Can We Assess Quality in Perioperative Regional Anesthesia and Analgesia in Orthopedic Patients?

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Disclosures

No conflicts of interest

Editorial boards: RAPM, BJA, Clin J Pain

PROSPECT (ESRA)

Topics of Discussion

HSS

-Focus on regional anesthesia for outpatient orthopedic surgery

-Can we measure quality in regional anesthesia?

    -What does AI say?

-Why is it difficult to measure quality in regional anesthesia?

-What should we be measuring?

-Bottom line: more questions than answers

Background

-Completed anesthesiology residency 1993 (no fellowship)

-Academic Practice (1993-2018): Univ Rochester/Johns Hopkins

    -RA, APS, OB

-Private Practice (2018-present): HSS (Weill Cornell)

    -Sports (shoulders), Joints (THA/TKA)

-Hospital for Special Surgery

    -Orthopedic only hospital: >40,000 cases annually with >80% performed under RA with sedation

    -Outpatient joints (THA, TKA, TSR)

    -Residents/fellows present; 75% solo

Total Shoulder Replacement: Typical Anesthetic

HSS

-Some surgeons prefer RA only/no GA

-Most patients would be appropriate for outpt TSR under RA w/ sedation

-Blocks performed in OR; Sedation: 5 mg IV midazolam, 25-50 mcgs fentanyl, 10-20 mg ketamine, 0.2 mg glycopyrrolate

-Superior nerve trunk or high supraclavicular block depending on anatomy

    -25-35 ml of LA (1.5% mepivacaine, 0.5% bupivacaine w/ 2 mg dex)

-Propofol sedation 50-100 mcgs/kg/min (30-40 ml/hr)

    -Oral/nasal airway used not infrequently

-Pts d/c home within 2-3 hrs after PACU arrival; block duration 18-24 hrs

Total Knee Replacement: Typical Anesthetic

HSS

-All surgeons prefer neuraxial anesthesia with PNBs/sedation; no GA

-Most patients would be appropriate for outpt TKA under RA w/ sedation

-Blocks performed in OR; Sedation: 5 mg IV midazolam, 25-50 mcgs fentanyl, 10-20 mg ketamine, 0.2 mg glycopyrrolate

-Spinal anesthesia; 3.5-4 ml of 1.5% mepivacaine; can use chloroprocaine spinal if surgeon is reliably fast

-PNB: adductor canal, IPACK, ?geniculars

-0.25% bupivacaine with dex (2-4 mg)

-Propofol sedation 50-100 mcgs/kg/min (30-40 ml/hr)

-Pts d/c home within 3 hrs after PACU arrival

Can We Assess Quality in Regional Anesthesia? What Does Google AI Say?

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Yes, quality in perioperative regional anesthesia can be assessed through a combination of methods, including evaluating the process of administering the block (technique, nerve localization), monitoring patient response during surgery, assessing post-operative pain management, and tracking potential complications, all while considering patient-reported outcomes and utilizing standardized quality indicators specific to regional anesthesia practices; however, there is currently no single "gold standard" method for comprehensive assessment.

Can We Assess Quality in Regional Anesthesia? Google AI Response

Key aspects of assessing quality in perioperative regional anesthesia:

-Structure indicators:

Availability of trained personnel with expertise in regional anesthesia

Access to necessary equipment and medications

Established protocols and guidelines for regional anesthesia techniques

Can We Assess Quality in Regional Anesthesia? Google AI Response

HSS

-Process indicators:

Proper patient selection and pre-operative evaluation

Accurate nerve localization and block placement

Monitoring of vital signs during the procedure

Effective communication between anesthesia team members

Documentation of key aspects of the regional anesthesia procedure

Can We Assess Quality in Regional Anesthesia? Google AI Response

HSS

-Outcome indicators:

Adequate surgical anesthesia achieved with the regional block

Minimal post-operative pain scores

Low incidence of complications like nerve damage or systemic toxicity

Patient satisfaction with the anesthetic experience

Length of hospital stay

Can We Assess Quality in Regional Anesthesia? Google AI Response

HSS

-Challenges in assessing quality in regional anesthesia:

Variability in practice patterns: Different clinicians may use different techniques and approaches to regional anesthesia

Subjective nature of pain assessment: Relying on patients' self-reported pain levels can be challenging

Data collection and analysis limitations: may require robust data collection systems to accurately monitor and analyze outcomes

https://www.google.com/search?q=Can+We+Assess+Quality+in+Perioperative+Regional+Anesthesia&rlz=1C1CHBF_enUS766US766&oq=Can+We+Assess+Quality+in+Perioperative+Regional+Anesthesia&gs_lcrp=EgZjaHJvbWUyBggAEEUYOdIBCzI5ODk2OTJqMGo3qAIAsAIA&sourceid=chrome&ie=UTF-8, accessed 2/5/2025

Addition of Dexamethasone to Prolong Peripheral Nerve Blocks: a ChatGPT-created Narrative Review

HSS

-Group of experts in RA invited to help shape the topic to be studied, refine the questions entered in to the ChatGPT program, vet the manuscript for accuracy, and create a commentary on the article

-ChatGPT produced an adequate summary of the topic for a general medical or lay audience

-Inadequate for a subspecialty audience as the expert authors

-Major concerns: poor search methodology, poor organization/lack of flow, inaccuracies/omissions of text or references, lack of novelty

-Conclusion: at this time, ChatGPT is not able to replace human experts and is extremely limited in providing original, creative solutions/ideas and interpreting data for a subspecialty medical review article

Reg Anesth Pain Med. 2024;49:777-781

Can We Assess Quality in Regional Anesthesia?

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-MPOG measures: AKI, PPC, Blood, PONV, SSI

    -Definable endpoints; outcomes not uncommon

-Regional Anesthesia:

    -Not easy vs. other processes

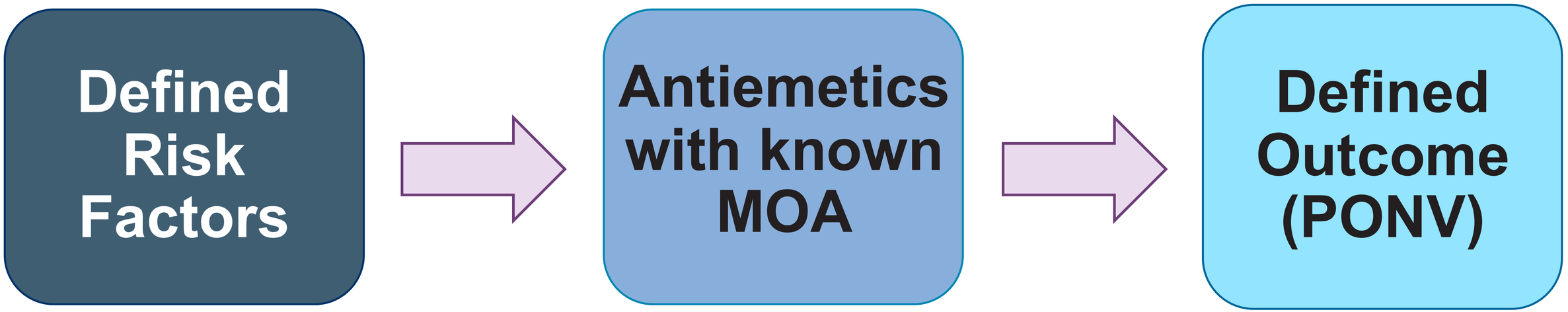
    -Endpoints not easily defined

    -Outcomes rare/uncommon: morbidity, mortality

-Patient centered endpoints

    -None developed or validated for RA *per se*

Causality in RA is Difficult to Determine: Example of PONV



Causality in RA is Difficult to Determine: PONV

-Antiemetics given in widely accepted fixed doses

-Well known and accepted risk factors

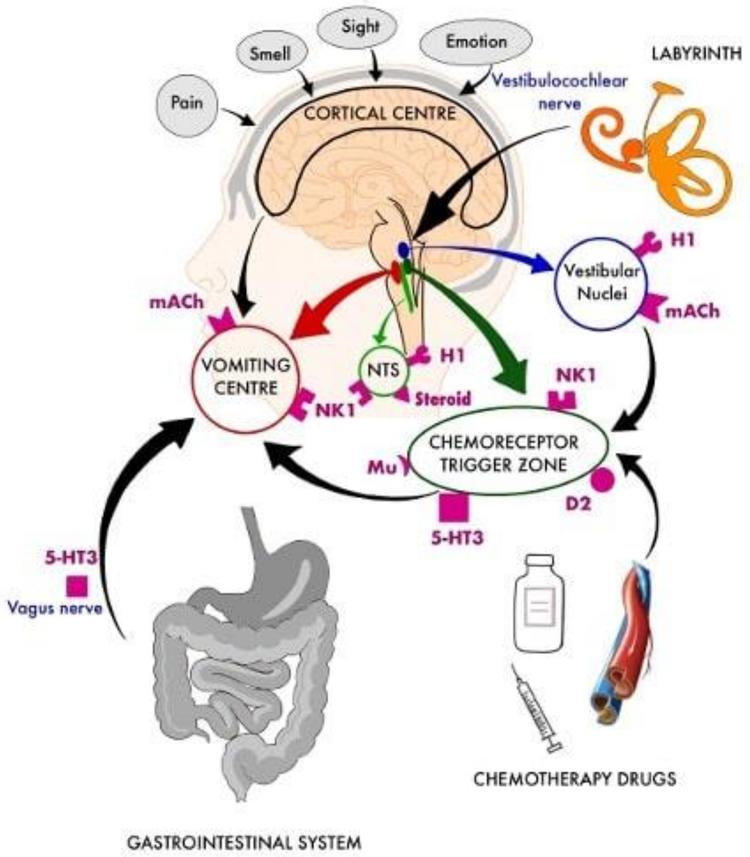
-Mechanism of action largely known (mostly receptor based)

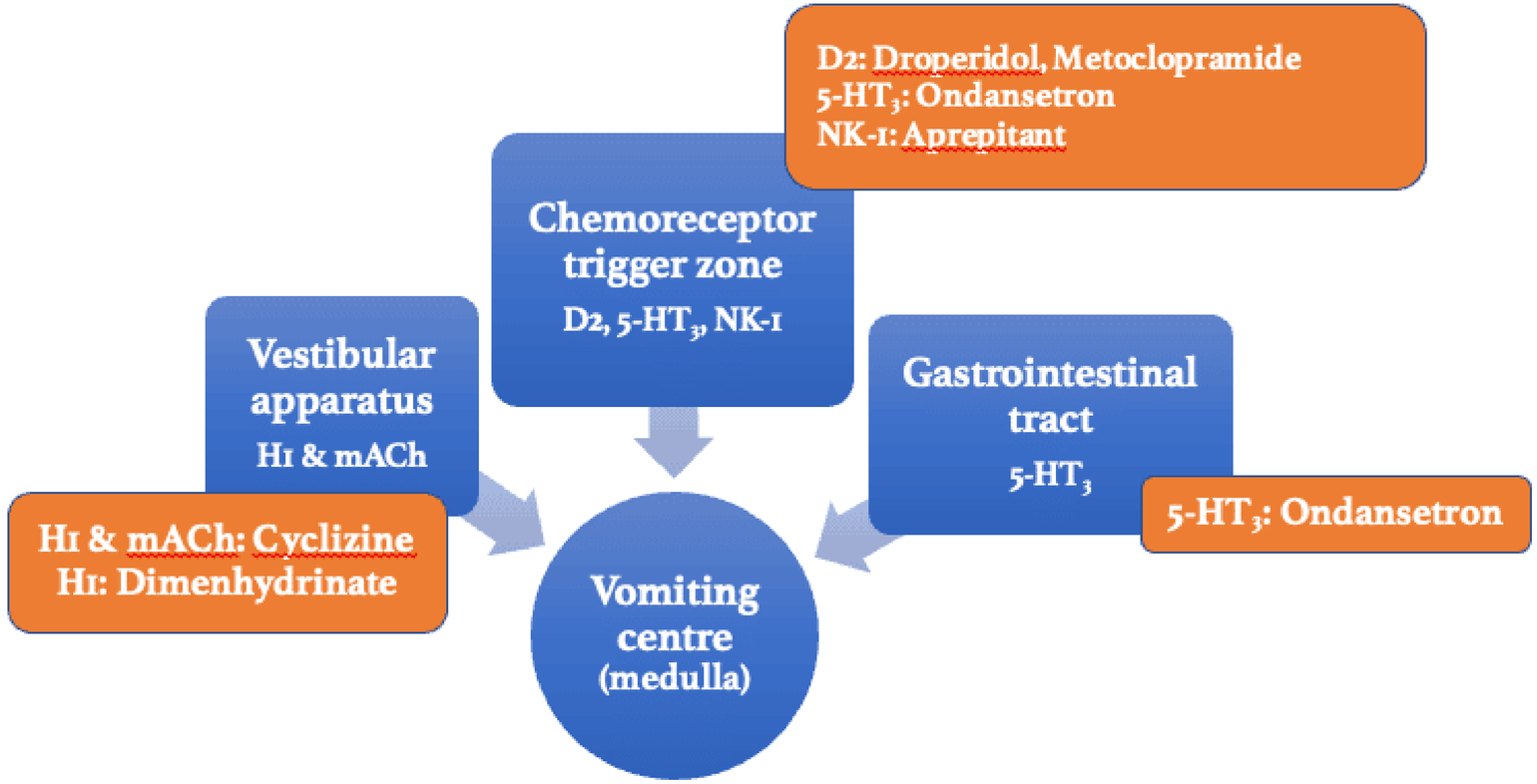
-Pharmacologic profile well defined

-Outcomes defined and relatively easy to measure

https://spec.mpog.org/Spec/Public/53, accessed 2/5/2025

Causality in RA is Difficult to Determine: PONV





https://resources.wfsahq.org/atotw/paediatric-postoperative-vomiting/, accessed 2/5/2025

Causality in RA is Difficult to Determine: PONV

-Measure ID PONV-05

-PONV Risk Factors:

Age<50 yrs, sex: F, h/o of PONV or motion sickness, non-smoker

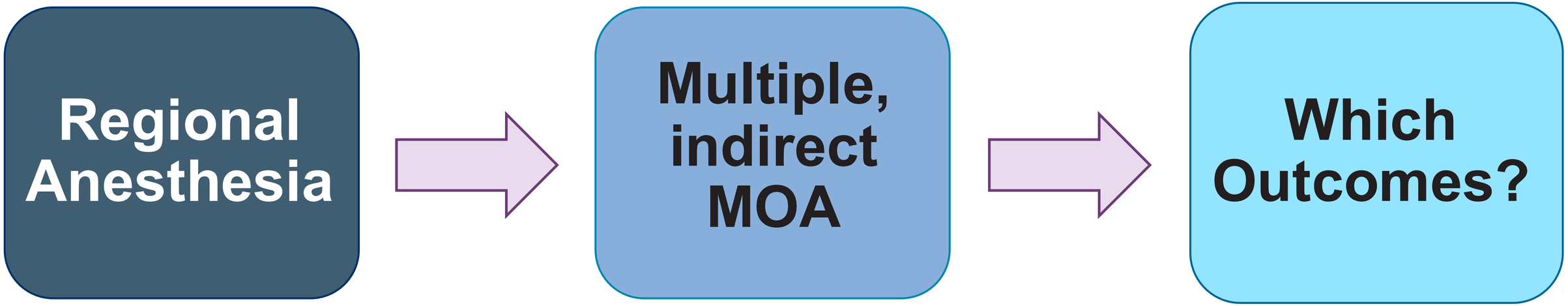
-Success criteria (patients ≥18 yr undergoing GA):

-At least two prophylactic pharmacologic antiemetic agents of different classes administered for patients with 1-2 two risk factors

-At least three prophylactic pharmacologic antiemetic agents from different classes for patients with three or more risk factors

https://spec.mpog.org/Spec/Public/53, accessed 2/5/2025

Causality in RA?



Causality in RA is Difficult to Determine

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-”Regional Anesthesia”: no “standard” intervention, multiple variables

- -Agent: short, intermediate, long acting
- -Dose: variable dosing; possible adjuvants
- -Catheters: congruency to surgery, duration, agents used

-Mechanism of Action

- -No direct MOA; benefits mediated via physiologic changes resulting from RA (eg, attenuated stress response)

-Outcomes: no “standard” definition

- -May or may not be attributable to RA *per se* (eg, ↓ mortality)
- -How to define “success”?

600

How Should We Assess Quality in Regional Anesthesia? One Possibility

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-Could rate of utilization of neuraxial anesthesia for THA/TKA be one measure?

- -Data suggests ↓ mortality, major morbidity with use of NA vs. GA
- -NA may confer a better profile for outpatient joint surgery
- -Rate of utilization of NA is still relatively low for THA/TKA

-Some societies/organizations have advocated for use of NA as the preferred type of anesthetic for THA/TKA

Regional Anesthesia and Outcomes for TKA/THA

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-Large observational studies suggest use of neuraxial anesthesia is associated with decrease in mortality/morbidity after TKA/THA

-Many database analysis of national registries

-No large scale RCTs unlike hip fracture surgery (REGAIN)

Spinal Anesthesia is a Grossly Underutilized Gold Standard in Primary Total Joint Arthroplasty: Propensity-matched Analysis of a National Surgical Quality Database

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-NSQIP database analysis 307,076 THA/TKA patients under SA or GA

-Propensity matching: compare differences in operative times, hospital LOS, discharge destination, 30-day adverse events

-Spinal anesthesia:

-Shorter LOS ($P < 0.001$) for TKA but no difference for THA

-Lower 0-day complication ($P < 0.001$ for THA and TKA)

-More likely to be discharged to home ($P < 0.001$ for THA and TKA)

-Between 2011 and 2018, SA use increased by 1.4% for THA and decreased by 0.2% for TKA (overall prevalence of 38.1% and 40.3%, respectively)

Arthroplasty. 2023 Feb 9;5:7

Spinal Anesthesia in Total Hip Arthroplasty is Associated With Improved Outcomes in the American Joint Replacement Registry Population

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-THAs in the American Joint Replacement Registry data (2017 to 2020)

-217,124 THAs: 119,425 (55%) received GA; 97,699 (45%) received SA

-Multivariable regression showed SA associated with:

- -Decreased risk of hospital LOS >3 days (P < .0001)
- -Lower likelihood of prolonged operative time (P < .0001)
- -Lower rates of 90-day readmission (P < .0001)
- -Decreased risk of 90-day all-cause revision (P < .0001)

-For THA, SA patients had shorter operative time, reduced LOS, decreased rates of readmission and revision compared to GA patients GA

Arthroplasty. 2024;30:101566

Perioperative Comparative Effectiveness of Anesthetic Technique in Orthopedic Patients

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-Data from Premier database (approximately 400 acute care hospitals in US) between 2006 and 2010

-Of 528,495 THA/TKA patients, information on anesthesia type was available for 382,236 (71.4%) records

    -11% neuraxial, 14.2% under combined NA/GA, 74.8% under GA

-Neuraxial anesthesia was associated with:

    -Lower 30-day mortality and in-hospital complications ($P < 0.001$)

    -Lower incidence of prolonged LOS, cost

-30-day mortality significantly higher in GA vs. NA or NA-GA groups for TKA ($P = 0.02$ for both)

Anesthesiology. 2013;118:1046–58

Neuraxial and General Anesthesia for Outpatient Total Joint Arthroplasty Result in Similarly Low Rates of Major Perioperative Complications: a Multicentered Cohort Study

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-Retrospective cohort study in ambulatory THA/TKA patients (Kaiser)

-Of 11,523 eligible patients, 10,003 received NA, 1520 received GA

-30-day major complications did not differ between NA and GA (p=0.39)

-No difference in 30-day minor complications (p=0.23)

-Neuraxial group: reduced pain and analgesia requirements, less PONV, and shorter median recovery room length of stay (by 52 min)

-NA patients more likely to fail same day discharge (p<0.01).

-NA improved outcomes that predict readiness for discharge

Reg Anesth Pain Med 2022;47:294–300

Regional Anesthesia and Outcomes for TKA/THA

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-Guidelines/societies recommend neuraxial anesthesia for TKA/THA

-AHRQ Safety Program for Surgical Care: THA/TKR

-Joint Commission National Quality Measures

-International Consensus on Anaesthesia-Related Outcomes after Surgery group (ICAROS)

Evidence Review Conducted for the AHRQ Safety Program for Improving Surgical Care and Recovery: THA and TKR

HSS

-Safety Program for Improving Surgical Care and Recovery (ISCR): AHRQ, ACS, Johns Hopkins Medicine Armstrong Institute for Patient Safety

-Evidence review/protocol was developed based on guidelines from several professional associations/societies and literature reviews

-THA: For patients without contraindications (assuming local expertise and resources are available), NA preferred for THA

-TKA: NA associated with improved outcomes in TKA patients. For patients without any contraindications (assuming local expertise and resources are available), NA preferred over GA for TKA

Anesth Analg. 2019 Mar;128:454-65
Anesth Analg. 2019 Mar;128:441-53

Specifications Manual for Joint Commission National Quality Measures (v2024B)

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-Outpatient and inpatient THA/TKA

-Performance Measure Name: Regional Anesthesia

-Description: Patients undergoing a total hip or total knee replacement with regional anesthesia attempted or performed

    -Regional anesthesia includes neuraxial anesthesia (spinal and epidural blocks) as well as peripheral nerve blocks.

-Rationale: Regional anesthesia is associated with fewer postoperative complications and deaths than general anesthesia.

https://manual.jointcommission.org/releases/TJC2024B/MIF0353.html
https://manual.jointcommission.org/releases/TJC2024B/MIF0369.html

Anaesthetic Care of Patients Undergoing Primary Hip and Knee Arthroplasty: Consensus Recommendations from the International Consensus on Anaesthesia-Related Outcomes after Surgery group

HSS

-ICAROS: multidisciplinary group include 50 anesthesiologists, orthopedic surgeons, healthcare researchers

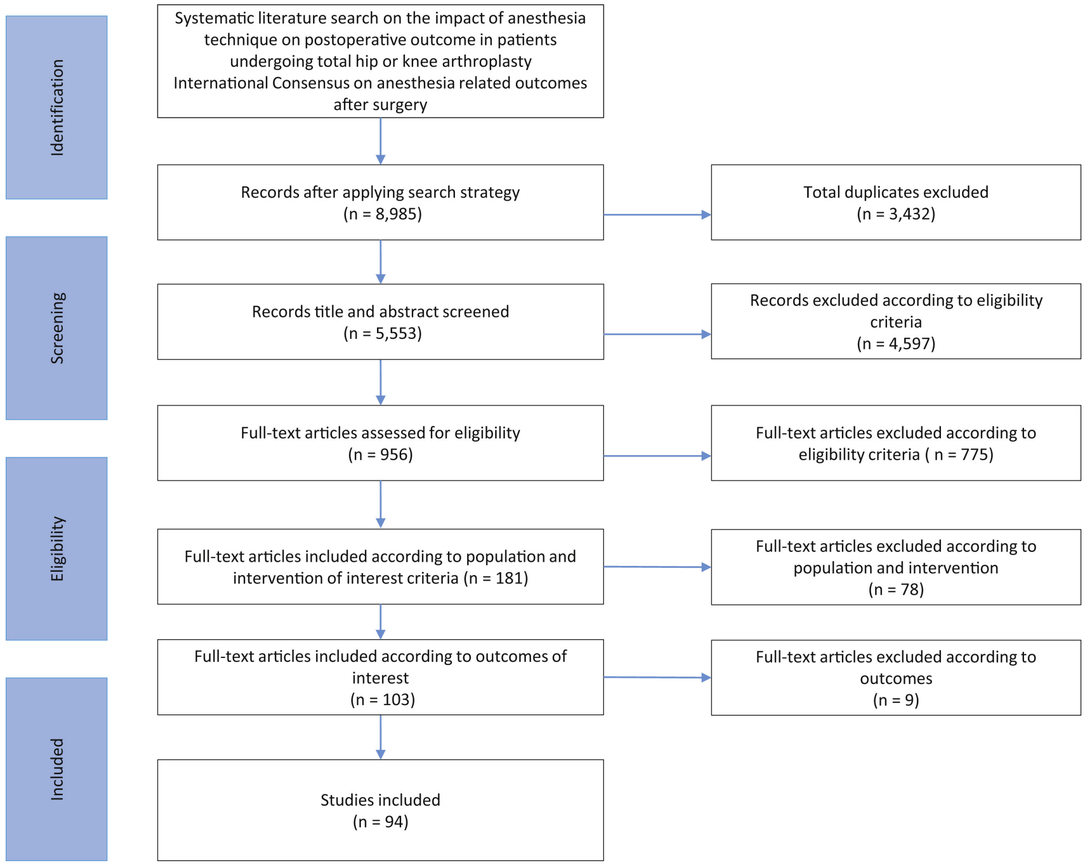
-Neuraxial anesthesia was associated with lower odds or no difference in virtually all reported complications, except for urinary retention

-NA associated with lower odds of mortality, pulmonary complications, acute renal failure, deep venous thrombosis, infections, and blood transfusion

-Consensus: NA is the preferred anesthetic technique (when no contraindications exist), and that this reduces the risk of most (but not all) complications. NA, which remains underutilized, may be used to improve perioperative outcomes

Br J Anaesthesia 2019;123:269-87

International Consensus on Anaesthesia-Related Outcomes after Surgery group (ICAROS) based on a systematic review and meta-analysis



Br J Anaesthesia 2019;123:269-87


ONE WAY
ONE WAY
ONE WAY

Utilization of Regional Anesthesia is Low

HSS

-Measuring utilization of RA might be quality indicator

    -Use backed by several guidelines and societies

-Easy to measure although the nuisances of the RA itself may be difficult to capture

-If adopted, target goal would need to be determined

    -Variability by region, type of practice

    -Variable acceptance by surgeons and patients

Rate of Neuraxial Anesthesia Usage: TKA/THA

Study	Rate of NA Use	Rate of GA Use
NSQIP	38.1%	40.3%
Premier	25.2%	74.8%
American Joint Replacement Registry	45%	55%
Kaiser (outpatient)	***87%***	13%

Anesthesiology. 2013 May;118(5):1046–1058
Arthroplasty. 2023 Feb 9;5:7

Arthroplasty. 2024;30:101566
Reg Anesth Pain Med 2022;47:294–300

Kaiser: Why a Higher Rate of NA?

-Created dashboard to give feedback by facility and across Kaiser

-Shared with anesthesiology providers

-If one facility stood out, tried to replicate their best practices at other locations

-To foster excellence and concentrate expertise, they created centers of excellence and anesthesiology teams for TJR

-Across the enterprise, they have a group focused on RA best practices to review and implement newer practices sooner rather than later

Persoanl communication JH, Feb 8, 2025

The Patterns of Utilization of Interscalene Nerve Blocks for Total Shoulder Arthroplasty

HSS

-Retrospective analysis of data from the National Anesthesia Clinical Outcomes Registry from 2010 to 2015

-Of 28,810 cases, 42.1% received an ISB

-Only 0.83% of cases received RA as the primary anesthetic

-Among ISB, 24% received a continuous PNC

-From 2010 to 2014, ↑ ISB utilization

Anesth Analg 2016;123:758-61

The Patterns of Utilization of Interscalene Nerve Blocks for Total Shoulder Arthroplasty

HSS

-Females received a higher percentage of ISBs vs males

-ASA PS I to II received more ISBs vs. higher ASA PS class

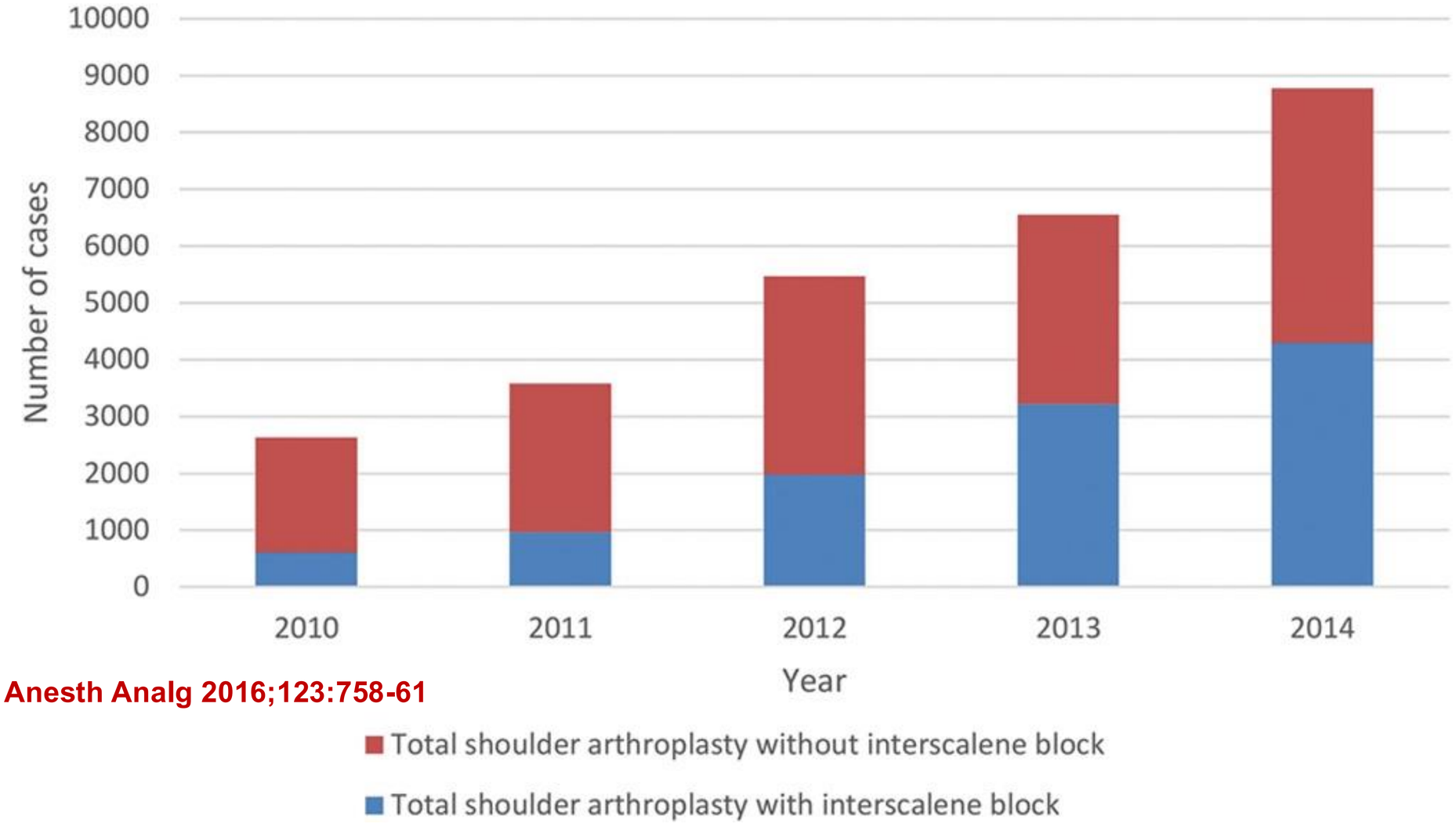
-Medium-sized community hospitals performed the most blocks

-Patients from zip codes of mixed urban/rural areas received the most ISBs

-Facilities performing <50 TSAs per year performed the most ISBs

Anesth Analg 2016;123:758-61

The Patterns of Utilization of Interscalene Nerve Blocks for Total Shoulder Arthroplasty



Anesth Analg 2016;123:758-61

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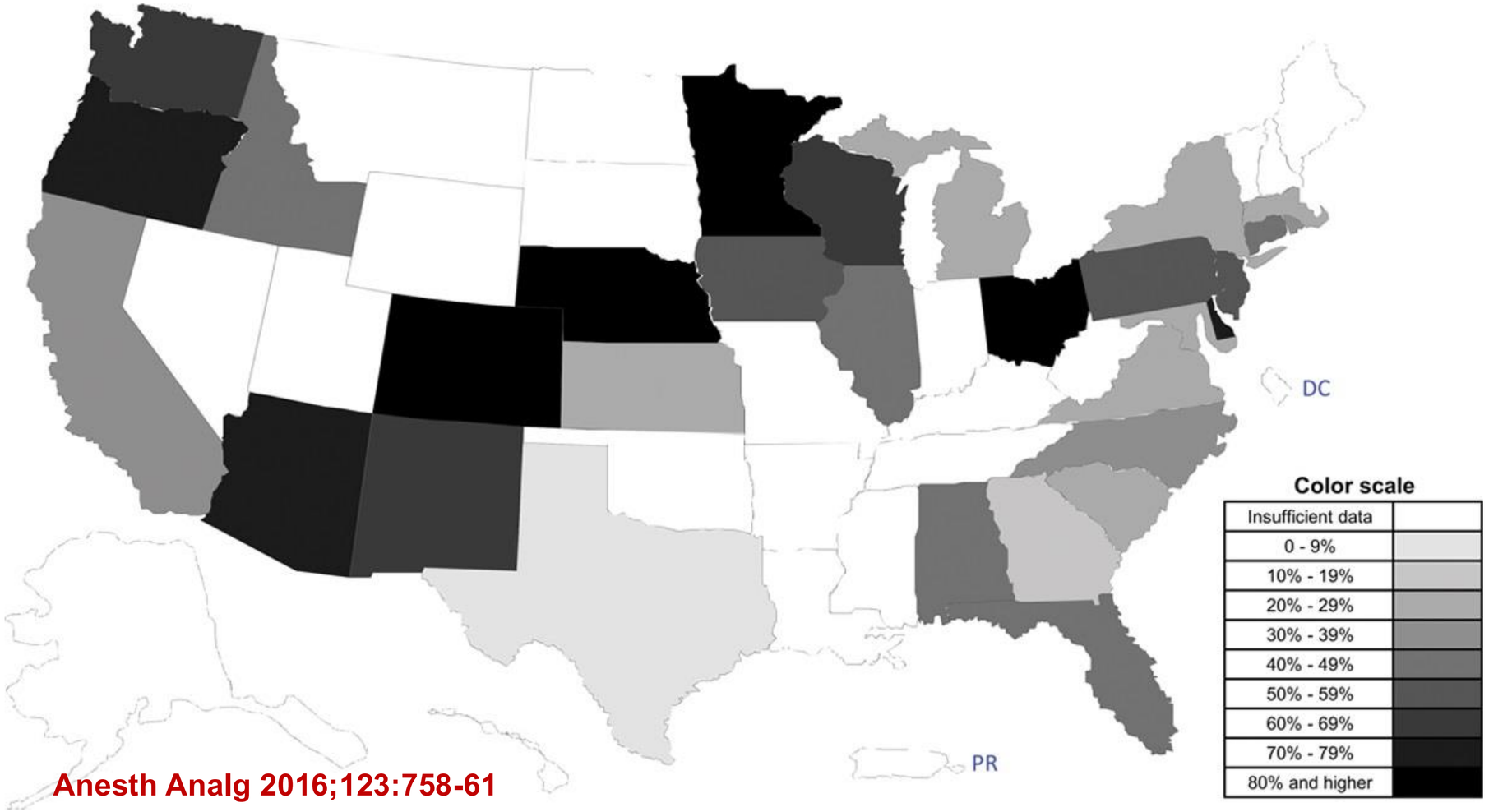


Anesth Analg 2016;123:758-61

Where Do We Go From Here?

HSS

“Prediction is very difficult, especially if it's about the future!”
Neils Bohr

“The only way you can predict the future is to build it.” Alan Kay

“If I had asked people what they wanted, they would have said faster horses.” Henry Ford

Patient Centered Outcomes

-Many feel that our patient “do better” with RA

-How do we capture this in a validated fashion?

-No psychometrically developed validated instruments to assess RA in the perioperative period

-There are several nonspecific psychometrically developed validated instruments to assess perioperative patient recovery

Psychometrically Developed Validated Instruments to Assess Perioperative Patient Recovery

HSS

-Quality of Recovery (QoL) instruments developed by Myles et al

-Validated in several languages and comes in different formats

-Original QoR-40 with shorter QoL-15 and QoL-7

-Assesses overall recovery, not regional anesthesia specific

Quality of Recovery

We would like to know how well you feel you have recovered from your anaesthetic and operation. Please circle the most appropriate responses.

Over the last ___ hours/days, have you:

	Not at all	Some of the time	Most of the time
1. Had a feeling of general well-being	0	1	2
2. Had support from others (especially doctors & nurses)	0	1	2
3. Been able to understand instructions and advice. Not being confused.	0	1	2
4. Been able to look after personal toilet and hygiene unaided.	0	1	2
5. Been able to pass urine ("waterworks") and having no trouble with bowel function.	0	1	2
6. Been able to breathe easily.	0	1	2
7. Been free from headache, backache or muscle pains.	0	1	2
8. Been free from nausea, dry-retching or vomiting.	0	1	2
9. Been free from experiencing severe pain, or constant moderate pain.	0	1	2

Summary Score. 0 to 18

Anesth Analg 1999;88:83-90.

Psychometric Development of a Validated Instruments to Assess Perioperative RA: Difficult at Best

HSS

-Creation of instrument

    -Determine which domains to assess

-Full psychometric evaluation

    -Validity: convergent validity, construct validity, discriminant validity

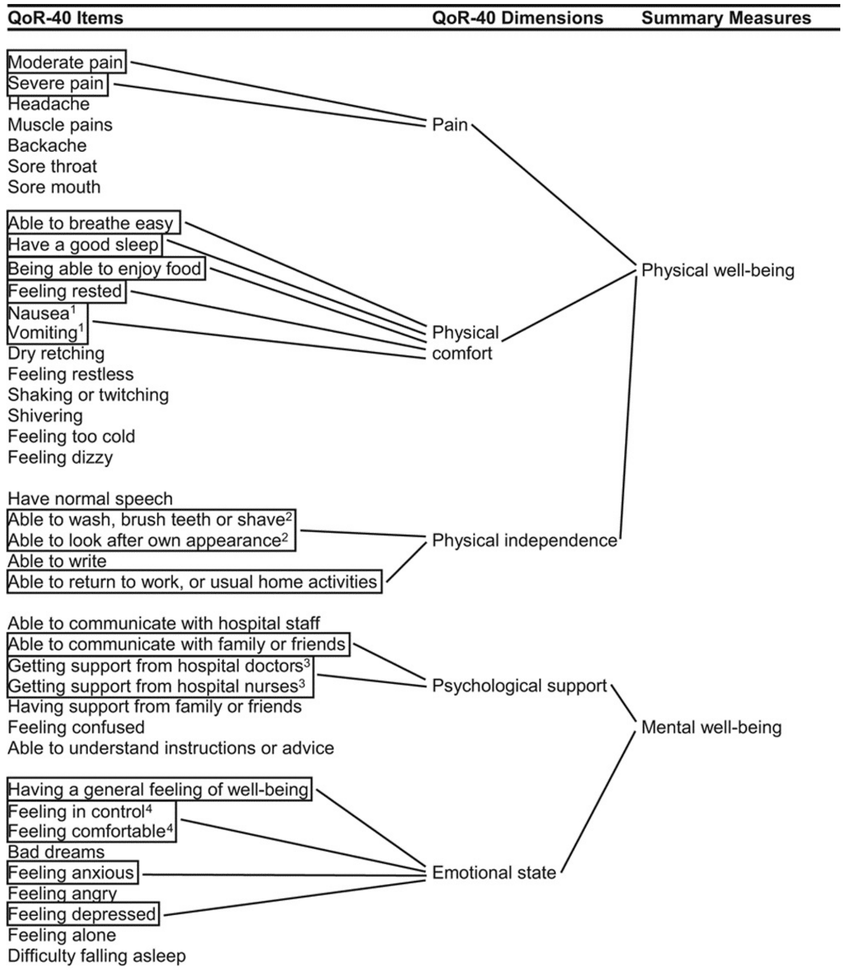
    -Reliability: internal consistency, split-half reliability, test–retest

    -Responsiveness: detect clinically important change

    -Acceptability and feasibility

Anesthesiology 2013;118:1332-40

Psychometric Development of a Validated Instruments to Assess Perioperative RA: Difficult at Best



Anesthesiology 2013;118:1332-40

Final Thoughts

HSS

-Measuring or assessing quality in regional anesthesia is complex

-Usage of regional anesthesia is relatively low despite recommendations by several societies/guidelines

-Most likely need development of validated patient centered endpoints

-Administration of a regional anesthetic *per se* does not guarantee outcome – how you manage the anesthetic may make a difference

Final Thoughts: Each One of Us Makes a Difference

“In every case in which an anaesthetic is to be administered there are three factors which contribute to the result: the special action of the agent, the peculiarities of the patient, and the *skill* with which the agent is administered.”

G. MacLeod, Discussion on Anaesthetics, Medico-Chiurgical Society Proceedings, Glasgow, 1890-91.

“Using an optimal balance between appropriate techniques, application of advanced equipment, and optimal doses of drugs, regional anaesthesia plays an important role in perioperative medicine. No outcome study or meta-analysis considers the *individual skills* and the directly associated success rates. In the author’s opinion, failed blocks are probably the most important factors for negative outcome. Improvement in outcome can probably be achieved when the skills of individual practitioners are improved and regional anaesthesia is used wisely and appropriately leading to reduced failure rates.”

Kettner SC, Willschke H, Marhofer P [Br J Anaesth. 2011;107(S1):i90-5]