

Nuts and Bolts of Enhanced Recovery after Surgery (ERAS)

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Disclosures: Current ASRA President - Elect 2015-2017

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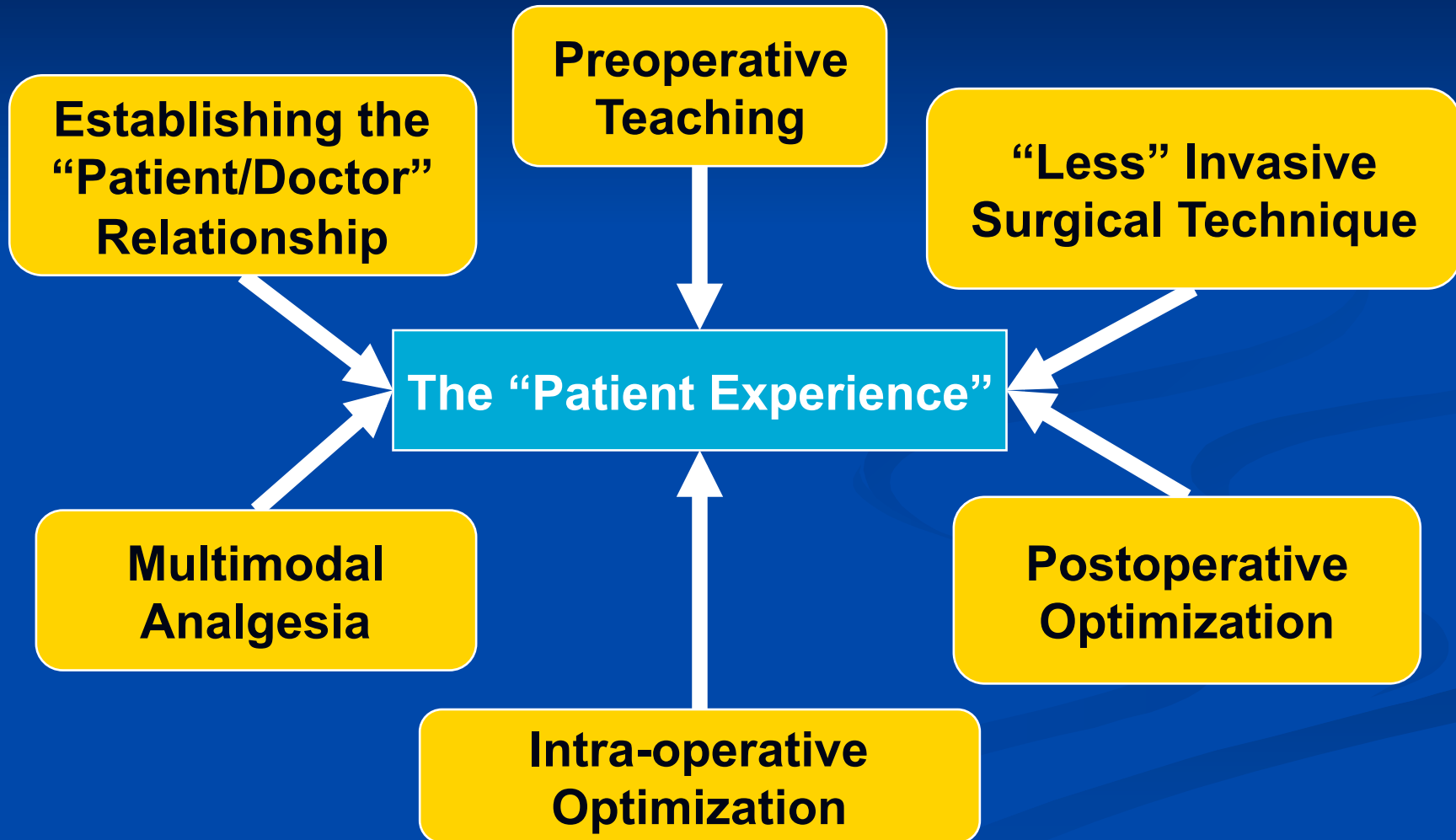
Objectives and Outline

1. Strategies in an ERAS model
2. The importance of perioperative pain Management for an effective ERAS model
3. Implementation of ERAS strategies.

Enhanced Recovery After Surgery (ERAS)

- The main aim is to improve patient outcomes and to accelerate recovery after surgery, with benefits to:
 - patients
 - staff and healthcare systems
 - more patients are treated with the available resources
- The component interventions aim to maintain physiological function and to reduce the stress associated with surgery.

Team Concept with ERAS



Mid-thoracic epidural anesthesia/analgesia

No nasogastric tubes

Prevention of nausea and vomiting

Avoidance of salt and water overload

Early removal of catheter

Early oral nutrition

Non-opioid oral analgesia/NSAIDs

Early mobilization

Stimulation of gut motility

Audit of compliance and outcomes

Preadmission counseling

Fluid and carbohydrate loading

No prolonged fasting

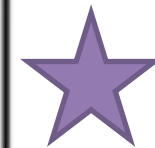
No/selective bowel preparation

Antibiotic prophylaxis

Thromboprophylaxis

No premedication

Short-acting anesthetic agents



Mid-thoracic epidural anesthesia/analgesia

No drains

Avoidance of salt and water overload

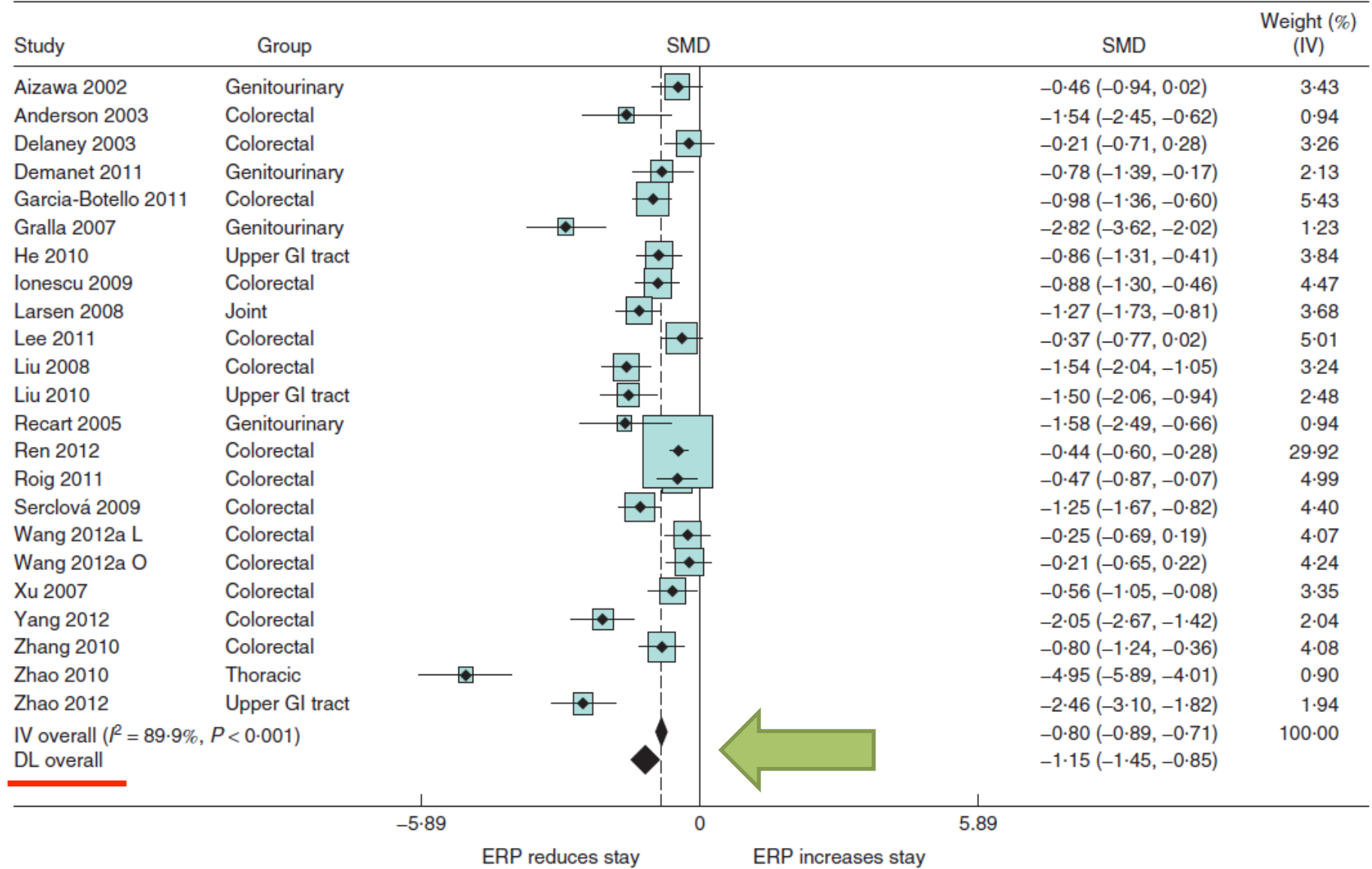
Maintenance of normothermia (body warmer/warm intravenous fluids)

Systematic review and meta-analysis of enhanced recovery programmes in surgical patients

BJS 2014

A. Nicholson¹, M. C. Lowe⁴, J. Parker⁵, S. R. Lewis², P. Alderson² and A. F. Smith³

- ERAS program had to include at least 4 elements of 21 criteria and is < 3 were not considered in the ERAS protocol
- Meta-analysis of the impact of ERAS on surgical outcomes, including *38 studies* across a range surgical specialties, has demonstrated that:
 - to a reduction in primary hospital stay (1.4 days)
 - and a 30 per cent reduction in risk of complications in the 30 days after surgery.



A Self-Paired Comparison of Perioperative Outcomes Before and After Implementation of a Clinical Pathway in Patients Undergoing Total Knee Arthroplasty

Christopher M. Duncan, MD, Susan M. Moeschler, MD,* Terese T. Horlocker, MD,*
Arlen D. Hanssen, MD,† and James R. Hebl, MD**

Reg Anesth Pain Med 2013

- 54 patients compared
- LOS:
 - Without clinical pathway: 4.4 day
 - With Clinical pathway: 3.4 days
- Cost savings: \$ 956.00/case

Pre-operative Teaching

- Maps out the entire process/defines goals
 - What not to do (eg, NSAIDS)
 - Pre-admission process
 - Details of the surgery
 - What the requirements for discharge are
 - Discharge planning initiated
 - Postoperative PT goals discussed
 - Postoperative office visit plan
- Give patients Rx for postoperative meds now
- Single session PT: assist device training



Stages of Interaction of patient with Anesthesiologist

- Preoperative period:
 - Identification of patient at perioperative clinic
- Intraoperative Period/Recovery Room:
 - Types of anesthesia & Analgesia
- Postoperative Period:
 - Until patient leaves the hospital and for 14 days

The ERAS Patient Evaluation: Pain Management

Preoperative

- Optimize health: “Prehabilitation”
- *Risk assessment for chronic pain after surgery*
- Appropriate testing
- Medication reconciliation
- Link patient and family to “navigator”

Risk assessment for pain after surgery

- Type of surgery:
 - Proximity to nerves
 - Revision surgery
- Preop opioid history (*medication reconciliation*)
- Chronic pain history such as fibromyalgia
- Psychological profile: **Catastrophizing**: Exaggerated negative mental state invoked during an actual or anticipated painful experience, is associated with thoughts that are negative, place excessive focus on the negative aspects of the pain experience, emphasize and magnify pain sensations and evoke feelings of hopelessness and inability to cope effectively with pain.

Chronic Preop Opioid use Prior to TKA

- 49 TKA patients non-randomized trial with preop opioids vs opioid naïve
- Results: for preop opioid vs opioid naïve
 - Longer hospitalization (4.3 vs 3.4 days)
 - More postop surgery such as: knee stiffness, knee manipulation, revisions and **Chronic pain**

Preoperative visit and Psychology

- Chronic pain patient often has anxiety & depression
- Growing literature indicating that psychological factors have a significant prognostic value in the prediction of post-TKA pain severity & physical function
 - Sullivan M et al : *Pain* 2011; 152: 2287-2293
- A study of n=120 patients, undergoing TKA
- Pre-surgical Pain Catastrophizing predicted postop analgesic requirements and function

Sullivan M et al: *Pain* 2009; 143: 123-129

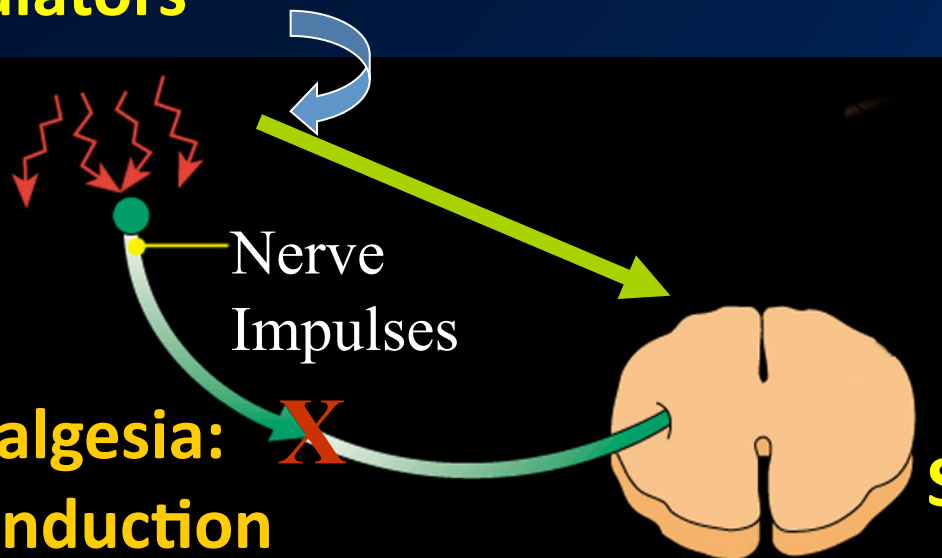
Riddle LP et al: *Clin Ortho Rel Res* 2010; 468: 798

Surgery and Acute Pain Mediators



Surgery

Humeral mediators



Regional Analgesia:
Neuronal conduction

Spinal Cord

Optimal Analgesia During Major Open and Laparoscopic Abdominal Surgery



Anesthesiology clin 2015

William J. Fawcett, MB BS, FRCA, FFPMRCA^{a,b,*},
Gabriele Baldini, MD, MSc^c

Advantages of epidurals

- Attenuation of some aspects of the stress response
 - Neuroendocrine (sympathetic and pituitary activation)
 - Metabolic (eg, hyperglycemia, protein breakdown)
 - But no effect on inflammatory changes mediated by cytokines
- Improvement in pulmonary function
 - Reduced incidence of postoperative hypoxia
 - Reduced incidence of atelectasis and infection
- GI
 - Reduced ileus
 - Earlier return to diet
- Reduction in pulmonary thromboembolism
- Reduction in blood loss
- Some studies have shown reduction in myocardial infarction, renal failure, and mortality

Multimodal Analgesia

- Definition: Multimodal analgesia is the combination of different analgesics that act by different mechanism, resulting in additive or synergistic analgesia with lowered adverse effects; compared to sole administration of an individual pharmacological agent
- Goal: Decrease use of Postoperative Opioids

Multimodal Analgesics for Postoperative Pain

PAIN

Ketamine, Dextromethorphan, Memantidine
Clonidine, Dexmedetomidine, Gabapentin,
Pregabalin, COX-1 & 2 inhibitors,
Acetaminophen

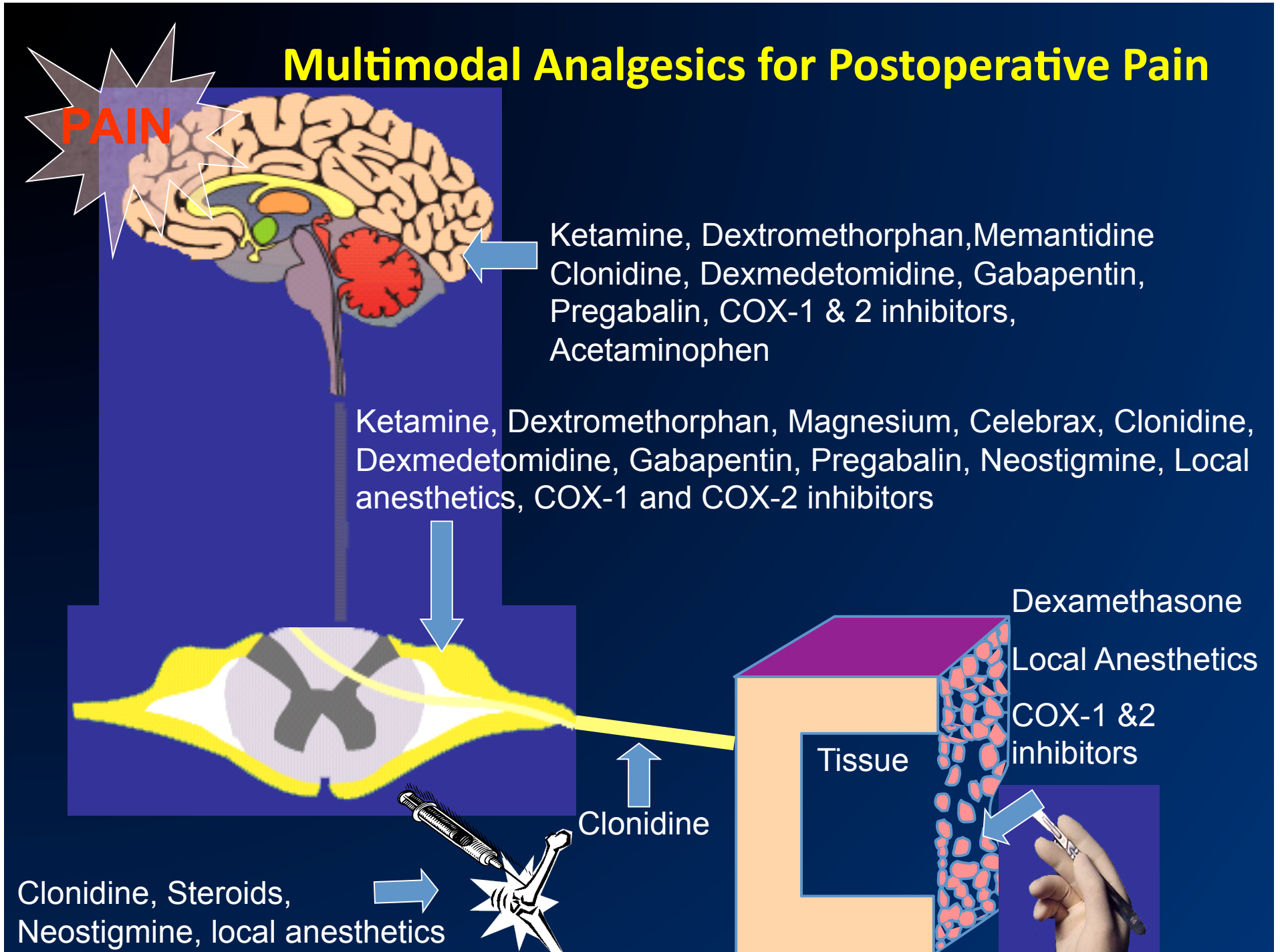
Ketamine, Dextromethorphan, Magnesium, Celebrax, Clonidine,
Dexmedetomidine, Gabapentin, Pregabalin, Neostigmine, Local
anesthetics, COX-1 and COX-2 inhibitors

Dexamethasone
Local Anesthetics
COX-1 & 2
inhibitors

Clonidine

Clonidine, Steroids,
Neostigmine, local anesthetics

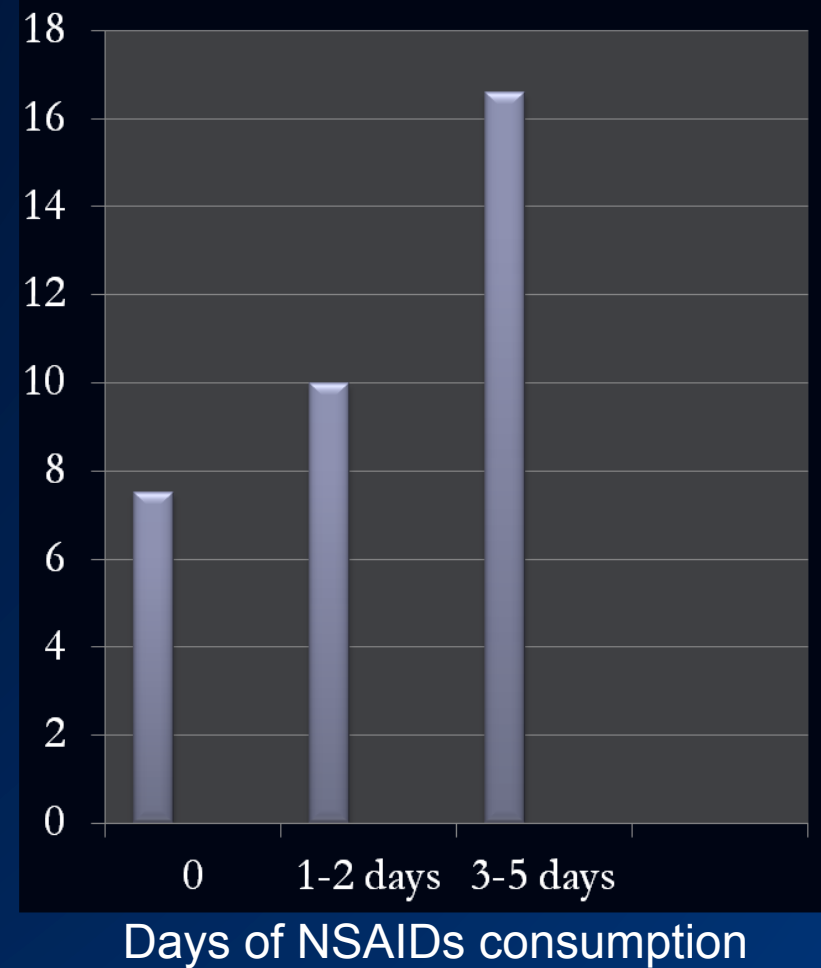
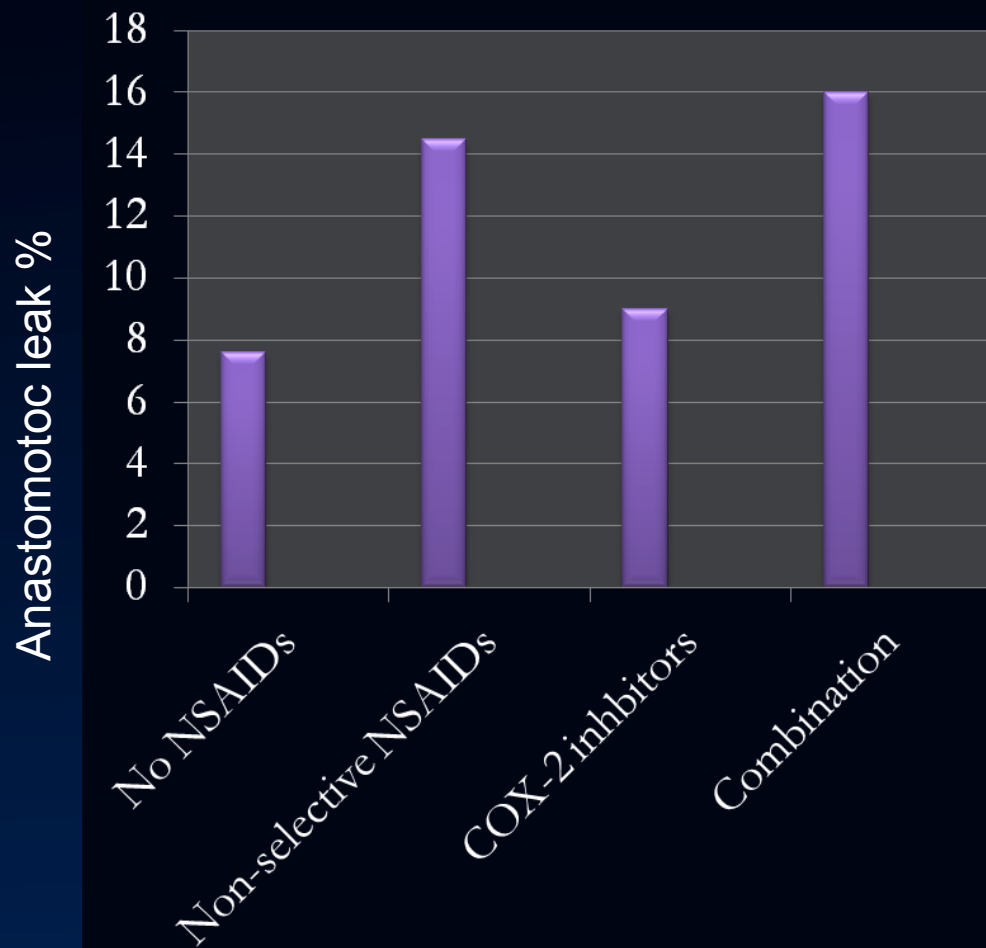
Tissue



Risk of Anastomotic leakage with NSAIDs after colorectal surgery

Gorissen KJ et al Br J Surg 2012; 99: 721-727

Retrospective study of 795 patients



NSAIDs and GI Leaks

Recent Study

- Retrospective, n= 13,082 patients
- **Exposure:** NSAID administration beginning within 24 h after surgery
- **Results:**
 - 4.8 % for NSAID group. **P= 0.16**
 - 4.2% for Non-NSAID group
- **Risk assessment:** Postoperative NSAIDs were associated with a significantly increased risk for anastomotic complications among patients undergoing non-elective colorectal resection.

Timo W. Hakkarainen: JAMA 2015, March

Implementation tools

- Culture defined as: “How things are done around here”
 - These are from values embedded within the organization
- Leadership:
 - More of transformational or facilitative style
 - Inspire and challenge staff to achieve shared value
- Facilitation: “a technique by which one person makes things easier for others”

Successful Implementation of Orthopedic Clinical Pathway

Research:

Rush were pioneers with RCT and outcomes

Professional consensus: The "Team Care Approach"

Strong leadership to facilitate change

Successful Implementation

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graph TD; A[Research: Rush were pioneers with RCT and outcomes] --> D([Successful Implementation]); B[Professional consensus: The "Team Care Approach"] --> D; C[Strong leadership to facilitate change] --> D;
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Rush's ERAS in Orthopedics via Evidence based

Effects of Perioperative Administration of a Selective Cyclooxygenase 2 Inhibitor on Pain Management and Recovery of Function After Knee Replacement A Randomized Controlled Trial

Asokumar Buvanendran, MD
Jeffrey S. Kroin, PhD
Kenneth J. Tuman, MD
Timothy R. Lubenow, MD
Dalia Elmofly, MD
Mario Moric, MS
Aron G. Rosenberg, MD

Context Controlling postoperative pain after knee replacement while reducing opioid-induced adverse effects and improving outcomes remains an important challenge.
Objective To assess the effect of combined preoperative and postoperative administration of a selective inhibitor of cyclooxygenase 2 on opioid consumption and outcomes after total knee arthroplasty (TKA).
Design, Setting, and Patients Randomized, placebo-controlled, double-blind trial conducted June 2001 through September 2002, enrolling 70 patients aged 40 to 77 years and undergoing TKA at a university hospital in the United States.

Perioperative Oral Pregabalin Reduces Chronic Pain After Total Knee Arthroplasty: A Prospective, Randomized, Controlled Trial

Asokumar Buvanendran, MD*
Jeffrey S. Kroin, PhD*
Craig J. Della Valle, MD†
Maruti Kari, MD*
Mario Moric, MS*
Kenneth J. Tuman, MD*

BACKGROUND: Despite the enormous success of total knee arthroplasty (TKA), chronic neuropathic pain can develop postoperatively and is both distressing and difficult to treat once established. We hypothesized that perioperative treatment with pregabalin, a chronic pain medication, would reduce the incidence of postsurgical neuropathic pain.
METHODS: We performed a randomized, placebo-controlled, double-blind trial of pregabalin (300 mg) administered before TKA and for 14 days after TKA (150–50 mg twice daily). Patients were screened for the presence of neuropathic pain at 3 and 6 mo postoperatively using the Leeds Assessment of Neuropathic Symptoms and Signs scale. Secondary outcomes included postsurgical recovery and rehabilitation measures, including knee range of motion, opioid consumption, postoperative pain scores, sleep disturbance, and time to discharge as well as the occurrence of postoperative systemic complications.

Genetic Variables & **Precision Pain Medications**

Predictors for moderate to severe acute postoperative pain after total hip and knee replacement

Spencer S. Liu · Asokumar Buvanendran · James P. Rathmell · Mona Sawhney · James J. Bae · Mario Moric · Stephen Perros · Ashley J. Pope · Lazaros Poulosides · Craig J. Della Valle · Naomi S. Shin · Colin J. L. McCartney · Yan Ma · Mahendrakumar Shah · Monica J. Wood · Smith C. Manion · Thomas P. Sculco

JAMA 2003



Need for Improved Perioperative Pain Management

Multimodal analgesia for controlling acute postoperative pain
Asokumar Buvanendran and Jeffrey S. Kroin

Anesthetic Techniques for Minimally Invasive Total Knee Arthroplasty
Asokumar Buvanendran, MD
Kenneth J. Tuman, MD
Dennis D. McCarroll, MD

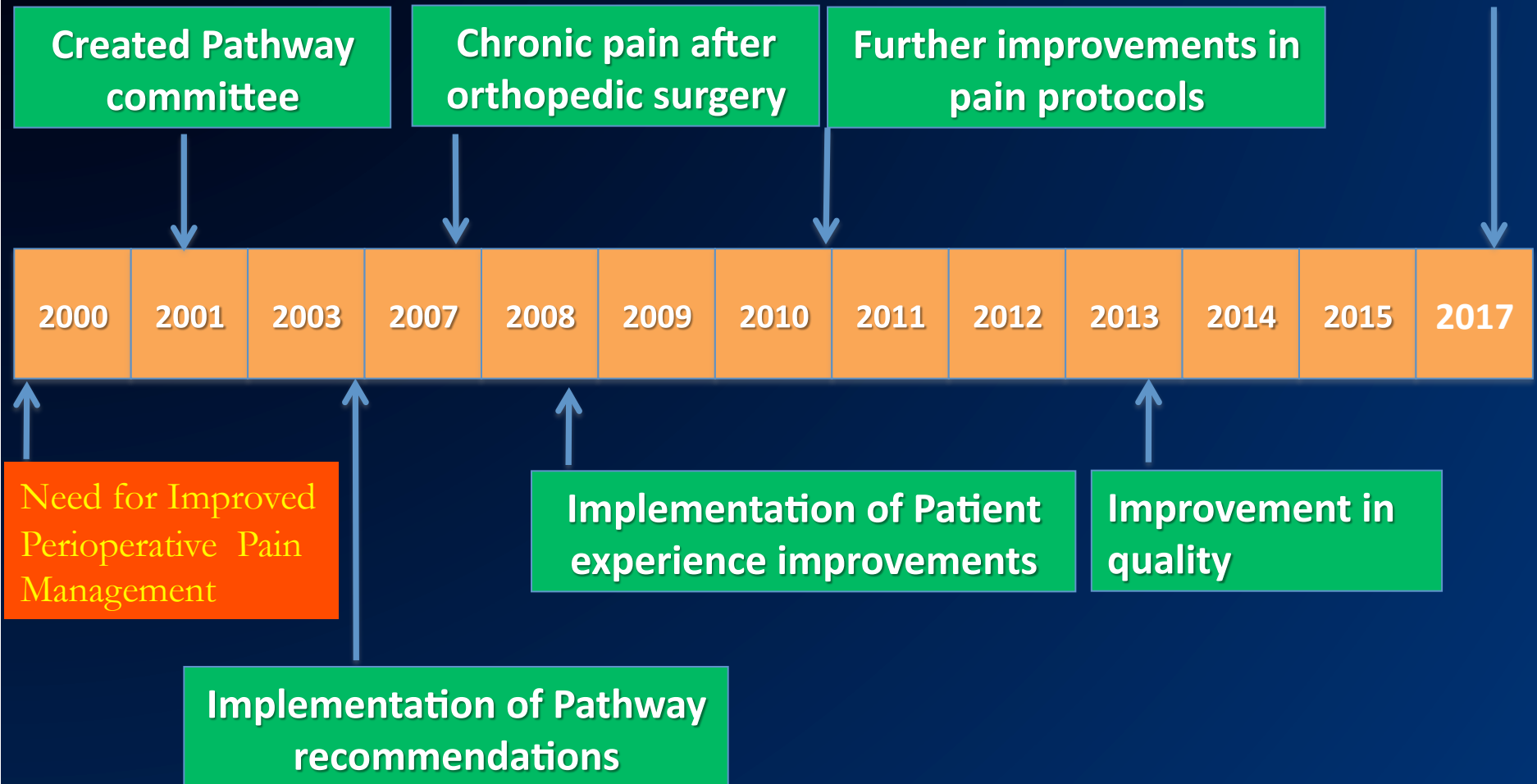
Large prospective study to determine predictors to **Prevent Chronic Pain After surgery**

Anesthesiology 2006; 104:403–10 © 2006 American Society of Anesthesiologists, Inc. Lippincott Williams & Wilkins, Inc.

Upregulation of Prostaglandin E₂ and Interleukins in the Central Nervous System and Peripheral Tissue during and after Surgery in Humans
Asokumar Buvanendran, M.D.,* Jeffrey S. Kroin, Ph.D.,† Richard A. Berger, M.D.,‡ Nadim J. Hallab, Ph.D.,‡ Chiranjeev Saha, M.D.,§ Corina Negrescu, M.D.,|| Mario Moric, Ph.D.,# Marco S. Caicedo, M.S.,** Kenneth J. Tuman, M.D.†

Rush's ERAS in Orthopedics via Evidence based

Genetic Variables
& Precision Pain Medications



15 year experience with an Multimodal Implemented Pathway for Orthopedic surgery

- Form a pathway committee with regular monthly meetings with 1-3 goals for each session
- Members for committee from ALL specialties
- Everyone has an **EQUAL voice** to express their opinion
- Implement one strategy over the next 3 months and re-assess.
- Examine the outcomes every 3-6 months

Current Rush LOS for joint replacement

TKA: 1.87 (FY14 Q2)

THA: 2.11 (FY14 Q2)

With 10 million inpatient surgeries/ year

- Hospital need to make sure that they have somebody who is accountable for helping to develop the policies and processes for addressing pain in patients postoperatively
- Hospitals need a dedicated team of professionals that develop specific protocols to allow for continuity of care, consistency of care, and dependable outcomes with a low complication rate.