin glue
    - Prevents BMP from leaking out of disc space
    - Protects dural from bupivicaine exposure
  - 10cc of Exparel injected per side
  - Slow injection, starting deep and working superficially
  - 22G needle

Use of non-opioid analgesics to manage post-operative pain

Karthik Madhavan, MD
University of Miami
Miami, FL
Presented at North American Spine Society 2014

Purpose and Methods

- Evaluate the feasibility of liposomal bupivacaine in 1-2 level open spine procedures
- Methods:
  - Excluded patients using narcotics pre-operatively
  - Prospective, randomized control trial
  - Subjects:
    - N=8 bupivacaine group
    - N=8 liposomal bupivacaine
  - Patients were evaluated by experienced Nurse Practitioner who was blinded to the treatment arms
  - Results were recorded on a pain score of 1-10, narcotic consumption, and postop out of bed and ability to walk more than 150 feet

Results

- Patients treated with liposomal bupivacaine consumed 50% fewer narcotics post-op
- Patients treated with liposomal bupivacaine scored 4 points less on the 1-10 pain scale
- 5/8 patients were able to walk 150 feet in the Liposomal bupivacaine Group and 2 out of 8 patients were able to walk in the Bupivacaine Group

The Safety and Efficacy of Liposomal Bupivacaine for Transforaminal Lumbar Interbody Fusion and Laminectomy in an Ambulatory Surgery Center Setting

William Tally, MD
Athens Orthopaedics and University of Gerorgia
Athens, GA

Presented at Society for Minimally Invasive Spine Surgery 2014

Purpose and Methods

- Purpose:
  - The objective of the current study is to examine the safety of a novel time-released analgesic in spinal procedures in an ASC setting.
- Methods:
  - A total of 46 patients (27 male and 19 female, age 28–56 years, average=40 years) were treated consecutively in an ASC setting for lumbar spine conditions through either a one level MIS (TLIF) or a one or two level midline laminectomy. Indications for treatment included the following:
  - TLIF
    - Grade 1 or 2 spondylolisthesis at L4–L5 or L5–S1;
    - Recurrent herniated nucleus pulposus with radiculopathy from collapse and top down foraminal stenosis;
  - Midline Laminectomy
    - Severe tricompartmental stenosis at L3–L5 stemming from massive central herniation or congenital stenosis.

Results

- **Average operating times:**
  - 86 minutes (TLIF)
  - 50 minutes (laminectomy)
- **Average post-operative stay:**
  - 4.5 hours (TLIF)
  - 3.0 hours (laminectomy)
- **Across all patients:**
  - No adverse events including spinal anesthesia and nerve blocks
  - No transfers to inpatient status
  - No wound complications
  - All patients were discharged home on the day of surgery
  - All patients were discharged with oral NORCO (5/325 1–2 tablets prn) and oxycodone (5mg) for breakthrough pain as well as Flexeril (10 mg) and Valium (5 mg) PRN for muscle spasms

The Comparative Efficacy of EXPAREL® (bupivacaine liposome injectable suspension) in Preventing Postsurgical Pain After a One-Level Microdiscectomy vs. Bupivacaine HCl

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Methodist Hospital
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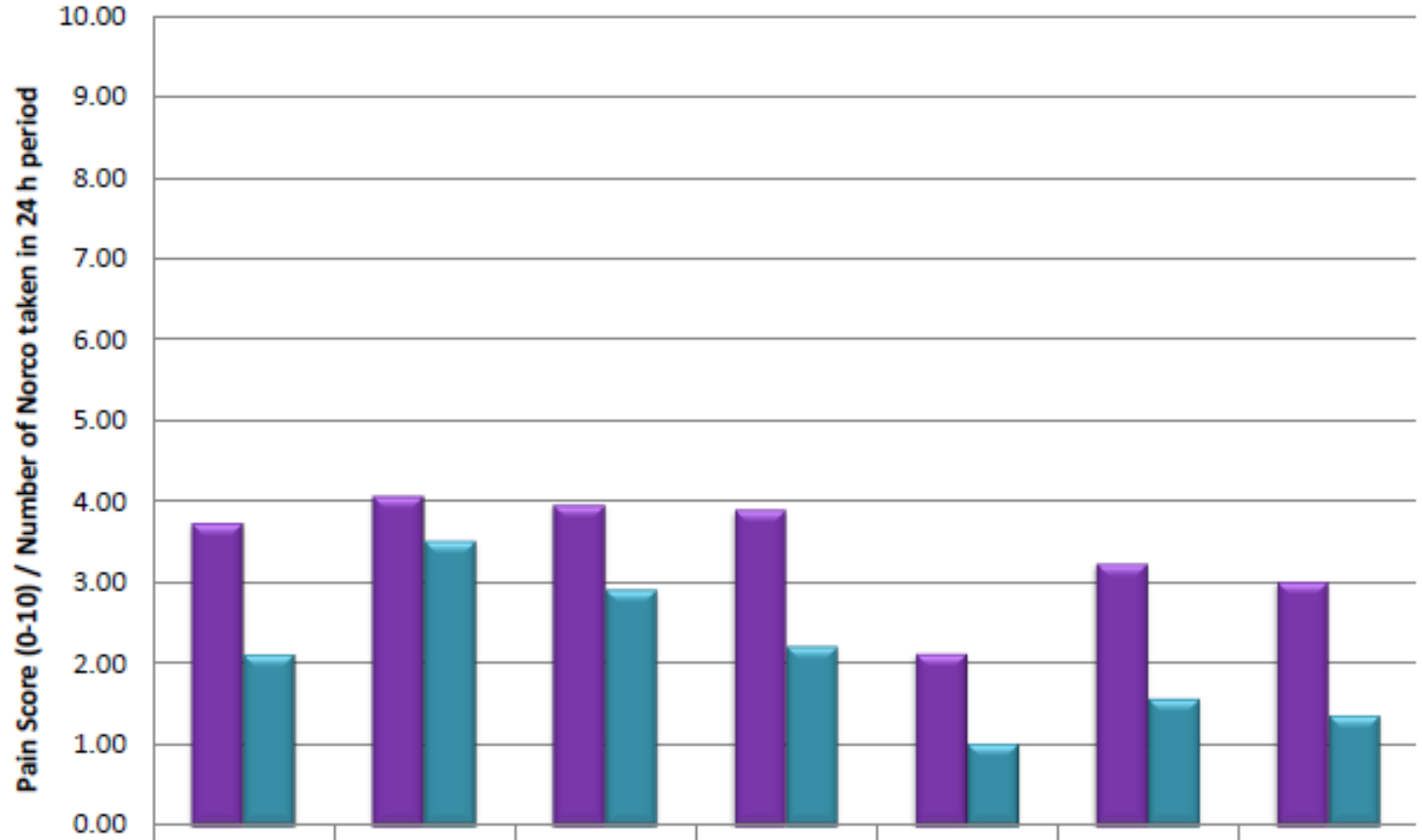
Presented at Mayfield Meeting 2014

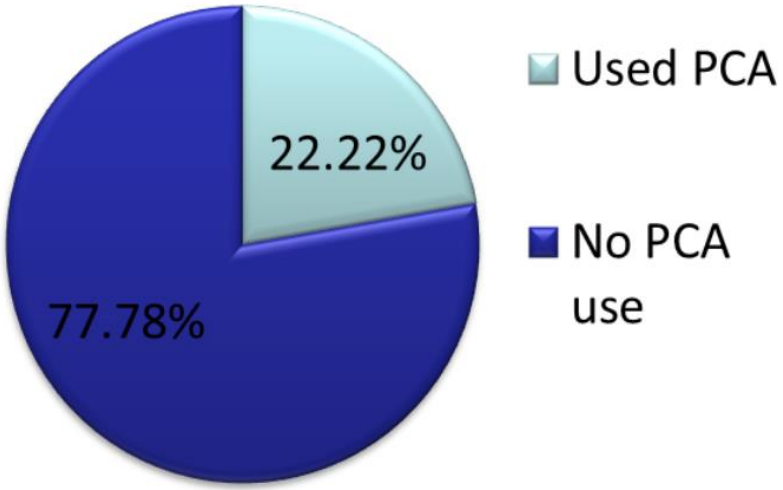
Injectable Liposomal Bupivicaine



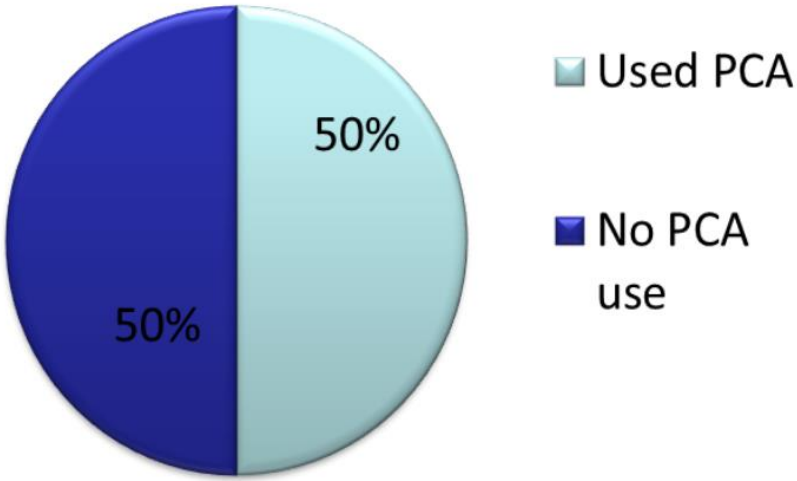
	Recovery Room	Pain - 24h	Pain - 48h	Pain - 72h	Norco - 24h	Norco - 48h	Norco - 72h
Bupivacaine	3.72	4.06	3.94	3.89	2.11	3.22	3.00
EXPAREL	2.10	3.50	2.90	2.20	1.00	1.55	1.35

Injectable Liposomal Bupivicaine

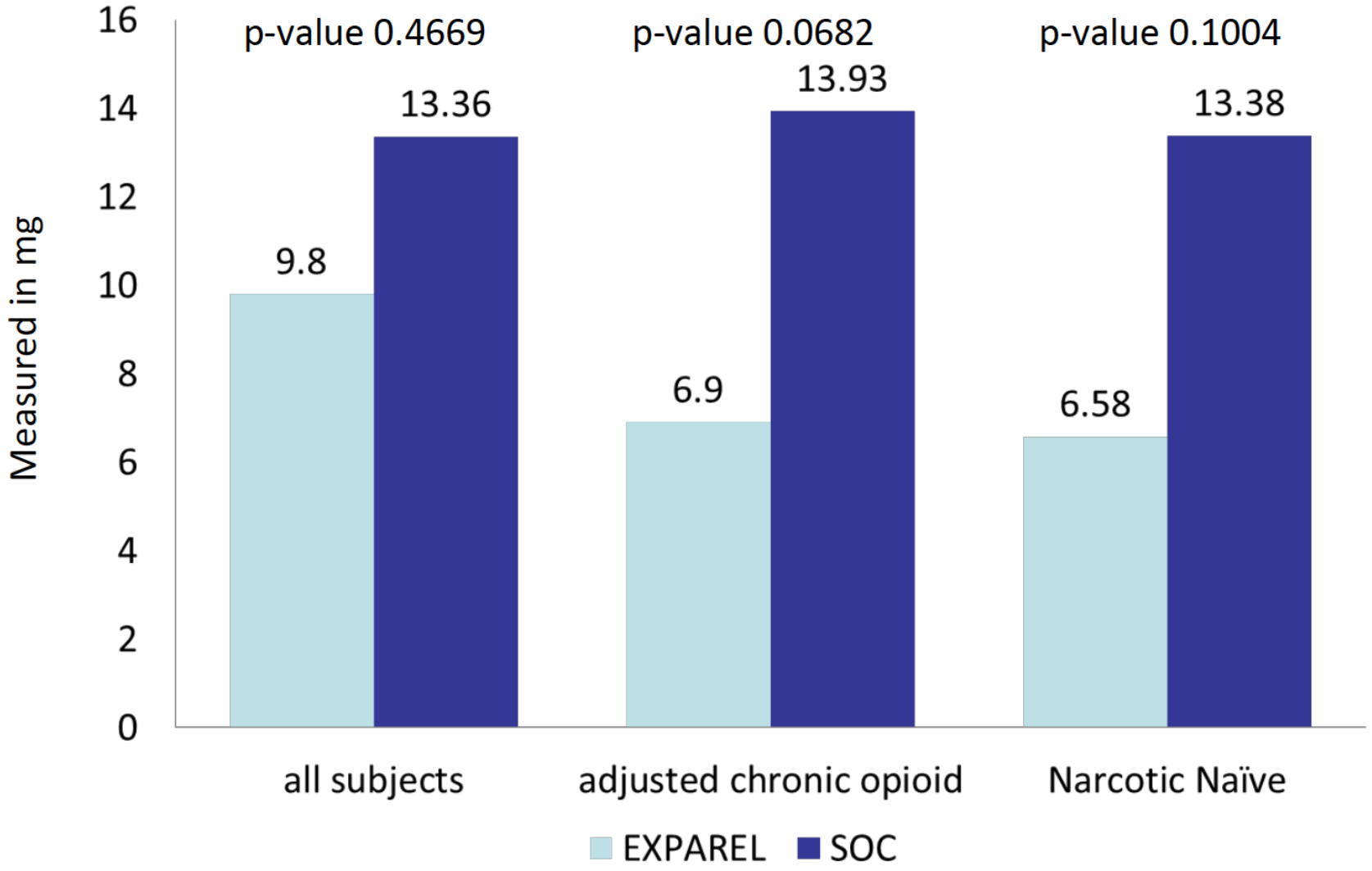
EXPAREL group



Active Comparator group



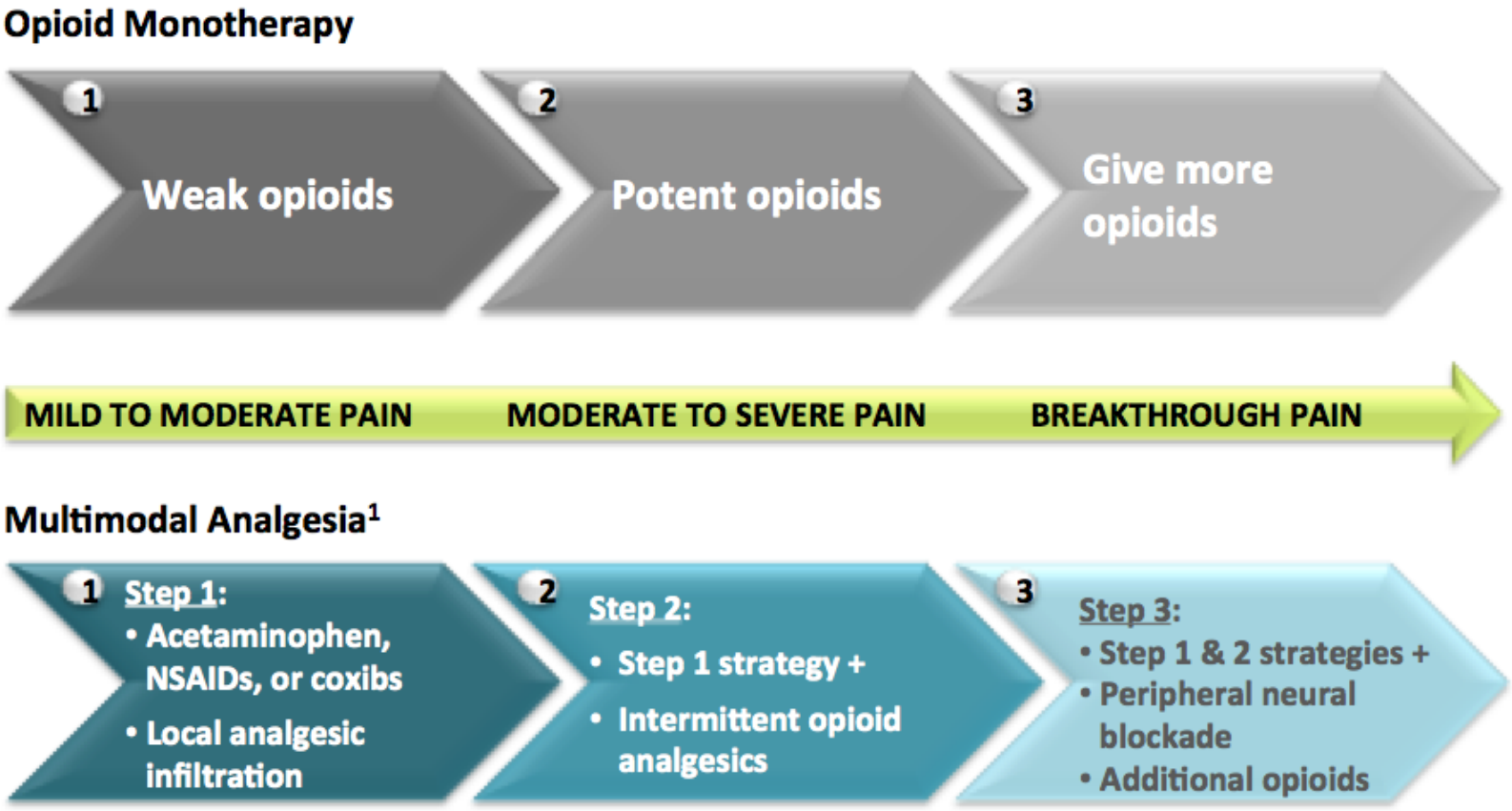
Injectable Liposomal Bupivicaine



Injectable Liposomal Bupivicaine

- Safe and efficacious in outpatient/ASC Setting
- Reductions in opioid/PCA use
- Decreased risk of ORAEs/hospital-acquired conditions
- More rapid rehabilitation
- Improved system efficiency
- Shorter hospital LOS
- Better patient satisfaction scores

Multimodal Analgesia



1. Crews JC, et al. *JAMA*. 2002;288:629-632.

Conclusion

- Increasing number spinal surgeries will be performed in outpatient setting
- Patient selection and team based approach are key
- Adequate postoperative pain control and reducing readmission rates is crucial for the success of these procedures
- Multimodal analgesia may be safer, more effective, and more cost effective than traditional pain management techniques

Thank You!