

Certificate in Clinician Performed Ultrasound (CCPU) Syllabus

Advanced Clinician Performed Neonatal Ultrasound

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Advance Clinician Performed Neonatal Ultrasound Syllabus

Purpose

This unit is designed to cover the theoretical and practical curriculum for advanced functional imaging of the neonatal heart and brain, as well as basic imaging of the abdominal organs and central line localisation.

Prerequisites

Learners should have completed the Applied Physics in Ultrasound unit.

Training

Mandatory attendance at a two day ASUM approved Advanced Clinician Performed Neonatal Ultrasound unit.

Assessments

Learners are required to perform supervised ultrasound scans, document them in a logbook, and submit the logbook in order to complete the unit.

Unit Objectives

Scanning the Neonate

On completing this unit, delegates should be able to:

- Demonstrate an understanding of the common conventions of neonatal scanning including image optimisation.
- Competently record a series of images to clearly demonstrate normal anatomy. Demonstrate proficiency in assessing and interpreting normal and abnormal neonatal cardiac haemodynamics.
- Understand limitations to the accuracy of haemodynamic measurements.
- Recognise common patterns of Congenital Heart Disease.
- Recognise common abnormalities found on cerebral ultrasound
- Use ultrasound to locate intravascular lines
- Recognise abnormal fluid collections in pleural and peritoneal space and common renal and hepatic abnormalities.
- Recognise when an examination is incomplete and needs to be repeated
- Demonstrate competency in:
 - Interpreting heart ultrasound findings to determine the significance of ductal shunting
 - Using coronal and sagittal cranial ultrasound windows via anterior fontanelle to demonstrate normal anatomical structures.
- Recognising intracranial bleeding with competent assessment of sub endymal, intraventricular and parenchymal bleeding.
- Recognising common structural abnormalities of cerebral development.

- Performing and interpreting Doppler studies of the anterior and middle cerebral artery.
- Interpreting cranial ultrasound findings in relation to the clinical scenario.

Unit Content

Advanced Clinician Performed Neonatal Ultrasound unit will cover:

1. Neonatal Cardiac Ultrasound
2. Neonatal Cranial Ultrasound
3. Neonatal Abdominal Ultrasound

Within each topic the following core competencies will be taught:

- i. Anatomy
- ii. Skills
- iii. Recording
- iv. Limitations
- v. Interpretation

1. Neonatal Cardiac Ultrasound

i. Anatomy

Normal anatomical structure of the heart as it relates to the standard echocardiographic windows will be presented, including:

- Surface anatomy of the heart and great vessels
- The three dimensional structure of the heart
- Derivation of the two dimensional images obtained using heart ultrasound
- Anatomy of the inflow tracts
- Anatomy of the great vessels (outflow tracts)
- Anatomy of the heart valves
- Anatomy of the cardiac chambers

ii. Skills

Training will teach learners the following image optimisation skills related to haemodynamic assessment:

- Assessing size and shunt direction of the patent ductus arteriosus
- Measuring Right and Left Ventricular Output
- Measuring Superior Vena Cava Flow
- Assessing myocardial function using M-mode and other means
- Assessing significance and direction of interatrial shunting
- Measuring or assessing pulmonary artery pressure using tricuspid incompetence, ductal shunt velocities or pulmonary artery Doppler acceleration times.
- Recognising common Congenital Heart Disease (CHD), including:
 - When to involve a Paediatric Cardiologist as set out in the "Appropriate Use"

Statement.

- Recognising indirect markers to the presence of CHD. For example, large or small vessels and chambers, and abnormal movement of myocardium or valves.
- Assessing infants with cyanosis of unknown cause
- Recognising echocardiographic features of PPHN
- Recognising common cyanotic CHD that can mimic PPHN (e.g. TAPVC, TGA)
- Recognising other common cyanotic CHD including ductal dependent pulmonary circulations
- Assessing infants with respiratory distress, heart failure and or shock
- Recognising common ductal dependent systemic circulation lesions.
- Recognising other common CHD including Pulmonary Stenosis, Fallots Tetralogy and AV Canal Defects.
- Recognising muscular and peri membranous VSDs

iii. Recording

Courses will teach learners the common conventions of cardiac scanning and how to competently record a series of images to clearly demonstrate normal cardiac anatomy.

iv. Limitations

Advanced Clinician Performed Neonatal Ultrasound courses will discuss:

- Understanding limitations to the accuracy of haemodynamic measurements.
- Recognising when an examination is incomplete and needs to be repeated.

During the introductory stage, all scans should be reviewed by a competent scanner (or paediatric cardiologist). There is a need to recognise when to refer because of an incomplete scan or a possible anatomical or functional abnormality. Important management decisions should not be made without such experienced review.

v. Interpretation

Courses will teach learners the skills needed to competently interpret the heart ultrasound findings in relation to the following criteria to determine the significance of ductal shunting:

- Interpreting abnormal and normal ventricular outputs
- Interpreting normal and abnormal SVC flow
- Interpreting normal and abnormal myocardial function
- Interpreting normal and abnormal atrial shunting
- Interpreting normal and abnormal pulmonary artery pressures

2. Neonatal Cranial Ultrasound

i. Anatomy

Normal cranial anatomy of the brain will be presented, including:

- Ventricular structure
- Anatomy of major sulcal patterns

- Thalamus
- Caudate nucleus
- Corpus callosum
- Cerebellum

ii. Skills

Courses will teach learners the following imaging skills:

- Obtaining coronal and sagittal cranial ultrasound windows via anterior fontanelle to demonstrate normal anatomical structures.
- Recognising intracranial bleeding with competent assessment of sub ependymal, intraventricular and parenchymal bleeding.
- Recognising common structural abnormalities of cerebral development.
- Performing and interpreting Doppler studies of the anterior and middle cerebral artery.

iii. Recording

Courses will teach learners the common conventions of cranial scanning and how to competently record a series of images to clearly demonstrate normal cranial anatomy or any abnormality.

iv. Limitations

All scans should be reviewed by a competent scanner (or paediatric radiologist). There is a need to recognise when referral is mandatory because of an incomplete scan or a possible anatomical or functional abnormality. Important management decisions should not be made without such experienced review.

v. Interpretation

Courses will teach learners to interpret the cranial ultrasound findings in relation to the clinical scenario. Important topics covered will include:

- Grading common patterns of peri/intraventricular haemorrhage.
- Recognising common structural abnormalities of cerebral development.
- Recognising the common parenchymal and Doppler changes seen in the asphyxiated infant.

3. Neonatal Abdominal Ultrasound

i. Anatomy

Normal abdominal anatomy will be presented, including:

- Anatomy and relationships of major organs
- Anatomy and relationships of IVC and abdominal aorta

ii. Skills

Courses will teach learners the following imaging skills:

- IVC and abdominal aorta including umbilical catheter and PIC tip location
- Ascites/pleural effusions
- Locating and identifying the kidneys

- Locating the bladder, and assessing relative volume.
- iii. Recording

Courses will teach learners the common conventions of abdominal scanning and how to competently record a series of images to clearly demonstrate normal abdominal anatomy.
- iv. Limitations

All scans should be reviewed by a competent scanner (or paediatric radiologist). There is a need to recognise when referral is mandatory because of an incomplete scan or a possible anatomical or functional abnormality. Important management decisions should not be made without such experienced review.
- v. Interpretation

Courses will teach learners the skills needed to competently interpret the ultrasound findings in relation to the clinical scenario, including:

 - Recognising and localising fluid in the pleural, peritoneal and pericardial spaces.
 - Recognising common renal abnormalities such as pelvic dilatation, hydro nephrosis and large or small kidneys.
 - Recognising and assessing volume of bladder contents.
 - Assessing for intravenous catheter tip position, particularly to exclude an intracardiac tip position.

Limitations and Pitfalls

Standards and appropriate use of Neonatal Clinician Performed Ultrasound

It is expected that the CCPU in Neonatal Ultrasound is to be used for provision of ultrasound at the point of care in a neonatal intensive care unit to enhance the clinical care of the infant and not to raise revenue.

Limitations of Use

Holders of the CCPU in Neonatal Ultrasound are expected to consult and request appropriate advice by a paediatric cardiologist or radiologist under the following circumstances:

By a Paediatric Cardiologist

- If the primary clinical concern is the possibility of congenital heart disease (CHD).
- If specific treatment is being instituted for CHD based on a clinician performed ultrasound (CPU).
- If transfer to a paediatric cardiology unit is being planned based on a CPU.
- If the clinical findings or course are NOT consistent with the CPU findings.
- If the baby is no longer in an NICU setting, for example, after discharge.

By a Radiologist

- For documentation and confirmation of abnormal cranial ultrasound results.
- For provision of routine cranial ultrasound services if this already exists.

Performance of a CPU is not expected to be equivalent to a study performed by an imaging consultant and as such should not be relied upon to exclude significant pathology.

Documentation

It is recommended that documentation of CPU studies specifically mention that ultrasound scans are clinician performed to distinguish them from studies by a consultative diagnostic imaging specialist. So document 'clinician performed cardiac ultrasound' or 'clinician performed cerebral ultrasound' and avoid terms such as 'Echocardiogram'.

Standards for CCPU in Neonatal Ultrasound Teaching Institutions and Courses

Recognised Institutions

Recognised institutions for training in the CCPU (Neonatal Ultrasound) should have the following:

- Be associated with a neonatal intensive care unit
- Close affiliation with a radiology and paediatric cardiology service
- At least one clinician whose qualification is recognised by the ASUM council as a qualification for training.
- Access to a level of ultrasound equipment to allow appropriate quality accuracy and repeatability of scanning. Equipment should be no older than 10 years.

Assessment and Logbook

- Documentation to show attendance and completion of "Advanced Clinician Performed Neonatal Ultrasound" CCPU course.
- Submission of a minimum of five ultrasound scans: Four cardiac and one cerebral, in digital format (DICOM or .avi) on USB stick or CD for review by the examiner. These scans should include all the views as defined in the "CCPU Neonatal Outline of Level 2 (advanced) Cardiac Scan", available on the ASUM website, www.ASUM.com.au.
- Completion of Logbook to satisfy requirements as set out below.

Logbook Requirements

- The logbook requirements should be completed and submitted within 2 years of finishing an ASUM accredited 'Advanced Clinician Performed Neonatal Ultrasound' CCPU course.
- The advanced logbook may be recorded in continuity with the 'Introduction' logbook
- Complete 25 cardiac ultrasounds (at least 50% should show a significant abnormality and/or demonstrate flow measurements)
- Complete 25 cerebral ultrasounds (at least 50% should show a significant abnormality)
- Complete 10 abdominal scans
- Demonstrate the ability to perform advanced cerebral, functional cardiac and basic abdominal scanning. All scans should be clinically indicated.
- These studies should be de-identified and stored digitally for review if required.
- These studies should all be signed off by an ASUM approved supervisor, which includes: A recertified Neonatal CCPU, anyone on the Neonatal supervisor register, DDU, DMU, AMS or other recognised ultrasound qualification or specialist Radiologist or Cardiologist.

The documentation in the logbook must include:

- Date of study, MRN and initials of patient
- Brief summary of findings
- Signature of supervisor
- A summary of the number of each type of scan performed demonstrating compliance with requirements for logbook.
- Documentation to be presented with the logbook and the scans in digital format demonstrating completion of these requirements must also include:
- Evidence of satisfactory completion of training sessions within a recognised institution in neonatal ultrasound.
- Evidence that all of the cases have been signed off by a suitably qualified clinician (see above).
- The preference of the neonatal CCPU committee is that there should be direct supervision of learners by an accredited supervisor. If learners have problems finding a supervisor to sign off the logbook, the committee will be prepared to consider direct electronic submission of ultrasound scans to demonstrate competence.

Recertification

In order to support ongoing education to improve patient care, CCPU holders are required to recertify at five-yearly intervals after the initial certification date recorded on the issued CCPU certificate. Recertification will require presentation of the requisite evidence demonstrating that the candidate has met practice requirements and Continuing Professional Development (CPD) requirements.

To achieve neonatal CCPU recertification the candidate must:

- Continue to fulfil the conditions for Eligibility and Admission to the CCPU.
- Record at least 25 Cardiac scans and 15 Cranial scans in a logbook per year, for five years.
The logbook must be submitted to ASUM with your recertification application.
- Record at least five (5) points of relevant CPD per year.
- Recertification will only be given where recertification requirements have been met.
- A CCPU holder who fails to meet the recertification requirements will be removed from the ASUM CCPU certified list and will be required to forgo the use of the post nominals.

Resources

Echocardiography for the neonatologist. Ed Skinner J, Hunter S and Alverson D. Churchill Livingstone, London, 2000.

Evans N, Malcolm G. Practical Echocardiography for the Neonatologist. Functional and Structural Echocardiography. A multimedia CDROM, Royal Prince Alfred Hospital 2000.
<http://www.slhd.nsw.gov.au/rpa/neonatal/echo.html>

Evans N, Malcolm G. Practical Head Ultrasound for the Neonatologist. A multimedia CDROM, Royal Prince Alfred Hospital 2000.

<http://www.slhd.nsw.gov.au/rpa/neonatal/echo.html>