Certificate in Clinician Performed Ultrasound

(CCPU)

Syllabus

Distal Brachial Plexus Block: Infraclavicular / Axillary

Australasian Society for Ultrasound in Medicine
P (61 2) 9438 2078 F (61 2) 9438 3686 E asum@asum.com.au W www.asum.com.au
ACN 001 679 161 ABN 64 001 679 161

Regional Anaesthesia – Distal Brachial Plexus Block: Infraclavicular / Axillary

Purpose

Demonstrate skill in obtaining appropriate ultrasound images/clips and needle guidance for Distal Brachial Plexus Block: Infraclavicular / Axillary. This module addresses the indications, approach, technique and specific risks related to proximal brachial plexus blocks. Brachial plexus blocks are separated into proximal and distal based on their relationship to the clavicle and the increased risk of complications related to proximal brachial plexus blocks. There is a separate Proximal Brachial Plexus Block CCPU. As the state of the art of regional anaesthesia develops and matures blocks and approaches may be integrated as appropriate for example the RAPTIR (retroclavicular approach to the infraclavicular region).

It also covers the principles of using ultrasound to guide other regional blocks and Catheter insertion in the Emergency Department, ICU or Operating theatres for upper limb analgesia and anaesthesia.

Prerequisites

CCPU candidates engaged in ultrasound assessment of patients must:

- Enrol in the CCPU.
- Review ASUM Code of Conduct and Safety Policies.
- Complete the ASUM CCPU online physics tutorial quiz.
- Attend a CCPU-accredited course.
- Self-directed learning before and ongoing includes understanding specific details, indications, and contraindications for the range of procedures that they perform. This includes asepsis and use of the various needles and catheter techniques.

*Please note that separate modules exist for the Erector Spinae block, Paravertebral block, Proximal Brachial Plexus block, Upper Limb Peripheral Nerve block and Fascia Iliac block

Course objectives

- **Neurological examination** before and after the procedure and its documentation.
- Knowledge of the **pharmacology of common local anaesthetic drugs**, for example, ropivacaine, bupivacaine and lidocaine.
    - Toxic doses, onset and duration of action.
    - Awareness that local anaesthetics are often available in multiple concentrations.
    - Knowledge of new and emerging medications.
- Knowledge of **local anaesthetic toxicity (LAST)**.
    - Signs, symptoms, and treatment algorithms of LAST.
- Indications and contraindications to the use of the local anaesthetic.
- **Local guidelines** inform decision-making related to nerve block techniques. Discussion of these local guidelines and impact on admitting services, for example, Orthopaedic and Trauma.
    - In case of admission to the hospital follow-up planning (Acute Pain Service consultation) for ongoing analgesia.
    - Follow-up after catheter insertion, typically admitting team and Acute Pain Service.
    - On discharge: relevant and appropriate discharge instructions and precautions.
- Relate CCPU Distal Brachial Plexus Peripheral Nerve Blocks to peer-reviewed literature and relevant published protocols or standards of practice.
- Demonstrate competency in ultrasound-guided regional anaesthesia.
- Describe the limitations of ultrasound in assessing distal brachial plexus blocks.
- Demonstrate appropriate ongoing patient management as a result of ultrasound findings and interventions in conjunction with other clinical information.

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- Document ultrasound-guided regional anaesthesia procedure.
- Document ultrasound findings in the patient's clinical record to facilitate continuity of care.
- Address the impact of coagulation status and anticoagulation medications.
- Identification and management to address (include and are not limited to):
    - Cardiovascular collapse
    - Seizures
    - Hypotension
    - Allergic reaction
    - Ventilatory impairment
    - Impaired consciousness
    - Haematoma
    - Infection
    - Abscess
    - Failed / incomplete block
    - Nerve damage

Course content

Time out and mechanisms to avoid wrong site block with verification of:

- Patient
- Site and side
- Consent
- Mark block site

Documentation by the proceduralist in the notes:

- Technique and method of block
- Drugs and dosages administered
- Complications and problems
- Follow-up drug orders
- Monitoring requirements following block

Clinical administration issues to address in the teaching course include:

- The requirement that the proceduralist remains immediately available until the block is satisfactory; the patient is stable and the potential for immediate complications has passed. For any regional anaesthesia technique, the institution should have a written protocol and procedure.
- Catheters used for regional anaesthesia are required to have unique labelling and dedicated pumps. Specific follow-up for block catheters should address the assessment of block adequacy and evaluation for adverse effects.
- Integration of regional anaesthesia with follow-up and coordination with the admitting Team and Pain Service as appropriate.
- Available medications and upper dose limits.

Further learning points include:

- Proficiency in **neurological examination** and documentation before and after a procedure.
- Proficiency in **image optimisation** facilitating procedural guidance.
- Address **adjuvant therapies** relating to block effectiveness or duration. For example, the inclusion or exclusion of steroids like dexamethasone with the local anaesthetic or systemically and considering other relevant medications like clonidine or emerging trends.
- Discuss needle options and risks for example spinal needle vs nerve block needle vs Touey vs nerve catheter needle.
- An understanding of the **anatomy** (and common variations) of the following structures, including their relationships to adjacent structures and surface anatomy.

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Surface Anatomy	Clavicle Sternocleidomastoid muscle – clavicular head Interscalene groove Thyroid cartilage Deltoid / deltopectoral groove / pectoralis major and minor Axillary artery pulse	
Ultrasound Anatomy	Vascular	**Subclavian artery and vein** **Axillary artery and vein** Carotid sheath: carotid / internal jugular vein Dorsal scapular vein
	Muscles	Sternocleidomastoid – clavicular head Deltoid, pectoralis majot=r and minor
	Nerves	Brachial Plexus: trunks, divisions cords and branches Musculocutaneous nerve -dermatomes, myotomes, osteotomes
	Bones	Clavicle Ribs Humerus
	Pleura	

Technical skills

- Perform a preliminary scan to determine the optimal target/site, adipose tissue, pectoralis major and minor, axillary artery and veins.
- Administration of local anaesthetic for the skin.
- Appropriate size and length of the needle.
- The vascular probe is placed in the axilla or infraclavicular region to identify the infraclavicular brachial plexus as appropriate to guide block.
- Optimise the image of the needle and use colour Doppler to ensure no vascular structures especially branches of the axillary vein in the path of the needle before needle insertion.
- Aspirate first followed by 1-2 ml injection to confirm the needle placement, the injection is in the lateral to medial approach. Note the potential technique of hydrodissection with normal saline before local anaesthetic delivery.
- Watch for the spread of the local anaesthetic. Repositioning the needle may improve the anaesthetic spread around the brachial plexus.
- Catheter insertion:
    - The procedure consists of three phases: (1) needle placement; (2) catheter advancement; and (3) securing the catheter.
    - Confirm the correct position of the catheter.
- Document the procedure with any complications during the procedure.

Equipment

- Sterile probe covers (and how to apply them)
- Aseptic technique
- Local anaesthesia per local protocol. Include dosing and dilution.
- Ropivacaine can be used, concentrations as an example vary: 0.2%,1% and 0.75 %. Less cardio-toxic, shorter onset of action, has inherent vasoconstrictor activity and does not come with adrenalin usually.

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- The typical volume of an Infraclavicular Nerve Block in an adult is 20-30 ml. Volume can be made up by adding normal saline.
- Catheter doses of local anaesthetic per local protocol.
- Patient, operator, machine, and equipment position.
    - Patient is comfortable and in the appropriate position (Sitting up or supine, head towards the contralateral side).
    - The operator, target and Ultrasound screen should be in a straight line the screen will often need to be on the other side of the patient.
    - All equipment is within reach and readily accessible.

Limitations and Pitfalls

- Cooperative patient with informed consent.
- Patients' ability to maintain position.
- Patient body habitus.
- Variable anatomy.
- Avoiding adjacent structures – nerve, pleura and lung, vasculature including Axillary artery and vein.
- Losing (and finding) the needle in both in-plane and out-of-plane techniques.

Expected standards of practice CCPU Infraclavicular / Axillary Block

Minimum expected ultrasound data acquisition/protocols:

Preparation

- Prepare clinical environment.
- Prepare patient, including informed consent where possible (refer to ASUM code of conduct) in line with state and hospital/practice policy.
- Select and prepare ultrasound and ancillary equipment in line with ASUMs safety policies.
- Enter patient data into ultrasound equipment.
- Informed consent and a cooperative patient able to maintain position. Ensure Distal Brachial Plexus Block is the right procedure for the patient.
- Ensure no allergies to the local anaesthetic used.
- Mark the Correct side.
- Intra lipid available in the bay.
- Appropriate staffing.
- Aseptic precautions.
- Ensure the patient is monitored during the procedure.
- ECG pre-procedure shows no 2nd or 3rd degree block.
- Upper limb nerve examination before the procedure, documented.

Image acquisition

- Acquire and optimise ultrasound images/data.
- Identify relevant anatomical features and landmarks.
- Identify and respond to ultrasound artifacts, if required, to improve diagnostic quality of images/data.
- Ultrasound techniques and physical principles
- Linear probe and scanner settings
- Pre-set, depth, frequency, focus and gain
- Important artefacts including relevant examples.
    - Reverberation artefact
    - Long path: Between the skin and horizontal fascial planes

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- Short path: Comet tail deep to needle
- Beam artefact: Either side of the needle
- Specular reflection.

Minimal recorded images/ultrasound data

The following are the required minimal images to be recorded unless the patient's clinical situation renders this impracticable and/or unsafe. In this situation, the practitioner should record whatever images are obtainable, in the time available, to answer the clinical question without allowing the ultrasound examination to interfere with ongoing medical treatment.

If local protocols recommend more recorded images/data for a particular examination, then these should be adhered to. If relevant - Images should be saved as cineloop or real-time recordings if possible.

- Infraclavicular block: Subclavian / Axillary Artery with Brachial Plexus related to it, ribs and pleura.
- Axillary block: Axillary artery/vein, pectoralis major and minor. Musculocutaneous nerve.
  1. Pre-needle insertion
  2. Post needle insertion
  3. Post anaesthetic injection – with hydro visualisation from lateral to medial approach.

If relevant any clinical situation-specific protocols and/or limitations

Post-procedure

- Ensure the procedure is adequately recorded in patient clinical record.
- Clean ultrasound equipment safely and correctly as per ASUM Safety Protocols
- Store ultrasound equipment safely and correctly.
- Observe the patient for analgesia, toxicity, and pain score.
- Admitting team or Acute Pain Service follow-up as appropriate for ongoing catheter care and analgesia.
- Discharge instructions and fact sheet for the patients that are discharged post-procedure.
- Patients who have procedures completed under regional anaesthesia (for example: wrist reduction) can be discharged home with a fact sheet outlining the expectation of duration of anaesthesia and analgesia.

Training

Recognized through attendance at an ASUM accredited (Distal) Brachial Plexus block course. (Please see the website for accredited providers)
Evidence of the satisfactory completion of a training course is required for unit award.

Teaching Methodologies for the Block Course

Courses accredited toward the CCPU will be conducted in the following manner:

- Pre-test to focus learners on main learning objectives.
- Each course shall comprise at least two (2) hours of teaching time of which at least one (1) hour shall be practical teaching. Stated times do not include the physics, artefacts and basic image optimization which should be provided if delegates are new to ultrasound.
- Learners receive reference material covering the course curriculum.
- The lectures cover at least the contents of this curriculum document.
- Live scanning sessions for this unit shall include sufficient live patient models to ensure that each candidate can scan and explore the normal vascular anatomy and adjacent

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anatomical relationships. Maximum 4:1 ratio of candidates to model. Neuro-vascular access phantoms shall be used for participants to practice in-plane Techniques.
- Complete a post-test to reinforce learning objectives.

Assessments
- Two (2) formative assessments of Infraclavicular / Axillary block.
- One (1) summative assessment of Infraclavicular / Axillary block.

All assessments are performed under the supervision of the Primary Supervisor using the competence assessment form supplied at the end of this document.

Please refer to section 8 of the CCPU Regulations for information regarding the timing and exclusion of these assessments in the logbook.

Logbook Requirements
For CCPU Distal Brachial Plexus block: Infraclavicular / Axillary candidates must demonstrate in their verified logbook that they have performed:

- Five (5) infraclavicular/axillary blocks (successful and directly supervised), for those new to new to regional blocks.
- Three (3) infraclavicular/axillary blocks (Successful and directly supervised), for those already competent at distal brachial plexus blocks.
- All procedures must be indicated and performed in a clinical environment.
- Simulators are not permitted.
- All logbook cases must be signed off by a suitably qualified supervisor (see section 6.0 of the CCPU Regulations)
- The 'Comparison with Further Imaging or Clinical Outcome' column should describe the outcome of the block for example successful, partial block or failure of block.
- At the discretion of the ASUM CCPU Certification Board candidates may be allowed an alternative mechanism to meet this practical requirement.

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ASUM CCPU Competence Assessment Form

CCPU Distal Brachial Plexus Block: Infraclavicular / Axillary

Candidate: _____

Assessor: _____

Date: _____

Assessment type: **Formative 1** (feedback & teaching given during assessment for education) ☐
Formative 2 (feedback & teaching given during assessment for education) ☐

To pass the summative assessment, the candidate must pass all components listed:

		Competent	Prompted	Fail
Prepare patient				
	Informed consent for nerve block			
	Position of patient and equipment			
Prepare Environment				
	Lights dimmed if possible			
Probe & Preset Selection				
	Can change transducer			
	Selects appropriate transducer			
	Selects appropriate preset			
Data Entry				
	Enter patient details			
Image Acquisition				
	Optimisation (depth, frequency, focus, gain)			
Identifies				
	Subclavian/Axillary artery and veins			
	Brachial plexus, musculocutaneous, muscles			
	Ribs, Pleura, Clavicle			
Describes appearance & pathology		**Competent**	**Prompted**	**Fail**
	Needle insertion technique: depth, angle			
	Injection of local anaesthetic technique			
Attentiveness to risk of complication				
	Aseptic technique			

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Pneumothorax			
Vascular or nerve injury			

Artefacts

Identifies & explains the basis of common artefacts			

Record Keeping

Indication and neuro assessment before			
Neuro assessment after			
Documents finding of focused study			

Machine Maintenance

Cleans / disinfects ultrasound probe			
Stores machine and probes safely and correctly			

Feedback of particularly good areas: _____

_____

_____

Agreed actions for development: _____

_____

_____

*Once the candidate has met the minimum assessment and logbook criteria (5 if new to Brachial Plexus blocks, 3 if experienced) the examiner may choose to recommend the candidate to the CCPU board for credentialing in Brachial Plexus Blocks CCPU.

Examiner signature: _____ Candidate signature: _____

Examiner name: _____ Candidate name: _____

Date: _____

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CCPU Distal Brachial Plexus Block: Infraclavicular / Axillary

Candidate: _____

Assessor: _____

Date: _____

Assessment type: **Summative** (feedback & teaching given during assessment for education) □

To pass the summative assessment, the candidate must pass all components listed:

	Competent	Prompted	Fail
Prepare patient			
Informed consent for nerve block			
Position of patient and equipment			
Prepare Environment			
Lights dimmed if possible			
Probe & Preset Selection			
Can change transducer			
Selects appropriate transducer			
Selects appropriate preset			
Data Entry			
Enter patient details			
Image Acquisition			
Optimisation (depth, frequency, focus, gain)			
Identifies			
Subclavian/Axillary artery and veins			
Brachial plexus, musculocutaneous n, muscles			
Ribs, Pleura, Clavicle			

	Competent	Prompted	Fail
Describes appearance & pathology			
Needle insertion technique: depth, angle			
Injection of local anaesthetic technique			
Attentiveness to risk of complication			
Aseptic technique			
Pneumothorax			
Vascular or nerve injury			

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*Once the candidate has met the minimum assessment and logbook criteria (5 if new to Brachial Plexus blocks, 3 if experienced) the examiner may choose to recommend the candidate to the CCPU board for credentialing in Distal Brachial Plexus Blocks CCPU.

I _____ (supervisor name) am satisfied that _____ (candidate's name) has demonstrated the minimum requirement for competency in Distal Brachial Plexus Blocks: Infraclavicular / Axillary on _____(date).

Supervisor signature: _____

Candidate Signature: _____

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