



MAYO CLINIC

Multimodal Analgesia Including Regional Anesthesia: Time to Revisit the Basics?



A black and white photograph of a bronze statue depicting two men in profile, looking towards the right. The man in the foreground has a stethoscope around his neck.

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**British-Ukrainian Symposium (BUS – 11):
Innovative Technologies and Techniques
in Anaesthesiology and Intensive Care**

Kyiv, April 18, 2019



Carlos Mantilla. 11-й Британо-Український Симпозіум. Київ, 2019

Learning Objectives

- Review evidence for the use of multimodal analgesic modalities post-operatively
- Review rationale for inclusion of peripheral nerve blockade
- Discuss implications of perioperative management on patient-relevant outcomes



Post-Operative Pain

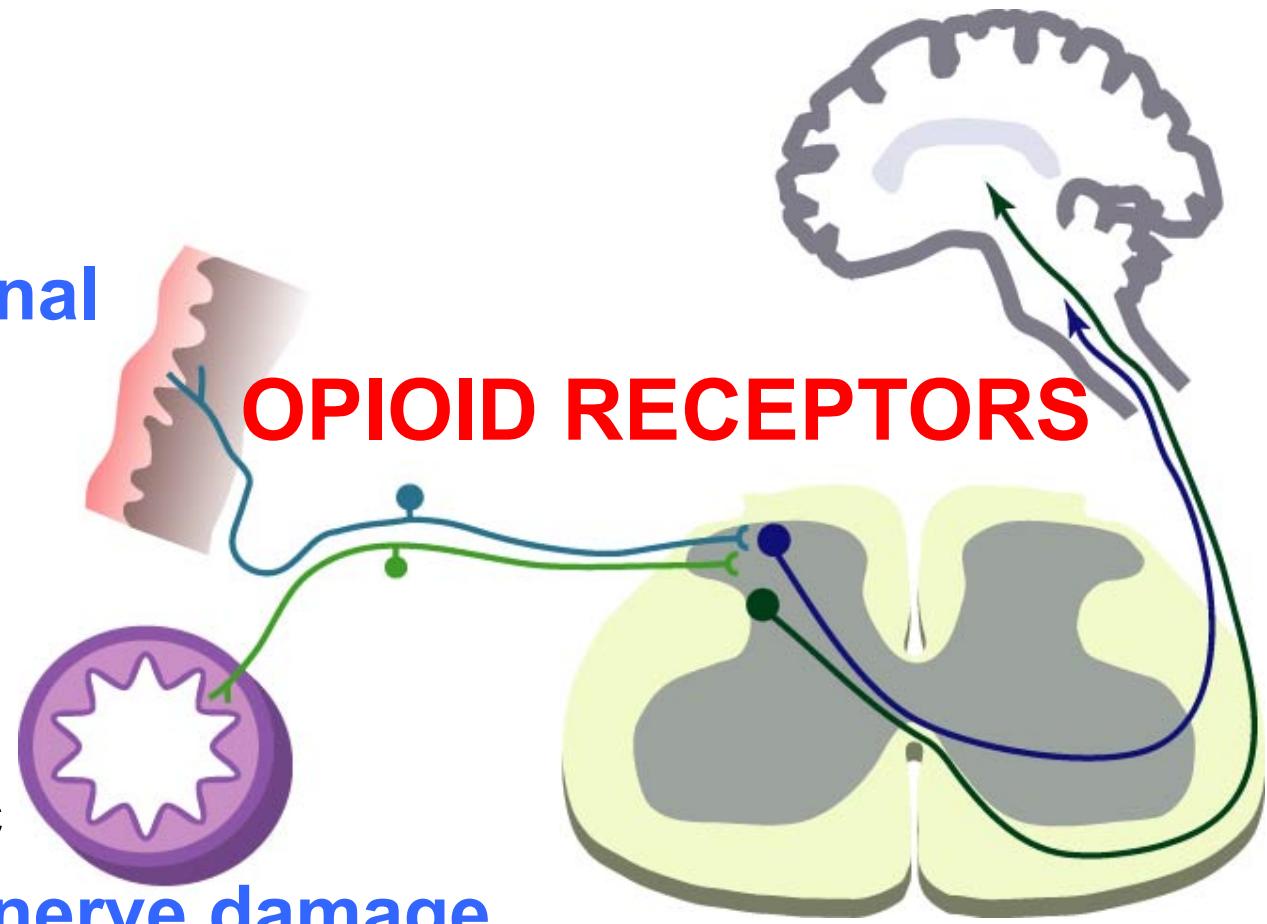
CHRONIC

- Acute Pain
- Recent onset & probable limited duration
- Starts with surgical trauma and usually ends with tissue healing
- Identifiable temporal and causal relationship to injury/disease
- Typically worse in the first few days
- Influenced by previous medical, social, cultural, and psychological experiences



Mechanisms of Postoperative Pain

- Nociceptive
 - Somatic
 - Incisional
 - Visceral
 - Ileus
- Neuropathic
 - Direct nerve damage



Opioids: Adverse Effects

- ***Nausea & vomiting***
- ***Constipation***
- ***Urinary retention***
- ***Pruritus & urticaria***
- ***Sedation & dizziness***
- ***Euphoria & hallucinations***
- ***Addiction***
- ***Muscle rigidity***



Alternatives to Opioids

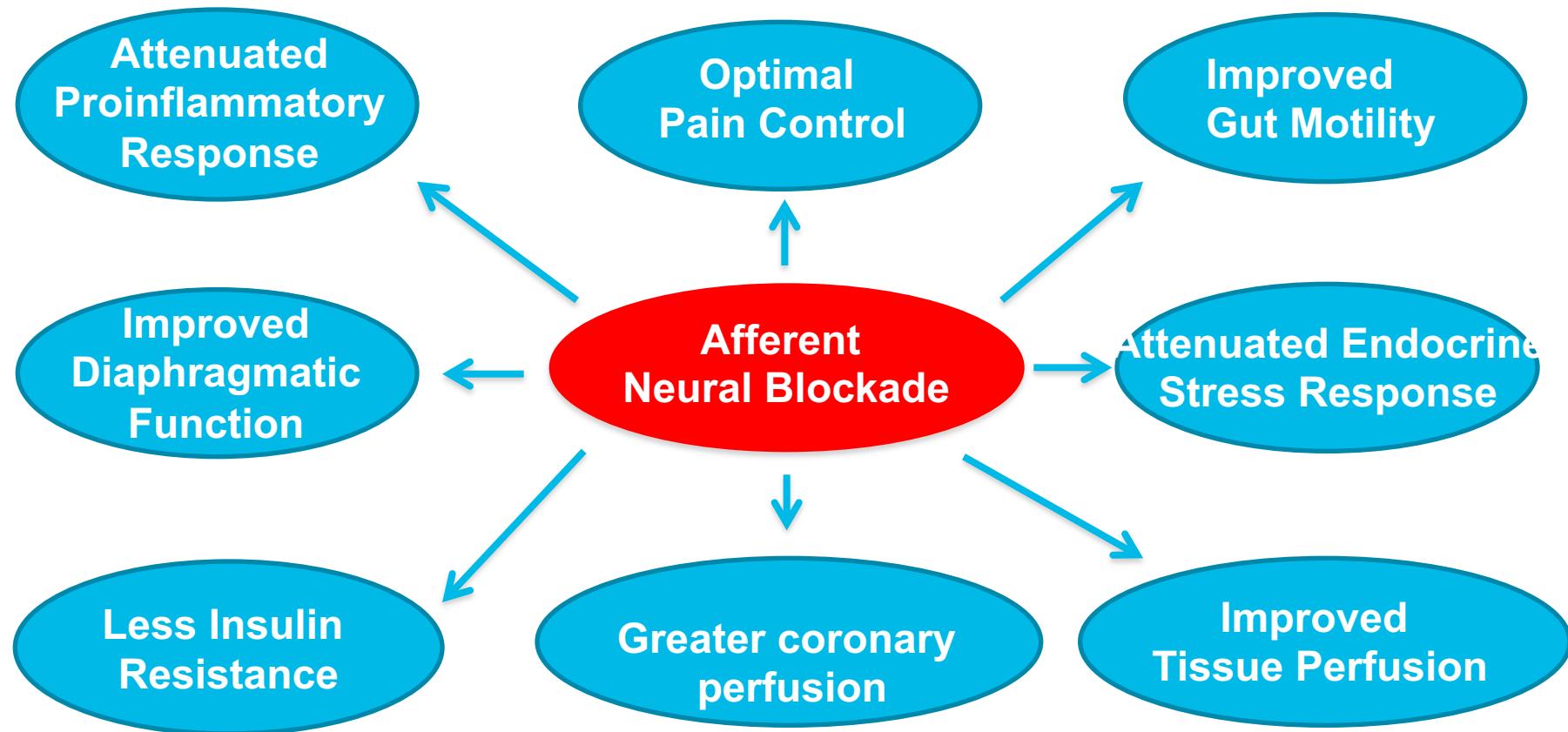
- **Regional anesthesia**
 - **Local anesthetics**
 - **NSAIDs and acetaminophen**
 - **Anticonvulsants**
 - **Antidepressants**
- Non-pharmacological***
- **Acupuncture**
 - **Hypnosis**
 - **Meditation**
 - **Physical therapy / Massage**
 - **Neuromodulation**



Regional Anesthesia

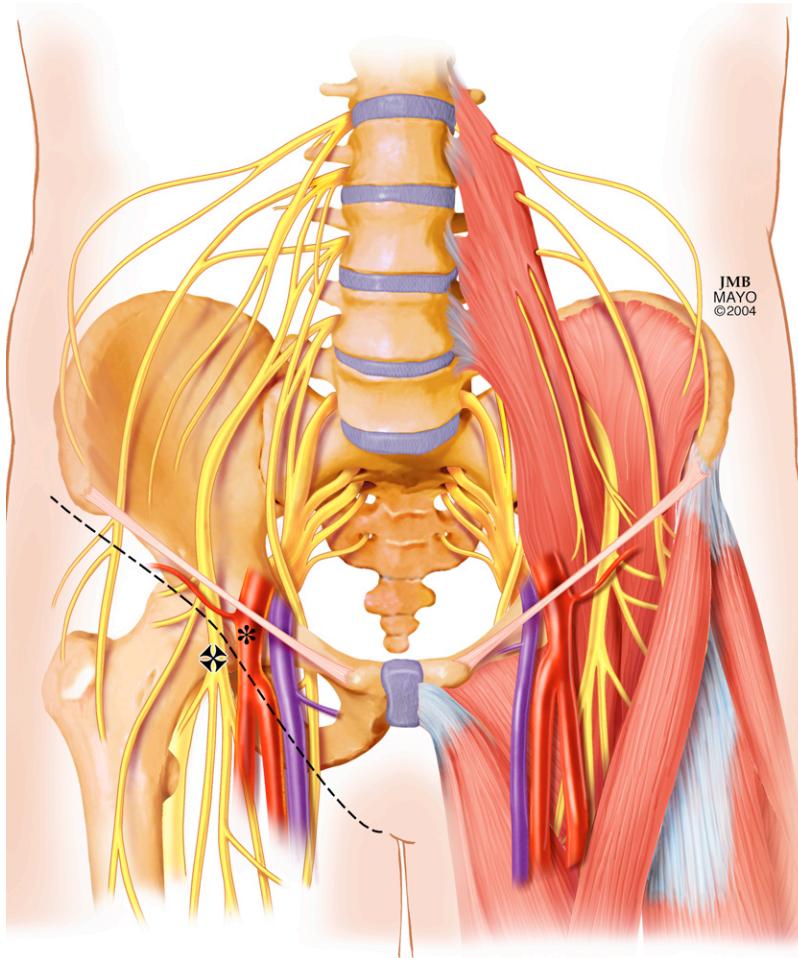


Use of Regional Anesthesia



Carli, *Reg Anesth Pain Med*, 2011

Total Hip and Knee Arthroplasty



- Performed in more than 1 million patients per year
- Highly protocolized practice
- Amenable to regional anesthesia techniques



Perioperative Multimodal Analgesia

- Assists pre-, intra- & post-operative planning
- Enhances postoperative recovery
- Reduces hospital length of stay
- Reduces cost
- Minimizes chronic pain syndromes

Hebl JR et al. *J Bone Joint Surg Am* 2005

Horlocker TT et al. *J Am Acad Orthop Surg* 2006

Hebl JR et al. *Reg Anesth Pain Med*. 2008

Duncan CM et al. *Reg Anesth Pain Med* 2009

Duncan CM et al. *Reg Anesth Pain Med* 2013



Use of Regional Anesthesia for Total Joint Arthroplasty

- **Neuraxial versus general anesthesia associated with superior perioperative outcomes**
 - Reduced 30-day mortality
 - Reduced complications (cardiopulmonary, GI)
 - Reduced resource utilization

Memtsoudis SG et al. Anesthesiol 2013



Use of Regional Anesthesia for Total Joint Arthroplasty

- **Peripheral nerve blockade associated with superior perioperative outcomes**
 - Reduced 30-day mortality
 - Reduced complications (cardiopulmonary, GI)
 - Reduced resource utilization

Memtsoudis SG et al. *Pain* 2016



The impact of peripheral nerve blocks on perioperative outcome in hip and knee arthroplasty-a population-based study.

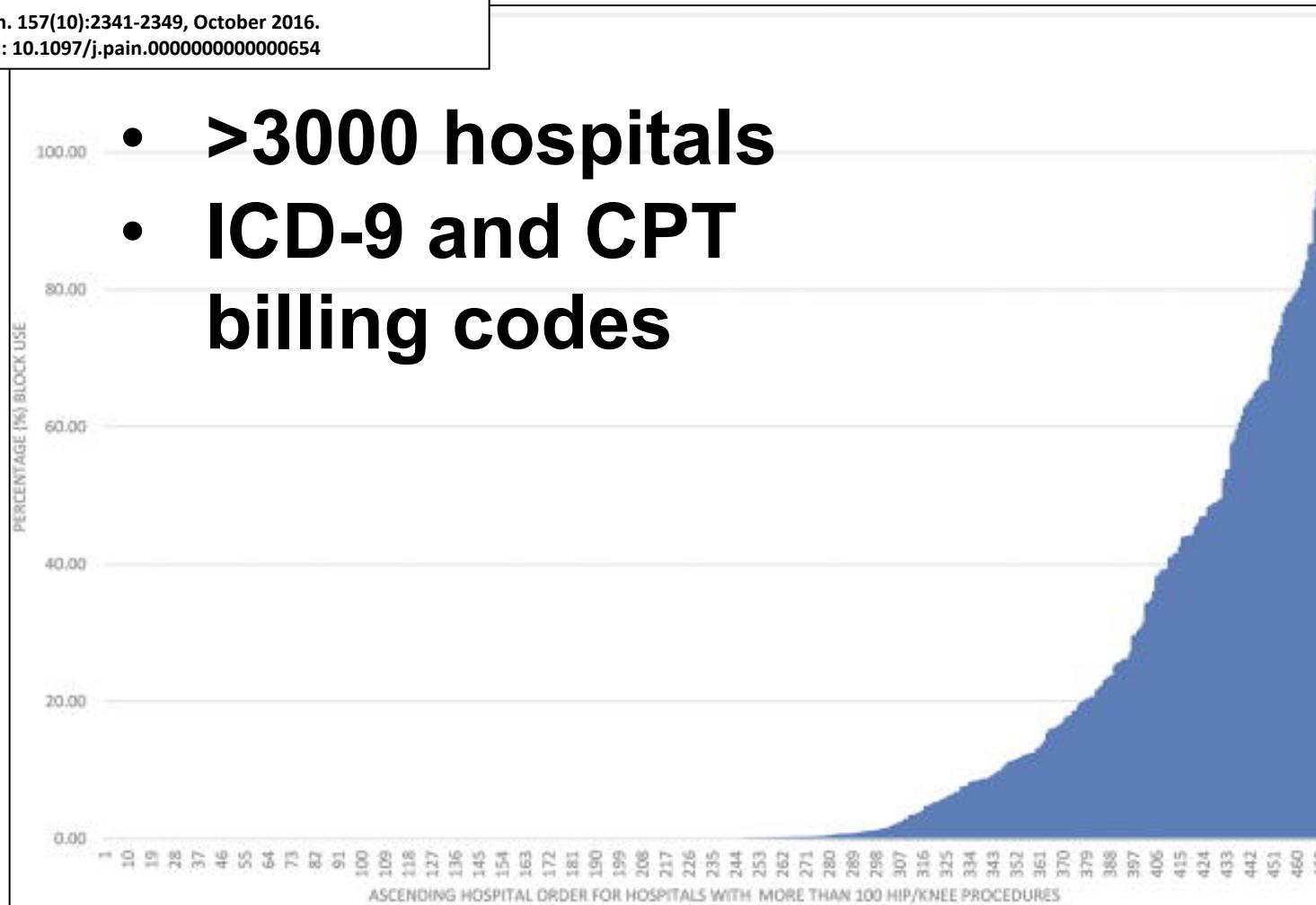
Memtsoudis, Stavros; Poeran, Jashvant; Cozowicz, Crispiana; Zubizarreta, Nicole; Ozbek, Umut; Mazumdar, Madhu

Pain. 157(10):2341-2349, October 2016.

DOI: 10.1097/j.pain.0000000000000654

Figure 1 . Hospital variation in PNB utilization; hospital-specific percentage of hip/knee procedures in which a peripheral nerve block was used.

- >3000 hospitals
- ICD-9 and CPT
billing codes



Wolters Kluwer

OvidSP

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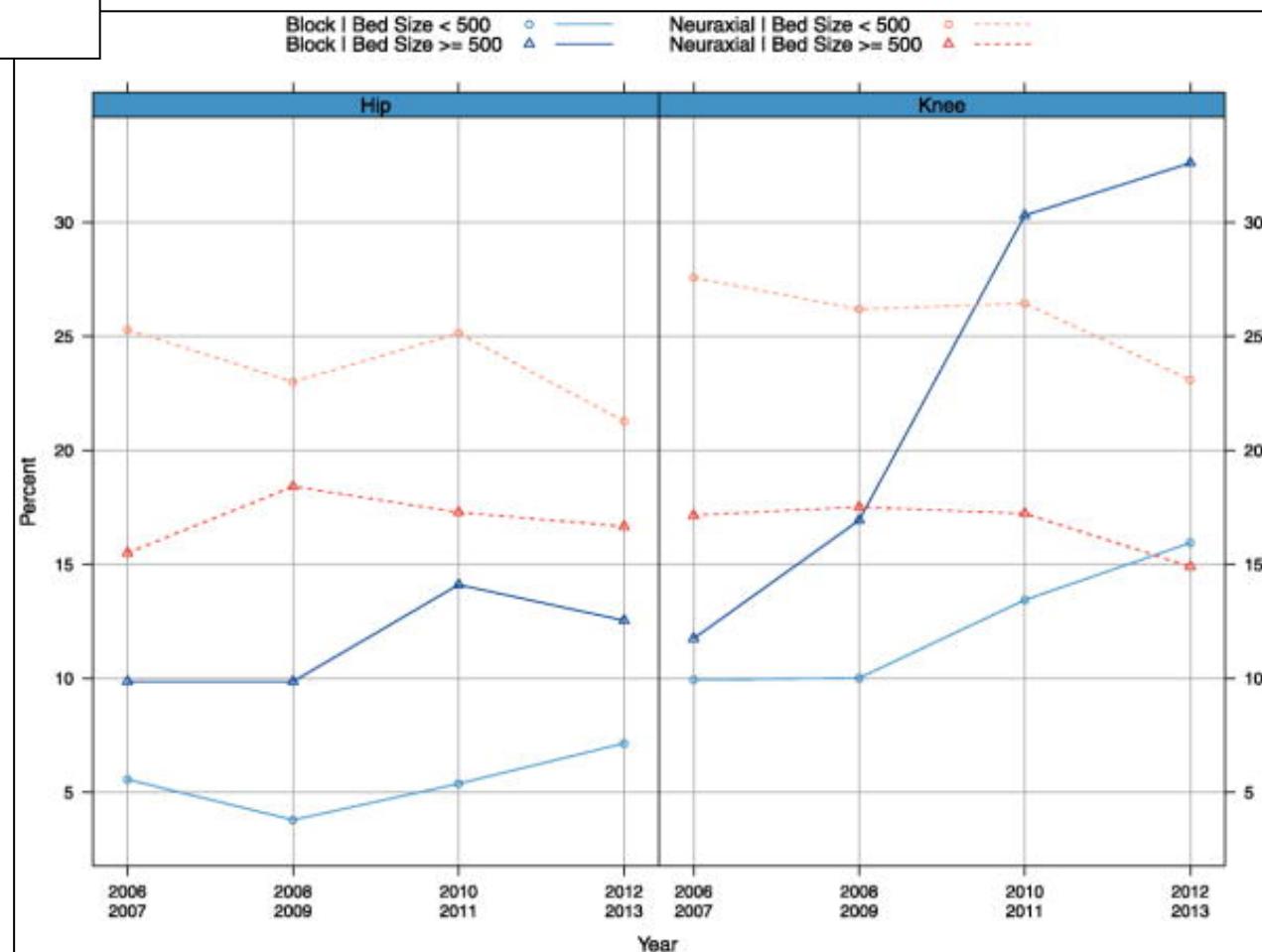
Trends in the Use of Regional Anesthesia: Neuraxial and Peripheral Nerve Blocks.

Cozowicz, Crispiana; Poeran, Jashvant; MD, PhD;
Zubizarreta, Nicole; Mazumdar, Madhu; Memtsoudis,
Stavros; MD, PhD

Regional Anesthesia & Pain Medicine. 41(1):43-49,
January/February 2016.

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FIGURE 3 . Neuraxial anesthesia and PNBs by hospital size. All trends significant ($P < 0.001$) with the Cochran-Armitage trend test.



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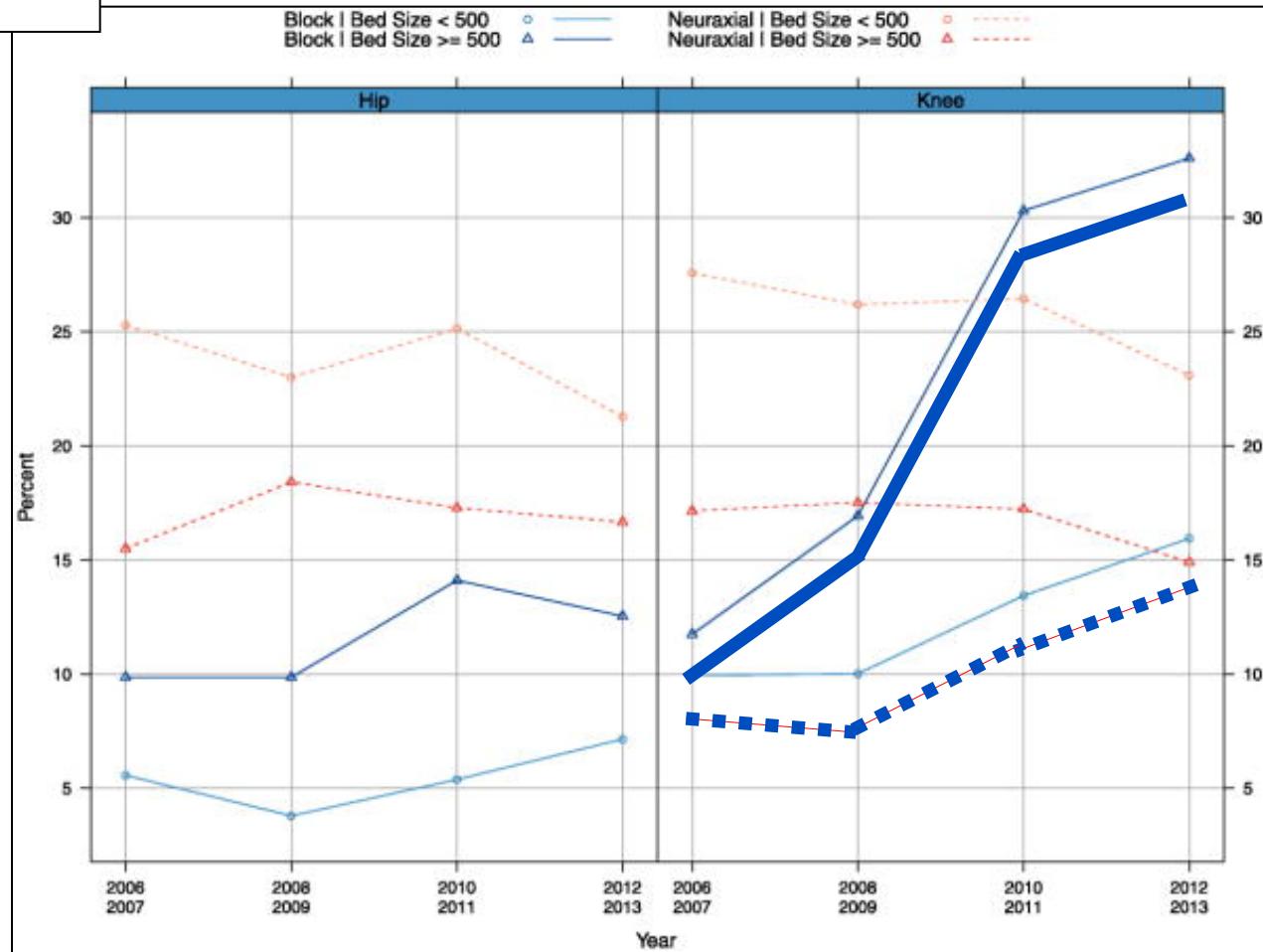
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FIGURE 3 . Neuraxial anesthesia and PNBs by hospital size.
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Knee

- >=500 bed
- ··· <500 bed



Neuraxial vs General Anesthesia for Total Hip and Total Knee Arthroplasty: Systematic Review of Comparative-Effectiveness Research

Outcome*	Studies (n)	Patients (n)	WMD or RR (95% CI)	P -value	I^2 (%) †
Surgery duration (min)	21	9382	WMD -5.13 (-10.96 to 0.70)	0.08	94
Length of stay (days)	12	1240	WMD -0.40 (-0.76 to -0.03)	0.03	73
DVT, none	9	721	RR 0.51 (0.41–0.62)	0.00	0
PE, none	7	607	RR 0.36 (0.22–0.60)	0.00	0
DVT, Rx	6	949	RR 0.82 (0.65–1.04)	0.10	34
PE, Rx	4	613	RR 0.83 (0.48–1.43)	0.50	0
Mortality	7	1149	RR 0.85 (0.30–2.46)	0.77	0
PONV	5	328	RR 1.33 (0.69–2.57)	0.40	86
Surgical site infection	5	8095	RR 0.91 (0.56–1.47)	0.69	0
Chest infection	3	266	RR 0.88 (0.19–4.11)	0.87	0
Nerve palsies	2	185	RR 0.68 (0.08–5.97)	0.73	0



Johnson RL et al. *Brit J Anaesth* 2016

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Neuraxial vs General Anesthesia for Total Hip and Total Knee Arthroplasty: Systematic Review of Comparative-Effectiveness Research

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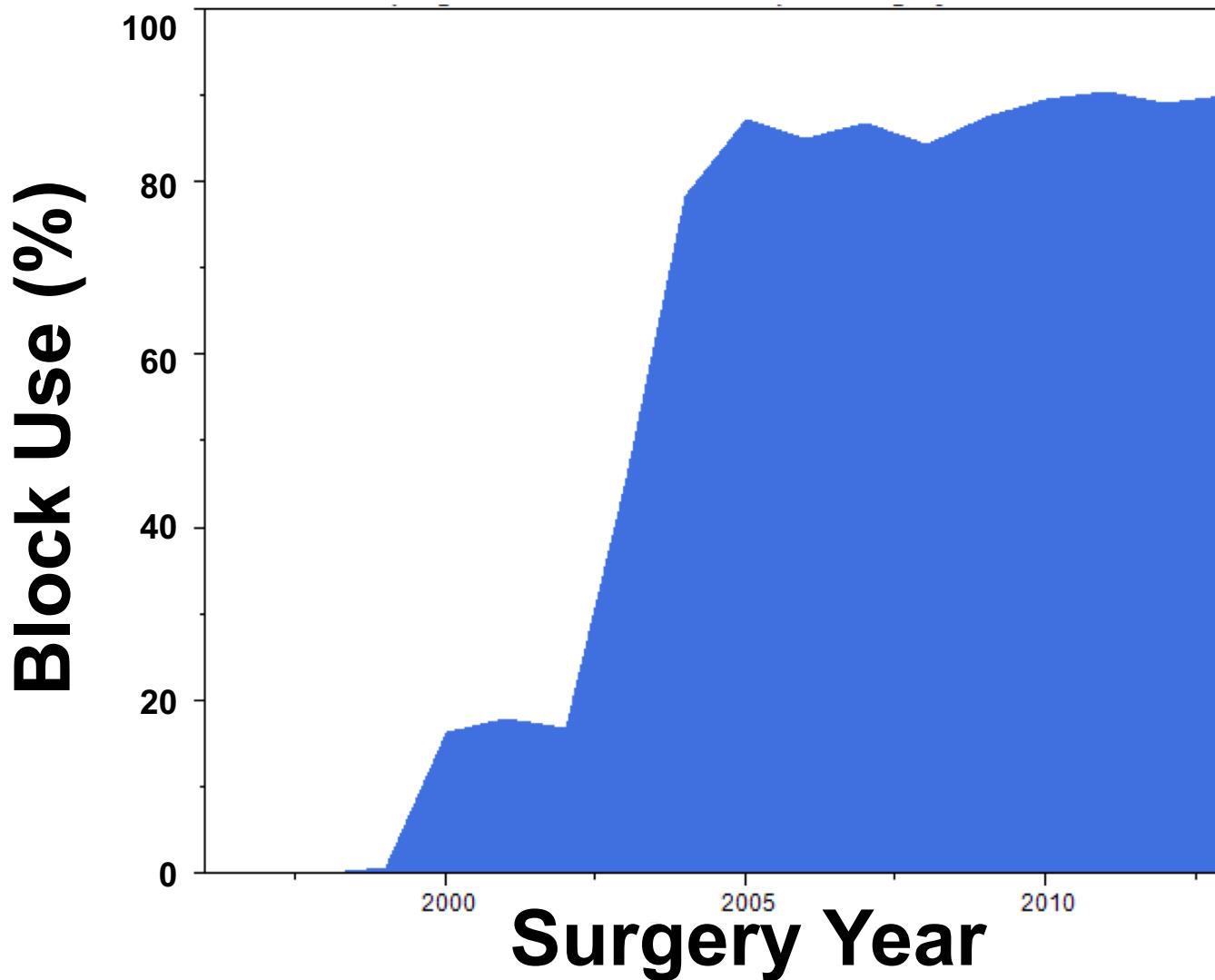
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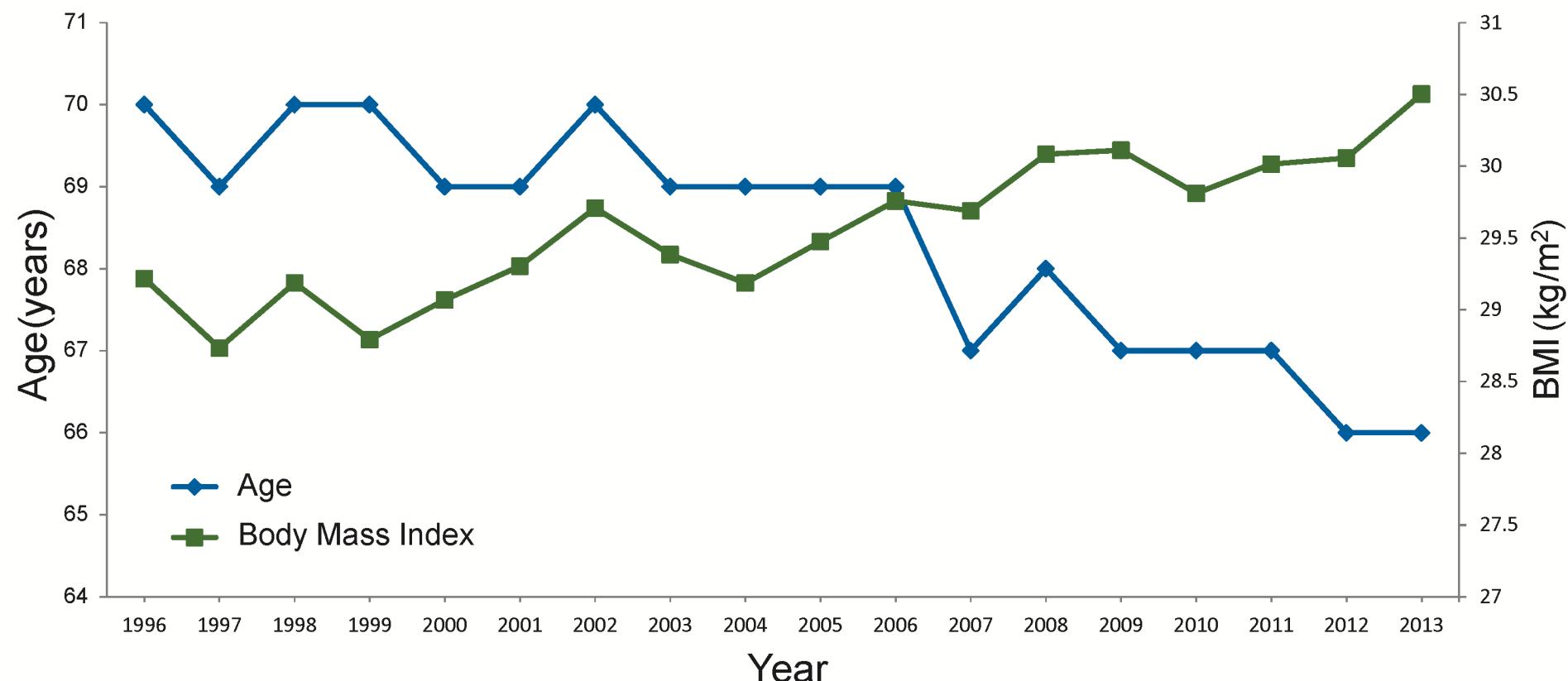
Johnson RL et al. *Brit J Anaesth* 2016

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Peripheral Nerve Blockade: Frequency



Use of Peripheral Nerve Blockade in Total Hip or Knee Arthroplasty



Use of Peripheral Nerve Blockade in Total Hip or Knee Arthroplasty

N = 34,406

Adjusted OR

Myocardial Infarction

0.47 (0.36-0.62)

Death

0.24 (0.15-0.38)

Any complication

0.43 (0.36-0.53)

Tien M et al. *in revision*



Regional Anesthesia



Incidence of Nerve Injury

Frequency (per 10,000)

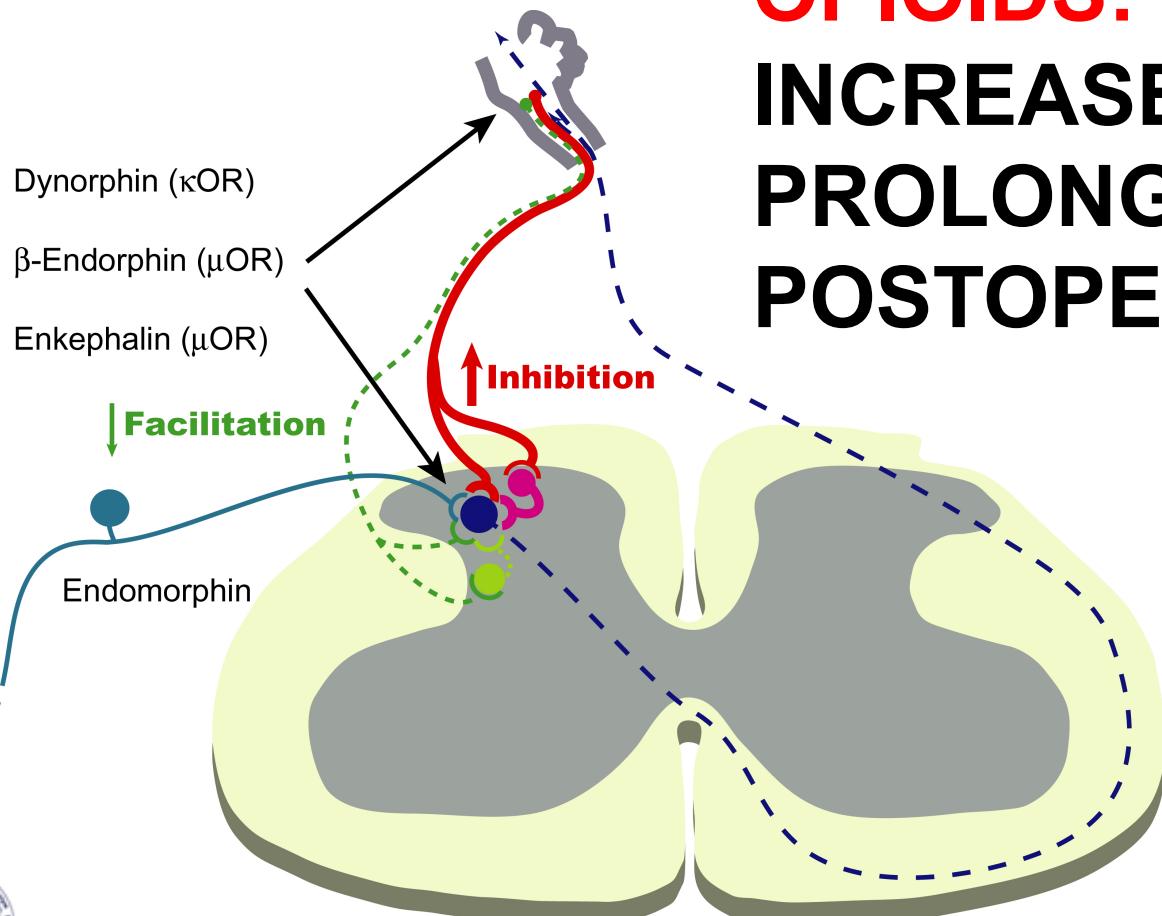
- **Neuraxial:** 0.4-11.8
- **Peripheral nerve blockade:** 2.7-3.8
- **TKA** (97/12,329) = **0.79%** (UL 95%CI: 0.96%)
- **THA** (93/12,998) = **0.72%** (UL 95%CI: 0.88%)

Not associated with peripheral nerve blockade or type of anesthesia

Jacob AJ et al. *Anesthesiol* 114:311, 2011
Jacob AJ et al. *Anesthesiol* 115:1172, 2011



Perioperative Multimodal Analgesia



OPIOIDS:
INCREASED RISK FOR
PROLONGED
POSTOPERATIVE USE



Opioid Tolerance

- **Organ specific:**

Euphoria

Nausea / Vomiting

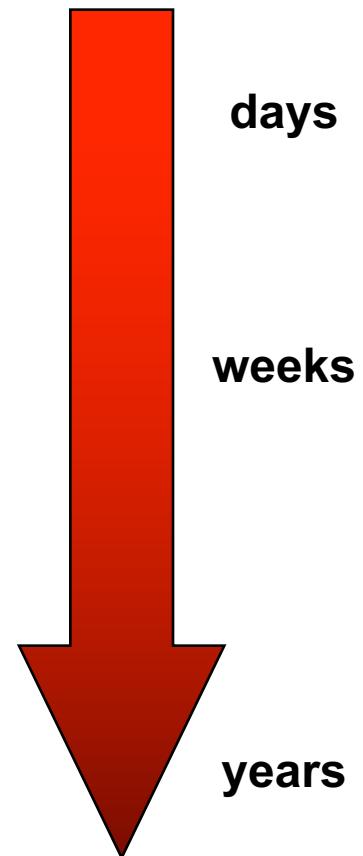
Sedation

Cognitive impairment

Analgesia

Respiratory depression

Constipation



Collett BJ. *Br J Anaesth* 1998;81:58-68

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Patient Satisfaction

- Opioid based IV PCA satisfaction is comparable to Epidural analgesia (even though epidurals have better efficacy)

Capdevila X et al. Anesthesiology 1999;91:8-15

- Poor correlation between patient satisfaction and experienced pain

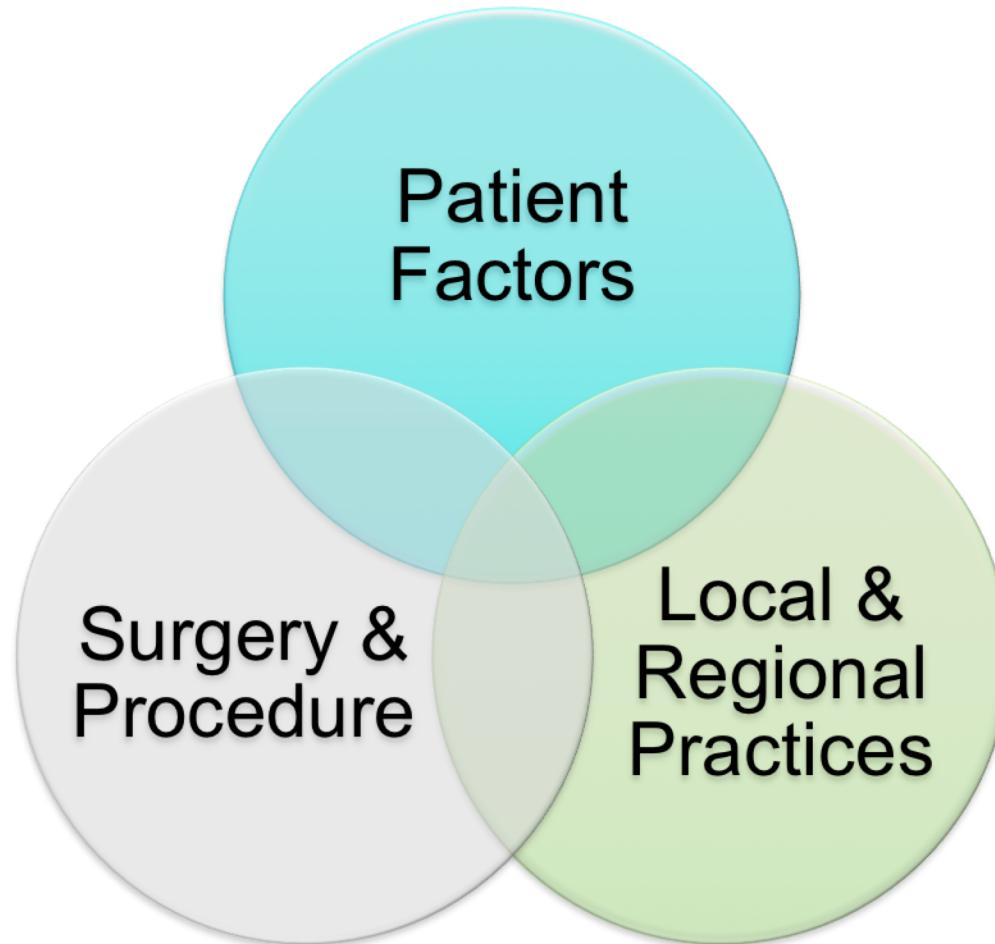
Ward SE. Pain 1994;56:299-306

- Satisfaction depends on quality of communication

Afilalo M. Ann Emerg Med 1996;27:436-8



Perioperative Outcomes



https://youtu.be/_pCT3mb8AEU

