

## Regional Anaesthesia Curriculum Resources

This document contains a series of resources designed to assist trainees in attaining the Key Capabilities required to meet each Stage Learning Outcome of the new 2021 Royal College of Anaesthetists' curriculum.

The material provided below has been curated by Regional Anaesthesia UK with input also from the Obstetric Anaesthetists' Association (OAA) and the British Ophthalmic Anaesthesia Society (BOAS). Suggested content for each Key Capability of each Stage Learning Outcome is provided, along with supplementary reading for those interested. Free online resources can vary in quality, and what is included below has been reviewed and recommended by national experts who believe this reflects contemporary, best practice. Whilst not an exhaustive list, we hope the content herein will facilitate achievement of the High Level Outcome which ultimately is to provide safe and effective regional anaesthesia. The document has been generated with approval from the Royal College of Anaesthetists (RCoA) but the content is not formally endorsed as such.

### *Types of resource*

#### "Knowledge based" Key Learning Capabilities

- Contemporary publications
- Relevant national standards or guidelines from the RCoA, Association of Anaesthetists (AA) or other bodies.
- Links to RA-UK approved documents and other international society guidance
- Links to appropriate e-LA modules and other e-learning (practice has evolved since some e-learning modules were designed; those not reflecting current practice are marked with an asterisk - we are aware the modules are being updated)
- RA-UK handbook
- Online RA resources
- Links to any relevant previous RA-UK ASM lectures/RCoA/AA webinars on the topic
- Links to educational material developed by the [OAA](#) and [BOAS](#)
- Link to Raising the Standards: RCoA Quality Improvement Compendium

#### "Procedural" Key Learning Capabilities

For procedural Key Learning Capabilities, background reading material is provided to help understand anatomy, sonoanatomy and the principles of each block. Basic transferable knowledge and skills required to safely and effectively perform any ultrasound guided nerve block are included in Stage 1E.

- Anatomy and sonoanatomy resources
- Video tutorials
- E-learning modules
- Links to regional anaesthesia courses can be found at [www.ra-uk.org](http://www.ra-uk.org)

## Index

Stage 1	Page
A. Risks and benefits of regional anaesthesia	4
B. Indications and contraindications to regional anaesthetic techniques	6
C. Practice measures to avoid wrong-site blocks	8
D. Performs spinal anaesthesia for ASA 1-3 patients independently	9
E. Performs simple peripheral nerve blocks with ultrasound	10
F. Performs ultrasound guided femoral or fascia iliaca independently	12
G. Obstetric anaesthesia: complications of regional anaesthesia including systemic local anaesthetic toxicity, high spinal and dural puncture headache	13
H. Obstetric anaesthesia: provides epidural or CSE analgesia for labour in ASA 1-3 obstetric patient and offers other forms of pain relief where neuraxial analgesia is contraindicated	15
I. Obstetric anaesthesia: provides neuraxial anaesthesia for operative delivery and other obstetric procedures in ASA 1-3 and manages inadequate block	17
J. Discusses scientific basis of ultrasound and generation of images	18
K. Discusses drugs and equipment used in regional anaesthesia	19
Stage 2	
A. Performs ultrasound guided brachial plexus blocks	20
B. Performs ultrasound guided fascial plane blocks for chest and abdominal wall	21
C. Demonstrates how to achieve an optimal ultrasound image and recognises common ultrasound artefacts	22
D. Describes ophthalmic blocks for patients undergoing awake ophthalmic surgery	23
E. Involves the patient in planning and understanding potential complications of regional anaesthesia	24
F. Assesses when a regional technique not appropriate	26
G. Manages inadequate block in the awake patient and in recovery if used as an adjunct to general anaesthesia	29
H. Describes the longer term management of complications of regional anaesthesia	30
I. Discusses the use of regional anaesthesia in the presence of abnormalities of coagulation	31
Stage 3	
A. Tailors regional anaesthesia techniques to patients undergoing day surgery	32
B. Manages regional anaesthesia and analgesia safely in the perioperative period in all settings	33
C. Performs US guided RA for the chest wall independently	35
D. Performs US guided RA for the abdomen independently	36
E. Performs US guided blocks for lower limb surgery independently	37

F. Performs ultrasound brachial plexus blocks independently 38

**Stage 3i** 39

- A. Can independently practice safely a wide range of regional techniques for all upper limb and shoulder surgery under block alone, including the management of continuous nerve catheters for post-operative analgesia
- B. Can independently practice safely a wide range of regional techniques for lower limb surgery, including the management of continuous nerve catheters for post-operative analgesia
- C. Can independently practice safely a wide range of regional techniques for chest and abdominal wall surgery
- D. Ability to independently organise, lead and evaluate the effectiveness and efficiency of an operating list planned under regional anaesthesia alone
- E. Supervises and advises colleagues on the suitability and delivery of regional anaesthesia in complex cases
- F. Can evaluate the place of regional anaesthesia, and any developments, within the patient perioperative pathway and advise on potential changes in practice

*Please note - embedded hyperlinks are provided where possible in each section*

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## Stage 1

### Key capabilities

#### 1A. Explains clearly to patients the risks and benefits of regional anaesthesia

(for obstetrics please see 1G, 1H and 1I)

#### Benefits

<b>Publications</b>	RA and outcomes. <i>BJA Ed</i> 2018; <b>18</b> : 52-56 Which patients benefit from RA? <i>Curr Op Anesth</i> 2016; <b>29</b> : 620-625
<b>National guidance/standards</b>	-
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	-
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	RCoA leaflet: Benefits of Spinal Anaesthesia RCoA leaflet: Nerve blocks for surgery on the shoulder, arm or hand
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	1.1 Patient information for anaesthesia 1.4 Consent in anaesthesia 1.5 Shared decision making in perioperative care

#### Risks

<b>Publications</b>	RA: risk, consent and complications. <i>Anaesthesia</i> 2021; <b>76</b> S1: 18-26 Complications of regional anaesthesia. <i>Anaesth Int Care</i> 2019; <b>20</b> : 210-214 Nerve injury after PNB – current understanding and guidelines <i>BJA Ed</i> 2018; <b>18</b> : 384-390
<b>National guidance/standards</b>	AA guideline. Regional Anaesthesia for lower leg trauma and the risk of acute compartment syndrome (2021) AA guideline. Regional anaesthesia and patients with abnormalities of coagulation ( <i>Note this is in the process of being updated</i> )
<b>RA-UK/ESRA/ASRA/OAA guidance</b>	RA-UK Peripheral nerve block follow-up Practice Advisory for the Prevention, Diagnosis, and Management of Infectious Complications Associated with Neuraxial Techniques: An Updated Report by the American Society of Anesthesiologists Task Force on Infectious Complications Associated with Neuraxial Techniques and the American Society of Regional Anesthesia and Pain Medicine. <i>Anesthesiology</i> 2017; <b>126</b> : 585–601
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 05b_03_04 Complications of spinals and epidurals</li> <li>• 05b_04_06 Complications of peripheral nerve blocks*</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	RCoA Anaesthesia risk leaflets RA Risks infographic
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	-

*Supplementary reading/online material*

Defining success in RA. *Anaesthesia* 2021; **76**: S1 40-52

Updates in our understanding of LA toxicity: a narrative review. *Anaesthesia* 2021; **76**: 27-39

The second ASRA practice advisory on neurologic complications associated with RA and pain medicine *Reg Anes Pain Med* 2015; **40**: 401-430

Relevant [Cochrane reviews](#) from Cochrane RA collection

- RA versus conventional analgesic techniques
- Neuraxial blockade for the prevention of postoperative mortality and major morbidity and mortality
- Multiple Cochrane reviews examining RA in orthopaedics (hip fracture, TKA, THA, shoulder surgery), vascular surgery and cardiac surgery.

The [PROSPECT guidance](#) contains useful recommendations about analgesia (including regional techniques) for specific procedures.

Online videos – Neuraxial Blockade Modern Anaesthetic Practice (Parts 1, 2, 3)

Nerve injury in regional anaesthesia. Anaesthesia tutorial of the week (TOTW) 422

The second ASRA evidence-based medicine assessment of ultrasound guided RA *Reg Anes Pain Med* 2016; **41**: 181-94

The role of regional anaesthesia and multimodal analgesia in the prevention of chronic postoperative pain: a narrative review. *Anaesthesia*. 2021;**76** Suppl 1: 8-17

\* Good module. Evidence now suggests LA toxicity and intravascular injection is reduced by ultrasound.

## 1B. Explains clearly to patients the Indications and contraindications to regional anaesthesia

(for obstetrics please see 1G, 1H and 1I)

### Indications

<b>Publications</b>	<p>Regional anaesthesia and outcomes. <i>BJA Ed</i> 2018; <b>18</b>: 52-56</p> <p>Best practices for safety and quality in peripheral regional anaesthesia. <i>BJA Ed</i> 2020; <b>20</b>: 341-347</p> <p>Regional anaesthesia for trauma: an update. <i>BJA Ed</i> 2013; <b>14</b>: 136-141</p> <p>General principles of regional anaesthesia in children. <i>BJA Ed</i> 2019; <b>19</b>: 342-348</p> <p>Which patients benefit from RA? <i>Curr Op Anesth</i> 2016; <b>29</b>: 620-625</p>
<b>National guidance/standards</b>	<p>AA guideline. Anaesthesia for day-case surgery 2019</p> <p>AA guideline. Management of hip fractures 2020</p> <p>GMC Decision making and consent 2020</p>
<b>RAUK/ESRA/ASRA guidance</b>	Consent for Peripheral Nerve Blocks
<b>e-learning</b>	<p>eLA modules</p> <ul style="list-style-type: none"> <li>• 05b_03_01 Spinals and Epidurals: Indications and Contraindications*</li> <li>• 05b_04_02 Indications and Contraindications for/to Peripheral Nerve Blocks (PNBs)*</li> <li>• 05b_05_03 Practical Regional Anaesthesia 1: Which Blocks for which Operations?*</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	<p>RCoA leaflet: Your spinal anaesthetic</p> <p>RCoA leaflet: Anaesthetic choices for hip or knee replacement</p> <p>RCoA leaflet: Epidural pain relief after surgery</p> <p>RCoA leaflet: Nerve blocks for surgery on the shoulder, arm or hand</p>
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	<p>1.5 Shared decision making in perioperative care</p> <p>1.13 Enhanced recovery after surgery</p> <p>1.14 Individualised perioperative pain management</p>

### Contraindications

<b>Publications</b>	Regional anaesthesia in patients at risk of bleeding. <i>BJA Ed</i> 2021; <b>21</b> : 84-94
<b>National guidance/standards</b>	AA guideline. Regional anaesthesia and patients with abnormalities of coagulation ( <i>Note this is in the process of being updated</i> )
<b>RA-UK/ESRA/ASRA guidance</b>	<p>Regional anaesthesia in the patient receiving antithrombotic or thrombolytic therapy. <i>Reg Anes Pain Med</i> 2018; <b>43</b>: 263-309</p> <p>Practice Advisory for the Prevention, Diagnosis, and Management of Infectious Complications Associated with Neuraxial Techniques: An Updated Report by the American Society of Anesthesiologists Task Force</p>

	on Infectious Complications Associated with Neuraxial Techniques and the American Society of Regional Anesthesia and Pain Medicine. <i>Anesthesiology</i> 2017; <b>126</b> : 585–601
<b>e-learning</b>	eLA module 5b <ul style="list-style-type: none"> <li>• 05b_03_01 Spinals and Epidurals: Indications and Contraindications*</li> <li>• 05b_04_02 Indications and Contraindications for/to Peripheral Nerve Blocks (PNBs)*</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	RCoA leaflets as before
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	1.5 Shared decision making in perioperative care 1.13 Enhanced recovery after surgery 1.14 Individualised perioperative pain management

*Supplementary reading/online material*

Future directions in regional anaesthesia: not just for the cognoscenti. *Anaesthesia* 2020; **75**: 293-7

Online videos – Neuraxial Blockade Modern Anaesthetic Practice (Parts 1, 2, 3)

ANZCA Acute Pain Management: Scientific Evidence 5<sup>th</sup> Edition 2020 *Chapter 5.8*

\* Some of the CNB and PNB ‘indication’ evidence a little dated now (see Stage 1A) but still good modules.

\*<sup>1</sup> Still a useful module but some newer trunk blocks not mentioned obviously and also newer, more motor sparing block alternatives for knees and hips not mentioned.

### 1C. Practice measures to avoid wrong-site blocks

<b>Publications</b>	Further reducing the risk of wrong site block. <i>Anaesthesia</i> 2015; <b>70</b> : 1453
<b>National guidance/standards</b>	Stop before you block campaign HSIB investigation report
<b>RA-UK/ESRA/ASRA guidance</b>	RA-UK Stop Before You Block
<b>e-learning</b>	-
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	-
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	2.2. Conduct of Regional Anaesthesia

#### *Supplementary reading/online material*

Wrong-site regional anaesthesia: review and recommendations for prevention? *Curr Op Anaesth* 2015; **28**: 670–84

*NB. Mock before you block has not gained widespread acceptance, however the following papers contain excellent discussion around the risks and prevention of wrong sided block and are co-authored by Professor JJ Pandit Chair of the Safe Anaesthesia Liaison Group.*

“Mock before you block”: an in-built action-check to prevent wrong-side anaesthetic nerve blocks. *Anaesthesia* 2017; **72**: 150-5

Mock before you block. *Anaesthesia* 2017; **72**: 661-2

Exploring performance of, and attitudes to, Stop- and Mock-Before-You-Block in preventing wrong-side blocks. *Anaesthesia* 2018; **73**: 421–7

### 1D. Performs spinal anaesthesia for SA 1-3 surgical patients independently

<b>Publications</b>	Intrathecal drug spread. <i>BJA</i> 2004; <b>93</b> : 568-578 Failed spinal anaesthesia; mechanisms, management and prevention <i>BJA</i> 2009; <b>102</b> : 739-748
<b>National guidance/standards</b>	AA Safety guideline: skin antisepsis for central neuraxial blockade AA Recommendations for standards of monitoring during anaesthesia and recovery AA Regional anaesthesia and patients with abnormalities of coagulation (for further detail see Stage 2, Key Learning Capability I)
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 05b_03_01 Spinals and epidurals indications and contraindications*</li> <li>• 05b_03_03 Performing spinal and epidural injections</li> <li>• 07e_11_01 Spinal needles</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	Virtual spine – virtual lumbar spine anatomy (includes US also) Fundamentals of technical performance of spinal anaesthesia
<b>Webinars</b>	For day case spinals webinar see Stage 3
<b>RCoA QI Compendium</b>	-

#### *Supplementary reading/online material*

Spinal anaesthesia for ambulatory surgery. *BJA Ed* 2019; **19**: 321-328 (Stage 3)

ASRA guidance anticoagulation *Reg Anes Pain Med* 2018; **43**:263-309

NYSORA neuraxial techniques

Neuraxial US is a more advanced technique and not required for Stage 1. For further information see:

- USG Lumbar spinal anaesthesia. *BJA Ed* 2016; **16**: 213-220
- [OAA learning zone](#)
- Multiple neuraxial US [videos by Ki Jinn Chin](#)

\* Some of the CNB 'indication' evidence a little dated now (see Stage 1A) but still good modules.

## 1E. Performs simple peripheral nerve blocks with ultrasound

<b>Publications</b>	<p>Ultrasound-guided brachial plexus blocks <i>CEACCP reviews</i> 2014; <b>14</b>: 185-191</p> <p>Ultrasound-guided peripheral nerve blocks of the upper limb <i>BJA Ed</i> 2015; <b>15</b>: 160-165</p> <p>Ultrasound-guided femoral and sciatic nerve blocks. <i>CEACCP</i> 2013; <b>13</b>: 136–40</p> <p>Challenges solutions and advances in ultrasound guided RA <i>BJA Ed</i> 2016; <b>16</b>: 374-380</p> <p>Best practices for safe and quality in peripheral regional anaesthesia <i>BJA Ed</i> 2020; <b>20</b>: 341-347</p>
<b>National guidance/standards</b>	<p>AA Standards of Monitoring</p> <p>Ergonomics in the workplace. <i>Anaesthesia</i> 2021 doi:10.1111/anae.15530 (section on regional anaesthesia)</p>
<b>RA-UK/ESRA/ASRA guidance</b>	<p>RA-UK guidelines on supervision of patients during peripheral regional anaesthesia</p>
<b>e-learning</b>	<p>eLA modules</p> <ul style="list-style-type: none"> <li>• 10_01_01 - Ultrasound for regional anaesthesia</li> <li>• 10_04_01 - Introduction to the brachial plexus</li> <li>• 10_04_02 - Interscalene block</li> <li>• 10_04_03 - Supraclavicular block</li> <li>• 10_04_04 - Infraclavicular block</li> <li>• 10_04_05 - Axillary block</li> <li>• 10_04_06 - Peripheral nerve blocks of the forearm</li> </ul>
<b>RA-UK Handbook</b>	<p>Chapters 3,4,5 &amp; 6</p>
<b>Online resources</b>	<p>Plan A block videos</p> <p>AoA Education Shots Plan A blocks video</p> <p>USGRA Skills – safe approach to nerves</p> <p>Image acquisition in UGRA (Part 1, Part 2 and Part 3)</p>
<b>Webinars</b>	<p>RA-UK Plan A Block Webinar</p>
<b>RCoA QI Compendium</b>	<p>-</p>

### Supplementary reading/online material

Future directions in regional anaesthesia: not just for the cognoscenti. *Anaesthesia* 2020; **75** :293-7

Lower limb regional anaesthesia - essentials of our current understanding *Reg Anes Pain Med* 2019; **44**: 143-180

Essentials of our current understanding: Abdominal wall blocks *Reg Anes Pain Med* 2017; **42**: 133-183

Upper extremity regional anesthesia: essentials of our current understanding 2008 *Reg Anes Pain Med* 2009; **34**: 134-170 (old but still a classic !)

The sciatic nerve block *BJA Ed* 2020; **20**: 312-20

Regional anaesthesia for shoulder surgery. *BJA Ed* 2019; **19**: 98-104

<http://www.nysora.com/>

[www.usra.ca](http://www.usra.ca)



Duke University RA and Acute Pain medicine YouTube channel

Anaesthesia TOTW. 400 (interscalene); 401 (popliteal); 326 (axillary); adductor canal (301); femoral (284)

International consensus on anatomical structures to identify on ultrasound for the performance of basic blocks in UGRA. *Reg Anes Pain Med* 2021 (in press)

## 1F. Performs ultrasound guided femoral or fascia iliaca blocks independently

<b>Publications</b>	Fascia Iliaca compartment block. <i>BJA Ed 2019; 19: 191-7</i> Ultrasound-guided femoral and sciatic nerve blocks. <i>CEACCP 2013; 13: 136–40</i>
<b>National guidance/standards</b>	AA Recommendations for standards of monitoring during anaesthesia and recovery AA Regional anaesthesia and patients with abnormalities of coagulation (for further detail see Stage 2, Key Learning Capability I) RCEM Monitoring after a Fascia Iliaca Block
<b>RA-UK/ESRA/ASRA guidance</b>	Fascia iliaca blocks and non-physician practitioners
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 05b_04_09 Sample Lower Limb Block: Femoral Nerve Block*</li> <li>• 05b_04_05 Performing Safe Peripheral Nerve Blocks*<sup>1</sup></li> </ul>
<b>RA-UK Handbook</b>	Femoral Nerve Block
<b>Online resources</b>	RA-UK: Femoral nerve block video NYSORA: Ultrasound-guided fascia iliaca nerve Block NYSORA: Ultrasound-guided femoral nerve blocks Ki-Jinn Chin: Ultrasound-guided femoral nerve block Duke Regional Anesthesiology and Acute Pain Medicine: Femoral nerve block
<b>Webinars</b>	Plan A Blocks Webinar
<b>RCoA QI Compendium</b>	4.5 Anaesthesia for patients with fractured neck of femur

### Supplementary reading/online material

Systematic review of the effects of fascia iliaca compartment block on hip fracture patients before operation. *BJA 2018; 120: 1368-80*

Peripheral nerve blocks for hip fractures in adults. *Cochrane Database Systematic Reviews 2020 Issue 11. Art. No.: CD001159. DOI: 10.1002/14651858.CD001159.pub3. Accessed 01 September 2021.*

Anaesthesia TOTW. Femoral (284); Fascia iliaca (193)

\* Femoral nerve block module describes landmark and nerve stimulation technique only.

\*<sup>1</sup> Module useful but does not contain some of the more contemporary evidence

**1G. Obstetric anaesthesia: Identifies and initiates initial management of complications of regional anaesthesia including systemic local anaesthetic toxicity, high spinal and dural puncture headache**

## **Obstetric Anaesthetists' Association** Promoting the highest standards of anaesthetic practice in the care of mother and baby

<b>Publications</b>	The <a href="#">OAA learning zone</a> is regularly updated and includes relevant publications on each topic
<b>National guidance/standards</b>	OAA/AA guideline - Guidelines for Obstetric Anaesthetic Services 2013 OAA Guideline – Treatment of obstetric post-dural puncture headache AA Guideline – Severe local anaesthetic toxicity AA / OAA Guideline - Neurological monitoring associated with obstetric neuraxial block 2020 AA / OAA / RAUK Guideline: skin antisepsis for central neuraxial blockade
<b>RA-UK/ESRA/ASRA/OAA guidance</b>	The third ASRA practice advisory on local anesthetic systemic toxicity. <i>Reg Anesth Pain Med</i> 2018; <b>43</b> : 113-23 ASRA local anesthetic toxicity checklist Practice Advisory for the Prevention, Diagnosis, and Management of Infectious Complications Associated with Neuraxial Techniques: An Updated Report by the American Society of Anesthesiologists Task Force on Infectious Complications Associated with Neuraxial Techniques and the American Society of Regional Anesthesia and Pain Medicine. <i>Anesthesiology</i> 2017; <b>126</b> : 585–601 The second ASRA practice advisory on neurologic complications associated with RA and pain medicine. <i>Reg Anesth Pain Med</i> 2015; <b>40</b> : 401-430
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 04a Obstetrics</li> <li>• 08 Obstetrics – Intermediate Level</li> </ul>
<b>RA-UK handbook</b>	-
<b>Online resources</b>	In addition to <a href="#">OAA Learning Zone</a> as above AA/OAA safety guideline summary poster. Neurological monitoring after spinal / epidural OAA Labour Pains infographic. Risks of Regional Anaesthesia (Epidurals & Spinals) and General Anaesthesia Explained OAA Labour Pains leaflet. Headache after an epidural or spinal injection? What you need to know
<b>Webinars</b>	See <a href="#">OAA Learning Zone</a>
<b>RCoA QI Compendium</b>	7.10 Postnatal obstetric anaesthetic; adverse effects and complications

*Supplementary reading/online material*

**There is a wealth of additional information on the [OAA learning zone](#).**

Post-natal neurological problems. *CEACCP* 2013; **13**: 63–6

NAP3: The 3rd National Audit Project of the Royal College of Anaesthetists. Major Complications of Central Neuraxial Block in the United Kingdom. London: RCoA; 2009



MBRRACE-UK: Saving Lives, Improving Mothers' Care – implications for anaesthetists. *Int J Obst Anesth* 2015; **24**: 161-173

UK Confidential Enquiry into Maternal Deaths – still learning to save mothers' lives. *Anaesthesia* 2018; **73**: 416-420

Hyperthermia after epidural analgesia in obstetrics *BJA Ed* 2021; **21**: 26-31

Anaesthesia TOTW. Complications post neuraxial anaesthesia in obstetric patients (395)

**1H. Obstetric anaesthesia: Provides epidural or combined spinal-epidural analgesia for labour in the ASA 1-3 obstetric patient, and offers other forms of pain relief when neuraxial analgesia is contraindicated**

## **Obstetric Anaesthetists' Association** Promoting the highest standards of anaesthetic practice in the care of mother and baby

<b>Publications</b>	The <a href="#">OAA learning zone</a> is regularly updated and includes relevant publications on each topic
<b>National guidance/standards</b>	OAA/AA Guideline. Guidelines for Obstetric Anaesthetic Services 2013. Guidelines for the Provision of Anaesthetic Services Chapter 9: Guidelines for the Provision of Anaesthesia Services for an Obstetric Population. London: RCoA; 2019 National Institute for Health and Care Excellence. Intrapartum Care for Healthy Women and Babies. Clinical Guideline CG190. London: NICE; 2014 (updated 2017) AA / OAA Guideline. Neurological monitoring associated with obstetric neuraxial block 2020
<b>RA-UK/ESRA/ASRA/OAA guidance</b>	-
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 04a Obstetrics</li> <li>• 08 Obstetrics – Intermediate Level</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	OAA Labour pains leaflet. Pain relief in labour: How do the options compare? OAA Labour pains leaflet. Epidural information card OAA Labour Pains infographic. Risks of Regional Anaesthesia (Epidurals & Spinals) and General Anaesthesia Explained NICE Pathway pain relief in labour Neurological monitoring after spinal / epidural poster for patient information
<b>Webinars</b>	See <a href="#">OAA Learning zone</a>
<b>RCoA QI Compendium</b>	7.1 Information for women about analgesia and anaesthesia during delivery 7.4 Regional analgesia during labour <i>Section 9.9 of the GPAS obstetric document important and is all about patient communication and information – with a focus on translation and interpreting services</i>

*Supplementary reading / online material*

**There is a wealth of additional information on the [OAA learning zone](#).**

NAP3: The 3rd National Audit Project of the Royal College of Anaesthetists. Major Complications of Central Neuraxial Block in the United Kingdom. London: RCoA; 2009

Pain management for women in labour: an overview of systemic reviews. Cochrane Database Syst Rev 2012;**3**:CD009234

Epidural versus non-epidural or no analgesia for pain management in labour. Cochrane Database of Systematic Reviews 2018;**5**:CD000331

Anaesthesia TOTW. The Labour epidural: ambulatory neuraxial analgesia (446); The labour epidural – the basics (365); The labour epidural – troubleshooting (366)

Combined spinal-epidural versus epidural analgesia in labour. Cochrane Database Syst Rev. 2012 Oct 17;**10**(10):CD003401

Neuraxial US is a more advanced technique and not required for Stage 1. For further information see:

- USG Lumbar spinal anaesthesia. *BJA Ed* 2016; **16**: 213-220
- [OAA learning zone](#)
- Multiple neuraxial US [videos by Ki Jinn Chin](#)

**1I Obstetric anaesthesia: provides neuraxial anaesthesia for operative delivery and other obstetric procedures in ASA 1-3 patients and manages the inadequate neuraxial block**

## **Obstetric Anaesthetists' Association** Promoting the highest standards of anaesthetic practice in the care of mother and baby

<b>Publications</b>	The <a href="#">OAA learning zone</a> is regularly updated and includes relevant publications on each topic
<b>National guidance/standards</b>	National Institute of Health and Care Excellence. Caesarean section: Clinical guidelines [CG132], 2011
<b>RA-UK/ESRA/ASRA/OAA guidance</b>	Practice Guidelines for Obstetric Anesthesia. An Updated Report by the American Society of Anesthesiologists Task Force on Obstetric Anesthesia and Society for Obstetric Anesthesia and Perinatology. <i>Anesthesiology</i> 2016; <b>124</b> : 270–300
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 04a Obstetrics</li> <li>• 08 Obstetrics – Intermediate Level</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	In addition to <a href="#">OAA Learning Zone</a> as above OAA learning zone: epidural top up for Caesarean section OAA Labour Pains. Caesarean section information sheet OAA Labour Pains. Caesarean section FAQs <a href="#">Local guidelines on OAA website</a> (management of inadequate regional analgesia or anaesthesia)
<b>Webinars</b>	See <a href="#">OAA Learning zone</a>
<b>RCoA QI Compendium</b>	7.6 Caesarean section anaesthesia: technique and failure rate

*Supplementary reading / online material*

**There is a wealth of additional information on the [OAA learning zone](#)**

Royal College of Obstetricians and Gynaecologists, Royal College of Anaesthetists. Classification of Urgency Of Caesarean Section: A Continuum Of Risk. Good Practice Guide 11. London: RCOG; 2010

Consensus Statement Collaborators. International consensus statement on the management of hypotension with vasopressors during caesarean section under spinal anaesthesia. *Anaesthesia* 2018; **73**: 71-92

Failed spinal anaesthesia; mechanisms, management and prevention *BJA* 2009; **102**: 739-748

PROSPECT guideline for elective caesarean section: updated systematic review and procedure-specific postoperative pain management recommendations. *Anaesthesia* 2021; **76**: 665-680

Regional versus general anaesthesia for caesarean section. Cochrane Database of Systematic Reviews 2012. CD004350

Conversion of labour epidural analgesia to surgical anaesthesia for emergency intrapartum Caesarean section. *BJA Ed* 2019; **20**: 26-31

Preventing and treating hypotension during spinal anaesthesia for caesarean section. *BJA Ed* 2020; **11**: 360-361

## 1J. Discusses scientific basis of ultrasound and generation of images

<b>Publications</b>	Practical knobology for ultrasound guided images <i>Reg Anesth Pain Med</i> 2010; <b>35</b> : S68-73 Essential notes on physics of doppler ultrasound <i>BJA Ed</i> 2020; <b>20</b> : 122-3 Resolution in ultrasound imaging <i>CEACCP</i> 2011; <b>11</b> : 186-192
<b>National guidance/standards</b>	-
<b>RAUK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	eLA module <ul style="list-style-type: none"> <li>10_01_01 Ultrasound for RA</li> </ul>
<b>RA-UK Handbook</b>	Chapter 1 Principles of Ultrasound Guided Regional Anaesthesia Chapter 2 The Physics of Ultrasound
<b>Online resources</b>	www.usra.ca www.nysora.com Image acquisition in UGRA (Part 1, Part 2 and Part 3) Anaesthesia TOTW. Physics of US Part 1 (199); physics of US Part 2 (218)
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	-

### *Supplementary reading/online material*

Artefacts and pitfalls associated with UGRA Part 1 *Reg Anesth Pain Med* 2007; **32**: 412-418

Artefacts and pitfalls associated with UGRA Part 2 *Reg Anesth Pain Med* 2007; **32**: 419-433

*(these are covered in Stage 2C)*

## 1K. Discusses drugs and equipment used in regional anaesthesia

<b>Publications</b>	Challenges, solutions, and advances in ultrasound-guided regional anaesthesia. <i>BJA Ed</i> 2016; <b>11</b> : 374–380 Basic pharmacology of local anaesthetics. <i>BJA Ed</i> 2020; <b>20</b> : 34-41 Perineural adjuncts for peripheral nerve block. <i>BJA Ed</i> 2019; <b>19</b> : 276-282
<b>National guidance/standards</b>	LA Toxicity AAGBI Safety Guideline AA Standards of Monitoring Ergonomics in the workplace. <i>Anaesthesia</i> 2021 doi:10.1111/anae.15530 (section on regional anaesthesia)
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 05b_01_01 The Pharmacology of Local Anaesthetics Part 1</li> <li>• 05b_01_02 The Pharmacology of Local Anaesthetics Part 2</li> <li>• 05b_01_03 Systemic Local Anaesthetic Toxicity*</li> <li>• 07e_11_01 Spinal Needles</li> <li>• 07e_11_02 Equipment used In Epidural Anaesthesia</li> <li>• 07e_11_03 Equipment for Peripheral Nerve Block</li> </ul>
<b>RA-UK Handbook</b>	Chapter 1 Principles of Ultrasound Guided Regional Anaesthesia Chapter 2 The Physics of Ultrasound
<b>Online resources</b>	NYSORA Equipment Section NYSORA Pharmacology Section
<b>Webinars</b>	RA-UK Ambulatory Spinal Webinar
<b>RCoA QI Compendium</b>	2.2 Conduct of regional anaesthesia 11.8 Check and challenge: severe local anaesthetic systemic toxicity

### Supplementary reading/online material

NRFit resources (NHS England)

\* Useful but see 1A for more contemporary information about LAST

## Stage 2

### Key capabilities

#### 2A Performs ultrasound guided brachial plexus blocks

The recommended Plan A brachial plexus blocks are interscalene and axillary plexus blocks. Supraclavicular and infraclavicular (especially useful for catheter placement) blocks are also discussed here however given this is Stage 2.

<b>Publications</b>	<p>Ultrasound-guided peripheral nerve blocks of the upper limb. <i>BJA Ed</i> 2015; <b>15</b>: 160–165</p> <p>Anaesthesia for shoulder surgery. <i>BJA Ed</i> 2019; <b>19</b>: 98-104</p> <p>Ultrasound-guided upper and lower extremity nerve blocks in children. <i>BJA Ed</i> 2020; <b>20</b>: 42-50</p> <p>Infraclavicular brachial plexus blocks. <i>CEACCP</i> 2009; <b>9</b>: 139-143</p>
<b>National guidance/standards</b>	<p><a href="https://www.rcoa.ac.uk/gpas/chapter-6">https://www.rcoa.ac.uk/gpas/chapter-6</a> (2.19)</p> <p><a href="https://rcoa.ac.uk/gpas/chapter-16">https://rcoa.ac.uk/gpas/chapter-16</a> (4.4)</p>
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	<p>eLA modules (in addition to those in 1E)</p> <ul style="list-style-type: none"> <li>• 05b_04_08 Sample upper limb block: coracoid brachial plexus block*</li> <li>• 07a_03_07 Brachial plexus, nerve supply to the arm and hand</li> <li>• 07a_06_02 Surface anatomy of the neck and clavicular region</li> </ul>
<b>RA-UK Handbook</b>	Chapter 3 Upper Limb
<b>Online resources</b>	<p><b>RA-UK Plan A videos</b></p> <ul style="list-style-type: none"> <li>• Plan A Interscalene block</li> <li>• Plan A Axillary block</li> </ul> <p><b>USRA.ca site</b></p> <ul style="list-style-type: none"> <li>• Interscalene, supraclavicular, infraclavicular, axillary, mid-humeral, peripheral nerve blocks</li> </ul> <p><b>Duke Regional Anaesthesia and Pain Medicine site</b></p> <ul style="list-style-type: none"> <li>• Interscalene, supraclavicular, forearm blocks</li> </ul>
<b>Webinars</b>	Joint RCoA/RA-UK Plan A blocks webinar: Upper Limb blocks from 7 minutes
<b>RCoA QI Compendium</b>	-

#### Supplementary material

Anatomy of the brachial plexus and its implications for daily clinical practice: regional anaesthesia is applied anatomy. *Reg Anes Pain Med* 2020; **45**: 620-627

Upper Extremity Regional Anesthesia: Essentials of Our Current Understanding *Reg Anes Pain Med* 2009; **34**: 134-70

NYSORA website: Upper extremity blocks

For RA courses covering brachial plexus blocks see [www.ra-uk.org](http://www.ra-uk.org)

\* Useful but doesn't contain contemporary ultrasound infraclavicular approaches

## 2B. Performs ultrasound guided fascial plane blocks for the chest or abdominal wall

Common trunk blocks include rectus sheath, ESP, TAP, ilioinguinal/iliohypogastric, quadratus lumborum and superficial/deep serratus plane. Paravertebral is an important trunk block but it is not a block for novices. RA-UK include rectus sheath and ESP in the Plan A block list as being the two trunk blocks of most value taking into account both safety and efficacy.

<b>Publications</b>	Abdominal wall blocks for intraabdominal surgery. <i>BJA Ed</i> 2018; <b>18</b> : 317-22 (podcast also) Rectus sheath catheter analgesia for patients undergoing laparotomy <i>BJA Ed</i> 2018; <b>18</b> : 166-172 Paravertebral blocks and novel alternatives <i>BJA Ed</i> 2020; <b>20</b> : 158-165 Nerve blocks of anterior abdominal wall <i>BJA Ed</i> 2010; <b>10</b> : 182-186
<b>National guidance/standards</b>	<a href="https://rcoa.ac.uk/gpas/chapter-16#chapter-4">https://rcoa.ac.uk/gpas/chapter-16#chapter-4</a> (4.4. and 4.11)
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	eLA module <ul style="list-style-type: none"> <li>05b_02_02 Innervation of the trunk</li> </ul>
<b>RA-UK Handbook</b>	Section 4 – trunk blocks
<b>Online resources</b>	Anatomy and sonoanatomy (in addition to articles above) <ul style="list-style-type: none"> <li>Rectus sheath Plan A video Rectus sheath LA demonstration</li> <li>ESP Plan A video</li> <li>Duke Regional Anesthesia and Pain Medicine site <ul style="list-style-type: none"> <li>Rectus, ESP, serratus, paravertebral</li> </ul> </li> <li>USRA.ca site <ul style="list-style-type: none"> <li>Ilioinguinal/iliohypogastric, paravertebral, TAP</li> </ul> </li> </ul>
<b>Webinars</b>	RAUK Plan A webinar. Rectus sheath and ESP from 45 minutes.
<b>RCoA QI Compendium</b>	-

### Supplementary material

Essentials of our current understanding: abdominal wall blocks. *Reg Anes Pain Med* 2017; **42**: 133-183

Ultrasound guided fascial plane blocks of the chest wall – a state of the art review. *Anaesthesia* 2021; **76**: S1 110-126

NYSORA website TAP and Quadratus Lumborum blocks

NUSGRA e- module on paravertebral and ESP blocks

NUSGRA lecture on abdominal wall blocks

Review of peripheral nerve blocks for caesarean delivery analgesia. *Reg Anes Pain Med* 2020; **45**: 52–62

For RA courses covering trunk blocks see [www.ra-uk.org](http://www.ra-uk.org)

## 2C Demonstrates how to achieve an optimal image and recognises common ultrasound artefacts

Refer also to 1J for further material on scientific basis of ultrasound and image generation

<b>Publications</b>	Ultrasound-guided regional anaesthesia. <i>CEACCP</i> 2007; <b>7</b> : 20-24 Challenges, solutions, and advances in USGRA <i>BJA Ed</i> 2016; <b>16</b> : 374–380 Practical Knobology for Ultrasound-Guided Regional Anesthesia. <i>Reg Anes Pain Med</i> 2010; <b>35</b> : S68-S73 Needle-related ultrasound artifacts and their importance in anaesthetic practice. <i>BJA</i> 2014; <b>112</b> : 794–80
<b>National guidance/standards</b>	NICE: Ultrasound-guided regional nerve block. Interventional procedures guidance 2009
<b>RA-UK/ESRA/ASRA guidance</b>	The Second ASRA Evidence Based Medicine Assessment of UGRA: Executive Summary. <i>Reg Anes Pain Med</i> 2016; <b>41</b> : 181-94
<b>e-learning</b>	eLA module <ul style="list-style-type: none"> <li>04 04 Finding nerves: clicks, paraesthesias, nerve stimulation, LORTS and ultrasound*</li> </ul>
<b>RA-UK Handbook</b>	The Physics of Ultrasound The Principles of UGRA
<b>Online resources</b>	As per section 1J. Also : Essentials in USGRA Image acquisition in UGRA (Part 1, Part 2 and Part 3)
<b>Webinars</b>	-
<b>RCOA QI Compendium</b>	-

### Supplementary material

European Society of Anaesthesiology and Intensive Care Guidelines on peri-operative use of ultrasound for regional anaesthesia (PERSEUS regional anaesthesia): Peripheral nerves blocks and neuraxial anaesthesia. *Eur J Anaesth* 2021; **38**: 219-250

Needle Visualization in Ultrasound-Guided Regional Anesthesia: Challenges and Solutions. *Reg Anes Pain Med* 2008; **33**: 532-44.

Artefacts and pitfalls associated with UGRA Part 1 *Reg Anesth Pain Med* 2007; **32**: 412-418

Artefacts and pitfalls associated with UGRA Part 2 *Reg Anesth Pain Med* 2007; **32**: 419-433

For RA courses covering Knobology and Basic Ultrasound see [www.ra-uk.org](http://www.ra-uk.org)

\* Very little ultrasound is covered in this module - primarily discusses landmark and PNB techniques

## 2D. Describes ophthalmic blocks for patients undergoing awake ophthalmic surgery

This section has been prepared by the British Ophthalmic Anaesthesia Society [www.boas.org](http://www.boas.org)

<b>Publications</b>	A literature review of the sub-Tenon technique. <i>Ophthalmic Anaesthesia</i> 2018; <b>8</b> : 17-22 Regional anaesthesia for ophthalmic surgery <i>BJA Ed</i> 2017; 17: 221-27
<b>National guidance/standards</b>	Guidelines for the Provision of Ophthalmic Anaesthesia Services RCoA Local anaesthesia for ophthalmic surgery: Joint guidelines from the Royal College of Anaesthetists and the Royal College of Ophthalmologists 2012
<b>RAUK/ESRA/ASRA guidance</b>	
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 09_01_01 Anatomy for Ophthalmic Anaesthesia</li> <li>• 09_01_06 Regional Anaesthesia for Ophthalmic Surgery</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	<a href="http://BOAS.org">BOAS.org website</a> which has copies of the BOAS journal <i>Ophthalmic Anaesthesia</i>
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	-



## 2E. Involves the patient in planning and understanding potential complications of regional anaesthesia

Material from 1A and 1B relevant here also

<b>Publications</b>	<p>RA: risk, consent and complications. <i>Anaesthesia</i> 2021; <b>76</b>: S1 18-26</p> <p>Complications of regional anaesthesia. <i>Anaesth Int Care</i> 2019; <b>20</b>: 210-214</p> <p>Nerve injury after PNB – current understanding and guidelines <i>BJA Ed</i> 2018; <b>18</b>: 384-390</p> <p>Neurologic evaluation and management of perioperative nerve injury <i>Reg Anes Pain Med</i> 2015; <b>40</b>: 491-501</p> <p>Updates in our understanding of LA toxicity: a narrative review. <i>Anaesthesia</i> 2021; <b>76</b>: 27-39</p> <p>Consent in Anaesthesia, Critical Care and Pain Medicine <i>BJA Ed</i> 2018; <b>18</b>: 135-139</p> <p>RA and outcomes. <i>BJA Ed</i> 2018; <b>18</b>: 52-56</p>
<b>National guidance/standards</b>	<p>GMC - Decision making and consent</p> <p>GMC - Assessing mental capacity</p>
<b>RA-UK/ESRA/ASRA guidance</b>	<p>RA-UK Peripheral nerve block follow-up</p> <p>The second ASRA practice advisory on neurologic complications associated with RA and pain medicine <i>Reg Anes Pain Med</i> 2015; <b>40</b>: 401-430</p>
<b>e-learning</b>	<p>eLA modules:</p> <ul style="list-style-type: none"> <li>• 01_09_06 Risk and Consent</li> <li>• 02_21_01 Role of the Preoperative Visit</li> <li>• 04c_01_06 Consent and Autonomy</li> <li>• 05b_05_01 Consent for Regional Anaesthesia*</li> <li>• 05b_04_05 Performing Safe Peripheral Nerve Blocks*<sup>1</sup></li> <li>• 05b_03_04 Complications of spinals and epidurals</li> <li>• 05b_04_06 Complications of peripheral nerve blocks*<sup>2</sup></li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	<p>RCoA Patient information leaflets:</p> <p>Nerve blocks for surgery on the shoulder arm or hand</p> <p>Epidural pain relief after surgery</p> <p>Anaesthetic choices for hip and knee replacement</p> <p>Nerve Blocks: An information video for patients</p> <p>RA Risks infographic</p>
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	<p>1.1 Patient information for anaesthesia</p> <p>1.4 Consent in anaesthesia</p> <p>1.5 Shared decision making in perioperative care</p> <p>1.14 Individualised perioperative pain management</p> <p>1.15 Patient experience and outcome measures</p>

### Supplementary reading/online material

RA-UK Patient consent for peripheral nerve blocks

Does regional anaesthesia improve outcome? *BJA* 2015; **115** S2: ii26-ii35

Peripheral regional anaesthesia outcomes; lessons learned from the last 10 years *BJA* 2015; **114**: 728-745

Informed consent for regional anaesthesia *Curr Op Anesth* 2018; **31**: 614-621

Complications of peripheral nerve blocks *BJA* 2010; **105** (S1): i97-i107

\* References now a little dated and more contemporary evidence exists but remains useful to read.

\*<sup>1</sup> Module useful but does not contain some of the more contemporary evidence

\*<sup>2</sup> Good module. Evidence now suggests LA toxicity and intravascular injection is reduced by ultrasound

## 2F Assesses when a regional technique is not appropriate

Whether a nerve block is appropriate depends on many factors, and most importantly the wishes of the patient. Section 1A and 1B already contain resources outlining risks and benefits of RA, as well as indications and contraindications. Any decision about performing a block must take into account the risks and benefits of the block for the individual patient and the specific procedure. This must then be compared with the risks and benefits of alternative options. One approach is to consider patient factors (consent, capacity, absolute and relative contraindications such as pre-existing neurological disease, coagulopathy, comorbidities), surgical factors and anaesthetic factors when making a decision in conjunction with the patient. In addition to the table below further discussion is provided in the supplemental material.

<b>Publications</b>	<p>RA : risk, consent and complications. <i>Anaesthesia</i> 2021; <b>76</b> S1: 18-26</p> <p>Complications of regional anaesthesia. <i>Anaesth Int Care</i> 2019; <b>20</b>: 210-214</p> <p>Regional Anaesthesia in Patients at risk of bleeding <i>BJA Ed</i> 2021;<b>21</b> :84-94</p>
<b>National guidance/standards</b>	<p>AA guideline. Management of hip fractures 2020</p> <p>AA guideline. Regional anaesthesia and patients with abnormalities of coagulation (2013)</p> <p>AA guideline. Regional Anaesthesia for lower leg trauma and the risk of acute compartment syndrome (2021)</p> <p>AA guideline. Consent for anaesthesia (2017)</p>
<b>RA-UK/ESRA/ASRA guidance</b>	<p>Regional anesthesia in the patient receiving antithrombotic or thrombolytic therapy. <i>Reg Anesth Pain Med</i> 2018;<b>43</b>:263–309)</p> <p>Regional Anesthesia and acute compartment syndrome: principles for practice 2021</p> <p>Practice Advisory for the Prevention, Diagnosis, and Management of Infectious Complications Associated with Neuraxial Techniques: An Updated Report by the American Society of Anesthesiologists Task Force on Infectious Complications Associated with Neuraxial Techniques and the American Society of Regional Anesthesia and Pain Medicine. <i>Anesthesiology</i> 2017; <b>126</b>: 585–601</p>
<b>e-learning</b>	<p>eLA modules</p> <ul style="list-style-type: none"> <li>• 05b_05_01 Consent for Regional Anaesthesia*<sup>1</sup></li> <li>• 05b_03_01 Spinals and Epidurals: Indications and Contraindications*<sup>2</sup></li> <li>• 05b_03_04 Complications of Spinals and Epidurals</li> <li>• 05b_04_02 Indications and contraindications for/to Peripheral Nerve Blocks (PNBs)*<sup>2</sup></li> <li>• 05b_04_06 Complications of Peripheral Nerve Blocks*<sup>3</sup></li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	<p>RCoA leaflet: Benefits of Spinal Anaesthesia</p> <p>RCoA leaflet: Nerve blocks for surgery on the shoulder, arm or hand</p> <p>Royal College of Anaesthetist Risk Leaflets - generic</p>
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	<p>1.1 Patient information for anaesthesia</p> <p>1.2 Perioperative risk prediction</p> <p>1.4 Consent in anaesthesia</p>

*Supplementary material*

Centre for Perioperative Care – Shared Decision Making for Clinicians

Regional Anesthesia in Patients with pre-existing neurological disease *Reg Anesth Pain Med* 2015; **40**: 467-478

Whether a nerve block is appropriate depends on many factors, and most importantly the wishes of the patient. Section 1A and 1B already contain resources outlining risks and benefits of RA, as well as indications and contraindications. These therefore are not repeated here. Any decision about performing a block must take into account the risks and benefits of the block for the individual patient and the specific procedure. This must then be compared with the risks and benefits of alternative options. One approach is to consider patient factors, surgical factors and anaesthetic factors when making a decision in conjunction with the patient.

- Patient factors
  - Consent/patient wishes and capacity
  - Pre-existing absolute or relative contraindications to a block including
    - Neurological disease (see Section 1A and 1B, above and also ref 1 below) including diabetic neuropathy
    - Coagulopathy/antithrombotic drugs (see 2I)
    - Systemic or localised infection (ASRA practice advisory above)
    - Patients who are at higher risk of LA toxicity (see ref 2)
    - Specific side effects related to certain blocks and patients at risk e.g.
      - Pulmonary disease and brachial plexus approaches that risk phrenic nerve palsy or pneumothorax (see 1A/1B and also refs 3,4)
      - Fixed cardiac output for spinal anaesthesia
    - Pre-existing pain/anxiety/concerns
- Surgical factors
  - Anticipated pain?
    - Both early post-operatively and also the subsequent pain trajectory.
    - If the patient has chosen to have a general anaesthetic and block is just for analgesia need to decide is a block actually necessary for analgesia because anticipated pain is minimal or conversely is a single shot block sufficient and is a catheter technique required because the anticipated pain is such that a single shot block will be inadequate (or is anticipated pain higher in this individual patient due to pre-existing pain/anxiety etc)
  - Length of procedure?
    - Duration of single shot local anaesthetic (neuraxial or PNB) or is catheter technique necessary
    - Can patient tolerate 'awake' procedure (even with sedation) if this is a prolonged procedure
  - Day case (patient needs to ambulate but may be able to use crutches) versus in patient?
  - Surgical territory (dermatomes/osteotomes/myotomes)?

- Need to ensure block is appropriate and can it cover the surgical territory e.g. axillary surgery is very difficult (but not impossible) to cover for awake surgery. Knowledge of procedure and anatomy and blocks is key here!
  - Tourniquet?
    - Important if the regional technique is being used for anaesthesia rather than analgesia. Note for example an ankle tourniquet in awake patients is well tolerated even though this area is not anaesthetised by the block
  - Trauma and risk of compartment syndrome?
    - Needs discussion between anaesthetist and surgeon and patient (AoA document above)
  - Risk of post-operative hypotension following neuraxial techniques and concern re splanchnic perfusion (both secondary to hypotension or the use of vasopressors) and fluid balance. This is important in elective surgery but also in emergency patients who may be septic or fluid deplete in emergency surgery.
- Anaesthetic factors
 

Anaesthetic factors are generally not the sole reason why regional may not be appropriate unless operator experience is an issue. Clearly a well conducted GA is better than a poorly conducted regional technique. Anaesthetic factors in general when choosing a technique however include

  - Anaesthesia versus analgesia?
    - As above, if the procedure is minor procedure with little anticipated pain and the patient wishes a GA then the small risk of a block may outweigh any benefit
  - Neuraxial versus PNB? Is one potentially safer/better?
    - Sympathetic block associated with neuraxial techniques (See above)
    - Is it possible under PNB alone without the need for neuraxial?
  - Single shot versus catheter?
  - Additives, both PNB and neuraxial e.g. intrathecal opioid (ref 5)
  - Follow up, availability of appropriate monitoring either in ward or at home

## References

1. PNB in the patient with pre-existing neuropathy (abstract and a reference list from a recent ESRA lecture)
2. Updates in our understanding of LA toxicity: a narrative review. *Anaesthesia* 2021; **76**: 27-39
3. Anaesthesia for shoulder surgery. *BJA Ed* 2019; **19**: 98-104
4. Phrenic nerve palsy and regional anesthesia for shoulder surgery *Anesthesiology* 2017; **127**: 173-91
5. Perineural adjuncts for peripheral nerve block. *BJA Ed* 2019; **19**: 276-284

\*<sup>1</sup> References now a little dated and more contemporary evidence exists but remains useful to read.

\*<sup>2</sup> Some of the CNB and PNB 'indication' evidence a little dated now (see Stage 1A) but still good modules.

\*<sup>3</sup> Good module. Evidence now suggests LA toxicity and intravascular injection is reduced by ultrasound.

## 2G Manages inadequate block in the awake patient and in recovery if used as an adjunct to general anaesthesia

Additional material on managing inadequate neuraxial block in section 1I

<b>Publications</b>	Failed spinal anaesthesia: mechanisms, management and prevention. <i>BJA</i> 2009; <b>102</b> : 739-48 Failed epidural: causes and management. <i>BJA</i> 2012; <b>109</b> : 144-54 Complications of peripheral nerve blocks. <i>BJA</i> 2010; <b>105</b> (S1): i97-i107 (Small section on incidence of block failure)
<b>National guidance/standards</b>	-
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	-
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	Anaesthesia TOTW <ul style="list-style-type: none"> <li>• RA for awake hand surgery: block failure and troubleshooting issues (414)</li> <li>• The labour epidural: troubleshooting (366)</li> </ul> Why blocks fail and what to do about it, video by Dr Ki-Jinn Chin NYSORA <ul style="list-style-type: none"> <li>• Mechanisms and management of failed spinal anaesthesia</li> </ul>
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	2.2. Conduct of Regional Anaesthesia

### Supplementary reading

A BJA Education article is currently being prepared about the 'Management of Inadequate Peripheral Nerve Block' as there is less literature in this area.

## 2H Discusses longer term management of complications

A specific table has not been created here as complications of RA are mentioned elsewhere.

- Risks and benefits 1A, 2E, 2F
  - Generic complications
    - Neurological complications
      - Central and peripheral
    - LAST
    - Infectious
    - Bleeding related (2I)
  - Block specific
- Obstetric complications 1G (but also includes generic complications of neuraxial procedures)

## 2I Discusses the use of regional anaesthesia in the presence of abnormalities of coagulation

<b>Publications</b>	Regional anaesthesia in patients at risk of bleeding. <i>BJA Ed</i> 2021; <b>21</b> :84-94 Practice advisory on the bleeding risks for peripheral nerve and interfascial plane blockade: evidence review and expert consensus. <i>Can J Anaesth</i> 2019; <b>66</b> : 1356-1384
<b>National guidance/standards</b>	AA guideline. Regional anaesthesia and patients with abnormalities of coagulation (2013) ( <i>Note that this is currently under review</i> )
<b>RAUK/ESRA/ASRA guidance</b>	Regional anaesthesia in the patient receiving antithrombotic or thrombolytic therapy. <i>Reg Anesth Pain Med</i> 2018; <b>43</b> : 263–309 Regional anaesthesia in patients on antithrombotic drugs Joint ESAIC/ESRA guidelines. In press <i>Eur J Anaesth</i> 2021
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 05b_03_01 Spinals and Epidurals: Indications and Contraindications*</li> <li>• 05b_04_02 Indications and Contraindications for/to Peripheral Nerve Blocks (PNBs)*</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	ASRA Coags app
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	1.5 Shared decision making in perioperative care 1.13 Enhanced recovery after surgery 1.14 Individualised perioperative pain management

### Supplementary reading/online material

New antiplatelet drugs and new oral anticoagulants. *Br J Anaesth* 2016; **117**: 74-84

Perioperative management of oral anticoagulation. *BJA Educ* 2018; **18**: 259-264

\* Some of the CNB and PNB ‘indication’ evidence a little dated now (see Stage 1A) but still good modules.

## STAGE 3

### 3A Tailors regional anaesthesia techniques to patients undergoing day surgery

<b>Publications</b>	Pain management in day case surgery. <i>BJA Ed</i> 2015; <b>15</b> : 18-83 Spinal anaesthesia for ambulatory surgery. <i>BJA Ed</i> 2019; <b>19</b> : 321-328
<b>National guidance/standards</b>	GPAS Chapter 6: Guidelines for provision of anaesthesia services for day surgery 2021 AA and BADS Guidelines for Day Surgery 2019
<b>RA-UK/ESRA/ASRA guidance</b>	ASRA Guideline on management of post-operative pain (not specific to day surgery but contains some sections on RA)
<b>e-learning</b>	-
<b>RA-UK Handbook</b>	Chapter 3 Upper Limb blocks Chapter 4 Trunk blocks e.g. PECS/serratus, ilioinguinal/iliohypogastric Chapter 5 Lower limb blocks e.g. femoral triangle/adductor canal, popliteal, ankle
<b>Online resources</b>	Ambulatory spinal handbook
<b>Webinars</b>	RAUK Ambulatory spinal anaesthesia webinar
<b>RCoA QI Compendium</b>	Chapter 5.5 Discharge protocols Chapter 5.6 Unplanned hospital admission after day surgery

#### *Supplementary reading/online material*

Peripheral nerve blocks for outpatient surgery: evidence-based indications. *Curr Op Anesthesiol* 2013; **26**: 467-474

NYSORA – peripheral nerve blocks for outpatient surgery

Ambulatory regional anaesthesia tips and tricks (summary from an ESRA session)

British Association of Day Surgery documents

- Spinal anaesthesia for day surgery
- Setting up an upper limb regional anaesthesia service for day surgery

### 3B Manages regional anaesthesia and analgesia safely in the perioperative period in all settings

A table has not been produced for this section. This section really encompasses all of the other sections of the document.

1. The process starts with the shared decision-making process of choosing the correct block for the correct operation for the correct patient.

- Indication for block (1A, see also 2F)
- Identify any absolute or relative contraindications (1B, 2F, 2I)
  - Neurological disease (see Section 1A and 1B) including diabetic neuropathy
  - Coagulopathy/antithrombotic drugs (see 2I)
  - Systemic or localised infection (ASRA practice advisory above)
  - Patients who are at higher risk of LA toxicity
  - Specific side effects related to certain blocks and patients at risk e.g.
    - Pulmonary disease and brachial plexus approaches that risk phrenic nerve palsy or pneumothorax (see 1A/1B)
    - Fixed cardiac output for spinal anaesthesia
  - Pre-existing pain/anxiety/concerns
- Discuss risks and benefits in that individual patient and alternatives (including no block)
- Consent (2E)
- 2F for other considerations
  - Surgical
    - Anticipated pain
    - Length of procedure
    - Ambulatory surgery? (3A)
    - Surgical territory
    - Tourniquet
    - Trauma and risk of compartment syndrome
  - Anaesthetic
    - Anaesthesia versus analgesia
    - Neuraxial versus PNB
    - Single shot versus catheter
    - Additives
  - COVID (refs 1, 2)

2. Block conduct depends on the specific block (1D, 1F, 1G-I, 2A, 2B, 2D, 3C, 3D, 3E, 3F)

- Generic factors are covered in:
  - 1C Measures to prevent wrong sided block
  - 1E Performs simple peripheral blocks with ultrasound
  - 1J Generate US guided image and 2C recognise artefacts
  - 1K Drugs and equipment

3. Intra-operative monitoring (1E)

- Management of inadequate block (2G)

4. Post-operative care and follow up

- Monitoring for complications (2H)
- Management of catheters – either epidural or peripheral (3iA, 3iB, 3iC)
- Analgesia to prevent rebound pain

5. Documentation (an ASRA-ESRA consensus document about documentation is due to be released soon)

***Additional references***

1. Neuraxial anaesthesia and peripheral nerve blocks during the COVID-19 pandemic: a literature review and practice recommendations. *Anaesthesia*. 2020; **75**: 1350-63
2. Regional anaesthesia and COVID-19: first choice at last? *BJA* 2020; **125**: 243-7

### 3C. Performs ultrasound guided regional anaesthesia for chest wall independently

<b>Publications</b>	Ultrasound guided fascial plane blocks of the chest wall – a state of the art review. <i>Anaesthesia</i> 2021; <b>76</b> S1: 110-126 Paravertebral blocks and novel alternatives <i>BJA Ed</i> 2020; <b>20</b> : 158-165 Rib fracture management, <i>BJA Ed</i> 2016; <b>16</b> : 26-32
<b>National guidance/standards</b>	-
<b>RA-UK/ESRA/ASRA guidance</b>	Standardising nomenclature in regional anaesthesia: an ASRA-ESRA Delphi consensus study of abdominal wall, paraspinal and chest wall blocks. <i>Reg Anes Pain Med</i> 2021; <b>46</b> : 571-80
<b>e-learning</b>	eLA modules: <ul style="list-style-type: none"> <li>• 05b_04_10 Simple Peripheral Nerve Blocks of the Trunk*</li> </ul>
<b>RA-UK Handbook</b>	Chapters 4.5, 6.1 and 6.3
<b>Online resources</b>	Anaesthesia TOTW 424: Traumatic rib fractures Anaesthesia TOTW 427: Serratus plane Anaesthesia TOTW 414: The ESP block Anaesthesia TOTW 403: Anaesthesia for breast surgery Anaesthesia TOTW 376: Ultrasound guided paravertebral block Anaesthesia TOTW 346: PECS blocks ESP Plan A video Duke Regional Anesthesia and Pain Medicine site <ul style="list-style-type: none"> <li>• ESP, serratus, paravertebral, parasternal</li> </ul> USRA.ca site <ul style="list-style-type: none"> <li>• Paravertebral</li> </ul>
<b>Webinars</b>	Live demonstration paravertebral block What is the role of the ESP? Thoracic sonography
<b>RCoA QI Compendium</b>	13.6 Pain control in thoracic surgery 13.7 Acute pain control after cardiac surgery

#### Supplementary reading/online material

NYSORA anatomy

Complications rates of US guided paravertebral block for breast surgery. *Reg Anes Pain Med* 2020; **45**: 813-817

Anatomical basis of fascial plane blocks. *Reg Anes Pain Med* 2021; **46**: 581-99

ESP block: a qualitative systematic review. *Minerva Anesthesiol* 2019; **85**: 308-19

PROSPECT guideline for oncological breast surgery: a systematic review and procedure specific post-operative pain management guidelines. *Anaesthesia* 2020; **75**: 664-73

ESP block lecture by Ki Jinn Chin

ESP block notes

Perioperative breast analgesia: a qualitative review of anatomy and regional techniques. *Reg Anes Pain Med* 2017; **42**: 609-31

For RA courses covering chest wall regional techniques see [www.ra-uk.org](http://www.ra-uk.org)

\* Good but doesn't contain ultrasound guided block descriptions or newer trunk blocks

### 3D Performs US guided RA for abdomen independently

<b>Publications</b>	Essentials of our current understanding: Abdominal wall blocks. <i>Reg Anes Pain Med</i> 2017; <b>42</b> : 133-193 Abdominal wall blocks for intraabdominal surgery. <i>BJA Ed</i> 2018; <b>18</b> : 317-22 (podcast also) Rectus sheath catheter analgesia for patients undergoing laparotomy <i>BJA Ed</i> 2018; <b>18</b> : 166-172
<b>National guidance/standards</b>	-
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	eLA module <ul style="list-style-type: none"> <li>05b_02_02 - The innervation of the trunk</li> </ul>
<b>RA-UK Handbook</b>	Chapter 4
<b>Online resources</b>	Plan A block videos - Rectus sheath AA Education Shots Plan A blocks video USRA.ca <ul style="list-style-type: none"> <li>Ilioinguinal, TAP</li> </ul> Duke Regional Anesthesia and Pain Medicine site <ul style="list-style-type: none"> <li>Rectus sheath</li> </ul>
<b>Webinars</b>	RA-UK Plan A Block Webinar (from 45 mins)
<b>RCOA QI Compendium</b>	-

#### Supplementary reading/online material

NYSORA anatomy

NYSORA – rectus sheath, TAP, ilioinguinal, iliohypogastric, QL blocks

Ki Jinn Chin Thoracic epidurals vs abdominal wall fascial plane blocks ([Part 1](#) and [Part 2](#))

PROSPECT guidance for Caesarean section (2020), open liver resection (2019), inguinal hernia (2019), laparoscopic sleeve gastrectomy (2018), laparoscopic hysterectomy (2018), laparoscopic cholecystectomy (2017), open colorectal surgery (2016).

ERAS recommendations for elective colorectal surgery 2018

For RA courses covering abdominal regional techniques see [www.ra-uk.org](http://www.ra-uk.org)

### 3E Performs US guided blocks for lower limb surgery independently

<b>Publications</b>	Lower limb regional anaesthesia - essentials of our current understanding <i>Reg Anesth Pain Med</i> 2019; <b>44</b> : 143-180 The sciatic nerve block <i>BJA Ed</i> 2020; <b>20</b> : 312-20 Ultrasound-guided ankle block. <i>CEACCP</i> 2013; <b>13</b> : 174–178 (update in progress) Anaesthesia and analgesia for knee joint arthroplasty. <i>BJA Ed</i> 2018; <b>18</b> : 8-15 <i>See Stage 1F for USG Femoral or FI</i>
<b>National guidance/standards</b>	-
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	eLA modules <ul style="list-style-type: none"> <li>• 05b_04_07 Continuous regional analgesia – peripheral nerve catheters</li> <li>• 05b_04_09 Sample lower limb block: femoral nerve block*</li> </ul>
<b>RA-UK Handbook</b>	Section 5 Lower limb blocks
<b>Online resources</b>	NYSORA: Lower limb surgery USRA.ca : Lower limb blocks Duke Regional Anesthesia and Pain Medicine site <ul style="list-style-type: none"> <li>• Fascia iliaca, Adductor canal, iPACK, PENG, genicular blocks, femoral and lat femoral cutaneous of thigh, ankle, popliteal</li> </ul>
<b>Webinars</b>	RA-UK Plan A Block Webinar (femoral, adductor canal and popliteal)
<b>RCoA QI Compendium</b>	-

#### Supplementary reading/online material

NYSORA anatomy

ASRA News: How I Do It: Suprainguinal Fascia Iliaca Block 2020

ASRA News: How I Do It: iPACK block 2020

ASRA News: How I do it: Saphenous block 2020

Anaesthesia TOTW: 448 Motor-sparing regional anaesthesia blocks for knee surgery; 401 Popliteal block

Ultrasound visualization of the anatomy relevant for lumbar plexus block: comparison of the paramedian transverse and Shamrock scan technique *Reg Anes Pain Med* 2019; **44**: 573-577

Ki Jinn Chin videos: popliteal, ankle, PENG, femoral, fascia iliaca, obturator

For RA courses covering lower limb regional techniques see [www.ra-uk.org](http://www.ra-uk.org)

\* Does not discuss US guided technique – only landmark and peripheral nerve stimulation

### 3F Performs US guided brachial plexus block independently

Material below is in addition to 2A content.

<b>Publications</b>	Anatomy of the brachial plexus and its implications for daily clinical practice: regional anesthesia is applied anatomy. <i>Reg Anes Pain Med</i> 2020; <b>45</b> : 620-627 Upper Extremity Regional Anesthesia: Essentials of Our Current Understanding <i>Reg Anes Pain Med</i> 2009; <b>34</b> : 134-70 Assessment of topographic brachial plexus nerves variation at the axilla using ultrasonography, <i>Br J Anaes</i> 2009; <b>103</b> : 606–12
<b>National guidance/standards</b>	-
<b>RA-UK/ESRA/ASRA guidance</b>	-
<b>e-learning</b>	
<b>RA-UK Handbook</b>	Chapter 3 Upper limb
<b>Online resources</b>	RA-UK Plan A videos USRA.ca site Duke Regional Anaesthesia and Pain Medicine site Ki Jinn Chin videos <ul style="list-style-type: none"> <li>• Superior trunk block, supraclavicular, infraclavicular, axillary (Part 1 and Part 2), distal upper limb blocks (Part 1, Part 2 and Part 3)</li> </ul>
<b>Webinars</b>	RA-UK Plan A Block Webinar (Interscalene and axillary)
<b>RCOA QI Compendium</b>	2.2 Conduct of regional anaesthesia 11.7 Availability of ultrasound equipment in anaesthetic areas

#### Supplementary reading/online material

NYSORA anatomy

Diaphragm-sparing nerve blocks for shoulder surgery, revisited *Reg Anes Pain Med* 2020; **45**: 73-78

Surgical anesthesia for proximal arm surgery in the awake patient *Reg Anes Pain Med* 2021; **46**: 446–451

Duke Regional Anaesthesia and Pain Medicine site. In addition to Stage 2A – phrenic sparing blocks, costoclavicular, RAPTIR. Costoclavicular and RAPTIR in particular are advanced level blocks however and included simply for interest.

PROSPECT guidance rotator cuff surgery

Anaesthesia TOTW

- 414 RA for awake hand surgery: block failure and troubleshooting issues
- 400 Interscalene block
- 384 Supraclavicular
- 409 Infraclavicular
- 369 Anatomical variation of the brachial plexus and its clinical implications

Link for RA-UK forum discussion and RA-UK link network

For RA courses covering upper limb regional techniques see [www.ra-uk.org](http://www.ra-uk.org)

## Stage 3i

Many of these key learning capabilities are an extension of the topics covered in the previous sections. A table on catheters is included below given these have not been discussed as yet. This will help with 3iA and 3iB. 3D and 3E will be developed with increasing exposure and experience. A selection of references and general resources that may help are included also.

The [RA-UK link network](#) may be of use in advanced training if fellows wish to contact consultants in different hospitals/deaneries to observe specific techniques or list management strategies (e.g. a block room) not undertaken locally. Fellowship links are listed at the end of the document.

### *Perineural catheters*

<b>Publications</b>	Continuous Peripheral Nerve blocks: An update of the published Evidence and Comparison with Novel, Alternative Analgesic Modalities <i>Anesth Analg</i> 2017; <b>124</b> : 308-335 Peripheral nerve catheter techniques. <i>Anaes Int Care Med</i> 2016; <b>17</b> :194-195
<b>National guidance/standards</b>	-
<b>RA-UK/ESRA/ASRA guidance</b>	Practice Advisory for the Prevention, Diagnosis, and Management of Infectious Complications Associated with Neuraxial Techniques: An Updated Report by the American Society of Anesthesiologists Task Force on Infectious Complications Associated with Neuraxial Techniques and the American Society of Regional Anesthesia and Pain Medicine. <i>Anesthesiology</i> 2017; <b>126</b> : 585–601
<b>e-learning</b>	eLA module <ul style="list-style-type: none"> <li>• 05b_04_07 Continuous Regional Analgesia-Peripheral Nerve Catheters</li> </ul>
<b>RA-UK Handbook</b>	-
<b>Online resources</b>	<ul style="list-style-type: none"> <li>• USRA.ca site <ul style="list-style-type: none"> <li>○ Catheter technique</li> </ul> </li> <li>• NYSORA <ul style="list-style-type: none"> <li>○ Equipment for CPNB</li> </ul> </li> <li>• Ki Jinn videos <ul style="list-style-type: none"> <li>○ Popliteal, infraclavicular, interscalene catheter</li> </ul> </li> <li>• ATOW <ul style="list-style-type: none"> <li>○ Introduction to perineural catheters</li> </ul> </li> </ul>
<b>Webinars</b>	-
<b>RCoA QI Compendium</b>	-

### *Supplementary reading/online material*

#### **Catheters**

Promoting the use of peripheral nerve catheters: better catheter accuracy or more user friendliness?  
*Anaesthesia* 2017; **72**: 978-86

#### **Advanced upper limb blocks/concepts**

##### *Intercostobrachial nerves*

Ultrasound-Guided Selective Versus Conventional Block of the Medial Brachial Cutaneous and the Intercostobrachial Nerves: A Randomized Clinical Trial. *Reg Anes Pain Med* 2018; **43**: 832–837

*Axillary nerve*

Ultrasound-guided block of the axillary nerve: a volunteer study of a new method. *Acta Anaesth Scand* 2011 **55** : 565-70

*WALANT*

Wide awake surgery for flexor tendon primary repair: A literature review. *Orthopedic Reviews* 2020; **12** (s1): 8668

## **General resources**

### **Regional anaesthesia collections**

BJA Education regional anaesthesia collection

Anaesthesia 2021 Fundamental of regional anaesthesia issue

Cochrane reviews regional collection – Cochrane reviews examining regional anaesthesia

### **Recommendations and guidelines**

PROSPECT – evidence based, procedure specific post-operative pain management

ERAS Society Guidelines – enhanced recovery guidance. Not all recommend RA.

ICAROS group recommendations – rather than just examine effects of RA on analgesia and enhanced recovery these recommendations take into account potential morbidity benefits of RA.

- Neuraxial anaesthesia for THA and TKA
- PNBs for THA and TKA

### **Specific papers/themes**

Greengional anaesthesia – environmental issues and RA

RA and cancer

- The role of regional anaesthesia in the emerging subspecialty of onco-anaesthesia: a state of the art review. *Anaesthesia* 2021; **76** (S1): 148-159
- The impact of anaesthetic technique upon outcome in oncological surgery. *BJA Ed* 2019; **19**: 14-20

Chronic post-surgical pain

- The role of regional anaesthesia and multimodal analgesia in the prevention of chronic post-operative pain: a narrative review. *Anaesthesia* 2021; **76** (S1): 8-17
- Local and regional anaesthesia at the time of surgery to prevent longer term persistent pain after surgery. *Cochrane Dat Syst Rev* 2018 Issue 6. Art. No.: CD007105

### **Online lecture series and you tube channels**

Amit Pawa you tube channel

Ki Jinn Chin you tube channel

Duke University Regional Anesthesia and Acute Pain medicine you tube channel



## **Fellowships**

See RA-UK website for [UK RA fellowships](#)

International fellowship programmes

- <https://esraeurope.org/esra-approved-training-institutions/>
- <https://www.asra.com/the-asra-family/trainees/fellowship-directory>