

Certificate in Clinician Performed Ultrasound (CCPU) Syllabus

Paediatric Hip Effusion (PHE)

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Paediatric Hip Effusion PHE

Purpose:

This unit is designed to cover the theoretical and practical curriculum for paediatric hip joint effusion (PHE).

Demonstrate skill obtaining accurate ultrasound images and measurements during assessment of the paediatric hip in acute atraumatic limp or hip pain. Hip joint ultrasound searches for hip joint effusion. Findings are positive, negative, or equivocal and enhance clinical decision making.

This module is designed for clinicians who manage children in their clinical setting. Clinicians should also be familiar with standard ED clinical guidelines supporting such evaluations.

Prerequisites:

CCPU candidates engaged in ultrasound assessment of patients should have:

- Enrolled in the CCPU
- Reviewed <u>ASUM Code of Conduct</u> and <u>Safety Policies</u>
- Completed the ASUM CCPU online physics tutorial quiz
- Attended a CCPU-accredited course or have a supervisor of suitable clinical experience.

Course objectives

The candidate:

- Demonstrates an understanding of the relevant anatomy
- Demonstrates effectively performing Paediatric Hip Effusion imaging
- Identifies hip effusion and accurately measures antero-posterior capsular height.
- Explains diagnostic criteria for a positive hip effusion.
- Understands limitations of ultrasound during hip effusion evaluation.
- Integrates sonographic findings with clinical evaluation to make management decisions.
- Understands the value of further radiological evaluation and consultation. This includes repeat ultrasound (e.g. equivocal or inconclusive scan, or more complex evaluation) and senior medical input in certain situations (e.g. septic child).
- Writes a structured report to accompany the hip effusion ultrasound examination

Course content:

A course presents the following material:

Anatomy:

Anatomy of the hip joint with reference to paediatrics and hip effusion

Technical skills:

- Probe selection and manipulation for maximal image clarity.
- Techniques to improve visualisation and resolution.

Equipment:

A high frequency, linear transducer with a musculoskeletal preset is the default approach. Deeper joints require a lower frequency, curved array transducer. Institutions with limited probe selection should optimise whatever is available for maximal resolution at the desired depth (1-2 cm below the femoral neck) and focus (at the level of the joint capsule). In children who are reluctant to extend their hip, or where it may be difficult/uncomfortable to position a linear transducer in the sagittal plane, a curved transducer may be a suitable substitute.

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Diagnostic criteria:

An effusion is anechoic or hypoechoic fluid visible in the joint space. The joint capsule is distended (convex) and

- the capsular depth is >/= 6mm, or
- at least 2mm larger than the contralateral side.

If essential elements of the image are not present, or the image is of insufficient technical quality to demonstrate and compare the anterior hip capsular region the study is inconclusive.

Limitations and pitfalls:

- Inability of the patient to place or maintain the lower limb in a satisfactory position.
- Patient body habitus.
- Other causes of fluid in the hip joint, including blood (trauma, bleeding disorder, fracture, etc.) or physiological fluid.
- Synovitis causing increased capsular measurement.

Note that the purpose of this study is limited to defining the presence or absence of a hip effusion. Specifically, the module has not been designed for the interpretation or exclusion of possible traumatic or developmental pathology including fractures, idiopathic aseptic necrosis of the capital femoral epiphysis, slipped upper femoral epiphysis, osteomyelitis, or other distant inflammatory or suppurative disorders.

Also, a haemarthrosis may not show a typical anechoic effusion due to blood, although the convex capsule should be seen. Clinical judgement and relevant pathways should be followed if these conditions are suspected, or the features are atypical for transient synovitis or septic arthritis.

Expected standards of practice for CCPU Paediatric Hip Effusion (PHE)

Minimum expected ultrasound data acquisition/protocols:

Preparation

- Prepare clinical environment.
- Prepare patient, including informed consent where possible (refer to <u>ASUM code of</u> <u>conduct</u>) in line with state and hospital/practice policy.
- Examine the child in position of comfort to the extent possible. Remove or re-arrange clothing as required to give optimal access to the inguinal and upper thigh regions bilaterally. In general patients with hip effusions are more comfortable with the hip slightly flexed and externally rotated. Comparison image sets ideally mirror angles of the affected leg.
- Select and prepare ultrasound and ancillary equipment in line with <u>ASUMs safety policies</u>.
- Enter patient data into ultrasound equipment.

Image acquisition

- Use pre-sets. Optimise depth, frequency, focus, and gain
- Identify relevant anatomical features and landmarks.
- Identify and respond to ultrasound artifacts, if required, to improve diagnostic quality of images/data, for example
 - Expect posterior acoustic shadowing distal to bone surface
 - Fan to reveal or reduce anisotropy in psoas and other muscles

The transducer should be placed anteriorly over femoral head and neck. This view is best found with the probe at right angles to the lateral inguinal ligament pointing towards the umbilicus. The image orientation convention recommended is the femoral head to the left of the screen.

Essential elements of the image include:

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- Femoral head
- Hyaline cartilage overlying the femoral head
- Femoral neck
- Joint capsule passing under iliopsoas muscle and reflected along the femoral neck.
- Iliopsoas muscle
- Anterior thigh muscles: sartorius, rectus femoris and vastus intermedius

Rock the transducer to present the <u>femoral neck parallel to the transducer</u>. Fan to make the anterior bone surface bright, white and crisp. Identify and respond to ultrasound artifacts, if required, to improve diagnostic quality of images/data.

- Appropriate <u>depth</u> includes 1-2 cm below the superficial cortex of the femur with <u>focal point</u> at the capsule.
- For maximal objectivity and consistency, measurement of the capsular depth should be vertical between the cortex of the femoral neck at the point where this flattens from the head to the neck, and the deep surface of the iliopsoas.

Minimal recorded images/ultrasound data

The following are the minimum required 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.

- Longitudinal image of anterior hip joint, left and right
- Longitudinal image of anterior hip joint with measurements, left and right

If local protocols recommend more recorded images/data for a particular examination, then these should be adhered to.

If relevant any clinical situation-specific protocols and/or limitations should be noted.

Post-procedure

- Record procedure in patient clinical record.
- Clean ultrasound equipment safely and correctly as per <u>ASUM Safety Protocols</u>
- Store ultrasound equipment safely and correctly.

Training

Recognised through attendance at an ASUM-accredited Paediatric Hip Effusion 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 PHE 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, artifacts and basic image optimisation 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.

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- Live scanning sessions for this unit shall include sufficient live patient models to ensure achievement of learning objectives
- Complete a post-test to reinforce learning objectives.

This syllabus has been designed to integrate with the online teaching module on PHE ultrasound, from Royal Children's Hospital in Melbourne, which will be made freely available to those enrolling for this unit. The work of Royal Children's Hospital's Education Hub and the departments of Medical Imaging and Emergency in the creation of this module is acknowledged. The link to the on-line module and quiz can be found at this link (you will need to create an account): https://learn.rch.org.au/enrol/index.php?id=14

Additional Resources:

This module is designed for clinicians who manage children in their clinical setting. Clinicians should also be familiar with standard ED clinical guidelines supporting such evaluations. These include:

- https://www.rch.org.au/clinicalguide/guideline index/Child with limp/
- <u>https://www.childrens.health.qld.gov.au/for-health-professionals/queensland-paediatric-emergency-care-qpec/queensland-paediatric-clinical-guidelines/limp</u>

Assessments

- Two (2) formative assessments of Paediatric Hip Effusion.
- One (1) summative assessment of Paediatric Hip Effusion.

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 <u>CCPU Regulations</u> for information regarding timing and exclusion of these assessments in the logbook.

Logbook Requirements

For CCPU Paediatric Hip effusion, candidates must demonstrate in their verified logbook that they have performed

- Ten (10) Paediatric (bilateral) Hip ultrasound scans of which
- At least 2 scans must have a verified positive finding with appropriate measurements
- All scans must be performed in children aged 0-18 years
- All scans must be 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 clinical outcome.
- At the discretion of the ASUM CCPU Certification Board candidates may be allowed an alternative mechanism to meet this practical requirement.



ASUM CCPU Formative Competence Assessment Form CCPU PAEDIATRIC HIP EFFUSION (PHE)

Candidate:	
Assessor:	
Date:	

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

Formative 2 (feedback & teaching given during assessment for education)

Prepare patient	Competent	Prompted	Fail
Informed consent obtained			
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			[]
Acetabulum			
Femoral head			
Femoral neck			
Physis			
Joint capsule			
lliopsoas muscle			
Femoral head cartilage when seen			

Describes	s appearance & pathology Appropriate matching axis of both hips	Competent	Prompted	Fail
	Capsular appearance eg convex, concave			
	Capsular measurement			
Artefacts	Identifies 9 company the basis of company outif			1
	Pathology/anatomy			
Pocord Ko				
	States relevant side of clinical problem			
	Adequate and accurate images saved			
	Measurement of any effusion			
	Hip effusion: Present/absent/inconclusive			
	Any other relevant findings			
	Approriate clinical integration			
Machine I	Maintenance	L	1	1
	Cleans / disinfects ultrasound transducer			
	Stores machine and probes safely and correctl	у		
Agreed a developr	nctions for ment:			
*Once the choose to Effusion (e candidate has met the minimum assessme o recommend the candidate to the CCPU boa CCPU.	nt and logbook cr ard for credentialir	iteria the exa ng in Paediat	miner may ric Hip
Superviso	or's Name: C	andidate Name:		
Superviso	visor's Signature: Candidate Signature:			
Date:				
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ASUM CCPU Summative Competence Assessment Form

CCPU Paediatric Hip Effusion

Candidate:				
Assessor:				
Date:				
Assessment ty	pe: Summative (feedback & teaching given during	g assessment fo	r education) □	
To pass the s	ummative assessment, the candidate must pa	ass all compone	ents listed:	
Prepare patier	nt	Competent	Prompted	Fail
	Informed consent for XX			
	Position of patient and equipment			
Prepare Envir	onment Lights dimmed if possible			
Probe & Prese	et Selection Can change transducer			
	Selects appropriate transducer			
	Selects appropriate preset			
Data Entry	Enter patient details			
Image Acquis	ition Optimisation (depth, frequency, focus, gain)			
Identifies	Anterior hip joint			
	Acetabulum			
	Femoral head			
	Femoral neck			
	Physis			
	Joint capsule			
	iliopsoas muscle			
	Femoral head cartilage when seen			

Describes appearance & pathology Appropriate matching axis of both hips		Competent	Prompted	Fail	
	Capsular shape eq concave, convex				
	Capsular measurement				
• · • ·					
Artefacts	Identifies & explains the basis of common artefacts				
Record Keeping					
	Pathology/anatomy				
	States relevant side of clinical problem				
	Adequacy of images				
	Measurement of any effusion				
	Hip effusion: Present/ absent/inconclusive				
	Any other relevant findings				
	Approriate clinical integration				
Machine Maintenance					
	Cleans / disinfects ultrasound transducer				
	Stores machine and probes safely and correctly				
*Once the candidate has met the minimum assessment and loopook criteria the examiner may					

*Once the candidate has met the minimum assessment and logbook criteria the examiner may choose to recommend the candidate to the CCPU board for credentialing in Paediatric Hip Effusion CCPU.

I	(super	visor	nam	e) am	satisfie	d that
	(candidate's	name)	has	demonstrated	d the	minimum
requirement for competency in Paediatric Hip Effusion on _					(date	e).

Supervisor signature: _____

Candidate Signature: _____