Certificate in Clinician Performed Ultrasound

(CCPU)

Syllabus

Paravertebral Block

Australasian Society for Ultrasound in Medicine
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ACN 001 679 161 ABN 64 001 679 161

CCPU Paravertebral Block

Purpose
Demonstrate skill obtaining appropriate ultrasound images/clips and needle guidance for Paravertebral Block. This module addresses the indications, approach, technique and specific risks related to paravertebral blocks.
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.

Course objectives

- Relate CCPU Paravertebral Block CCPU to peer-reviewed literature and relevant published protocols or standards of practice.
- **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.
- Demonstrate competency in ultrasound-guided regional anaesthesia.
- Describe the limitations of ultrasound in assessing proximal brachial plexus blocks.
- Demonstrate appropriate ongoing patient management incorporating ultrasound findings and interventions in conjunction with other clinical information.
- 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 complications.

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Course content

The course will present learners with the following material:

Surface Anatomy

- Spinous Process in the midline, transverse process 2cm lateral to the spinous process.
- C7 spinous process is the most prominent vertebrae at the base of the neck.
- T8 at the level of the inferior angle of the Scapula.

Ultrasound Anatomy

- Muscles and ligaments:
  - Costotransverse ligament
  - Trapezius, Rhomboids and Erector Spinae above T8 and below T8 is trapezius and Erector Spinae.
  - Erector Spinae comprising of the “erector spinae” comprises a group of muscles including the iliocostalis, longissimus, and spinalis muscles. These run longitudinally from the skull to the pelvis and sacral region, and from the spinous to the transverse processes, extending to the ribs. The muscles change their size and profile during their craniocaudal course alongside the spine. As part of the “core” muscles, one of their main functions is to stabilize the spine.
- Nerves
  - Sensory innervation of the upper posterior thorax arises from the dorsal rami of the first cervical (C1) through the fifth lumbar (L5) nerves, while the ventral rami of the thoracic spinal nerves from T1-T12 continue as intercostal nerves innervating the anterolateral chest and abdominal wall.
- Bones
  - Transverse process, the vertebrae and Ribs.
- Pleura – Pleura and lung
  - Pleura and lung should not be easily visible at the level of TP, if visible the probe is too lateral.
- Arteries and veins
  - Intercostal and spinal

<u>Preparation for the procedure</u>

- Aseptic technique, sterile probe covers and how to apply them.
- Local anaesthesia per local protocol
- Patient, operator, machine, and equipment position.
- Patient comfortable and in appropriate position (Sitting up or supine, head towards the contralateral side).
- The operator is comfortable, usually seated.
- 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 within reach and readily accessible.
- Perform a preliminary scan to determine optimal target/site, adipose tissue, muscles, and differentiate between the rib and the transverse process.

<u>Technical skills</u>

- Aseptic technique.
- Optimise image of Transverse process.

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- Optimise image of the needle. Use colour Doppler to ensure no vascular structures are in the path of the needle before needle insertion.
- Once the transverse process contacted walk the needle inferior to the transverse process. Advance needle a further 1-1.5cm, aspirate and inject to identify 'loss of resistance' indicating correct needle position.
- At this point, a catheter can be inserted or a pre-loaded needle with the catheter. The procedure consists of three phases: (1) needle placement; (2) catheter advancement; and (3) securing the catheter.
- Confirm correct catheter position.

Limitation and pitfalls

- Cooperative patient with Informed consent.
- Anticipate local anaesthetic systemic toxicity (LAST). Prepare to manage with Intralipid.
- Patients' ability to maintain position.
- Patient body habitus
- Variable anatomy
- Avoiding adjacent structures – nerve, pleura, and lung
- Losing (and finding) the needle in both in-plane and out-of-plane techniques.
- Observe patient post procedure for local anaesthetic toxicity and the effect of the block.

Expected standards of practice CCPU Paravertebral Block

- Specific details, indications, and contraindications for the range of procedures that they perform. This should include an aseptic technique and the use of the various needles and catheter techniques.
- Risks of regional anaesthesia related to the physiological effects of a block, medication effects dosage and needle path complications. Identification and management to address include and are not limited to:
    - Cardiovascular collapse
    - Seizures
    - Hypotension
    - Allergic reaction
    - Ventilatory impairment
    - Haemo / pneumothorax
    - Impaired consciousness
    - Haematoma
    - Infection
    - Abscess
    - Failed block
    - Nerve damage
- Demonstrate 'time out' procedure and other mechanisms to avoid wrong site block with verification of:
    - Patient
    - Site and side
    - Consent
    - Marked block site
- Candidates should be able to demonstrate 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.
- Knowledge of pharmacology of common local anaesthetics for example ropivacaine, bupivacaine, and lignocaine especially the toxic dose, onset, and duration of action.

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Please note that separate modules exist for inter scalene, supra clavicular block, and Fascia iliac 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.

Image acquisition

- Acquire and optimise ultrasound images/data.
- Identify relevant anatomical features and landmarks.

Ultrasound techniques and physical principles

- Linear probe and scanner settings
- Pre-set, depth, frequency, focus and gain
- Important artefacts including relevant examples. Identify and manage ultrasound artifacts to improve diagnostic quality of images / data.
  - Reverberation artefact
  - Long path
  - Between the skin and horizontal fascial planes
  - 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 (for example clinically relevant example e.g. during CPR) 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.

- Pre needle insertion.
- Post needle insertion.
- Post anaesthetic injection / hydrodissection if visible.
- Lung ultrasound to exclude pneumothorax is optional.

If relevant any clinical situation specific protocols and/or limitations e.g. scanning during CPR

Sonographic appearances of expected positive, negative and equivocal findings

- Describe ultrasound appearances using correct sonographic terminology.
- Identify and describe conclusive findings, positive or negative.
- Identify limitations of an examination, including specific examples if appropriate.
- Identify the relevance of equivocal findings.

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Integration of ultrasound findings with clinical information

- Describe ultrasound findings relevant to clinical presentation and other data.
- Integrate information with ongoing clinical management of patient.

Post examination

- Ensure procedure and findings 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 complications, analgesia, toxicity and block effectiveness.
- Admitting team / Acute Pain Service review if available for ongoing catheter care and analgesia.

Training

- Recognised through attendance at an ASUM accredited course.
- Evidence of the satisfactory completion of a training course is required for unit award.

Teaching Methodologies for the CCPU Paravertebral Block

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 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 clinical skills, specifically related to the assessment of the Paravertebral Block.
- One (1) summative assessment of clinical skills, specifically related to the assessment of the Paravertebral Block.

All assessments are to be 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 timing and exclusion of these assessments in the logbook.

Logbook Requirements

For CCPU Paravertebral Block candidates must demonstrate, in their verified logbook, that they have personally performed:

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- Five (5) paravertebral blocks (successful and directly supervised), for those new to the paravertebral block. Three (3) paravertebral blocks (successful and directly supervised), for those already competent at the paravertebral block.
- Blocks must be clinically indicated.
- All logbook scans must be real-time scans. Simulators are not allowed to perform scans.
- 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
    - Outcome of the block for example successful, partial block or failure of block.
    - Complications.
- At the discretion of the ASUM CCPU Certification Board candidates may be allowed an alternative mechanism to meet this practical requirement.
- Those cases that involve a procedural component must be signed off by a suitable assessor who performs erector spinae plane blocks.

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ASUM CCPU Competence Formative Assessment Form

CCPU Paravertebral Block

Candidate: _____

Assessor: _____

Date: _____

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

	Competent	Prompted	Fail
Prepare patient			
Position			
Informed			
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, freq, focus, gain)			
Identifies			
Transverse process			
Ribs, Pleura			
Needle insertion technique			
Depth			
Angle			
Injection of local anaesthetic			
Amount			

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Identifies any complications (Pneumothorax / Lung US)			
Complications – Pneumothorax/ lung US			

		Competent	Prompted	Fail
Artefacts	Identifies & explains the basis of common artefacts			
Record Keeping	Pre needle insertion			
	Post anaesthetic injection			
	Documents focussed scan only			
	Describe findings briefly			
	Integrates ultrasound findings with clinical assessment and explains how the findings might change management			
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 Paravertebral blocks, 3 if experienced) the examiner may choose to recommend the candidate to the CCPU board for credentialing in Paravertebral Block CCPU.

Examiner signature: _____ Candidate signature: _____

Examiner name: _____ Candidate name: _____

Date: _____

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ASUM CCPU Competence Summative Assessment Form

CCPU Paravertebral Block

Candidate: _____

Assessor: _____

Date: _____

Assessment type: **Summative** (prompting allowed but teaching not given during assessment) □

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

		Competent	Prompted	Fail
Prepare patient				
	Position			
	Informed			
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, freq, focus, gain)			
Identifies				
	Transverse process			
	Ribs, Pleura			
	Needle insertion technique			
	Depth			
	Angle			
	Injection of local anaesthetic			
	Amount			
Identifies any complications (Pneumothorax / Lung US)				
	Complications – Pneumothorax/ lung US			
Artefacts		**Competent**	**Prompted**	**Fail**
	Identifies & explains the basis of common artefacts			
Record Keeping	Pre needle insertion			

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Post anaesthetic injection			
Describe findings briefly			
Integrates ultrasound findings with clinical assessment and explains how the findings might change management			

Machine Maintenance

Cleans / disinfects ultrasound probe			
Stores machine and probes correctly			

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

I _____(supervisor name) am satisfied that _____(candidate's name) has demonstrated the minimum requirement for competency in Paravertebral Blocks on _____(date).

Supervisor signature: _____

Candidate signature: _____

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