MONASH NEWBORN

Point of Care Ultrasound Training & Credentialing Handbook

NEONATAL CRANIAL ULTRASOUND

Monash Newborn
Handled with Care

MonashImaging
MonashHealth

A collaborative program of Monash Newborn & Monash Imaging supporting excellence in clinician performed ultrasound

Overview

Introduction
- Overview of collaborative PoCUS training program
- Process for Monash Health Neonatal Cranial module accreditation
- Booking one-to-one training sessions

Ultrasound System
- Knobology
- Entering patient details
- Infection control
- Equipment care

Scanning
- Safety
- Scan module protocol & imaging
- Practical scan skills
- Grading of intracranial haemorrhages

Scan Results
- Documenting findings on EMR

Other matters
- PACS upload of images
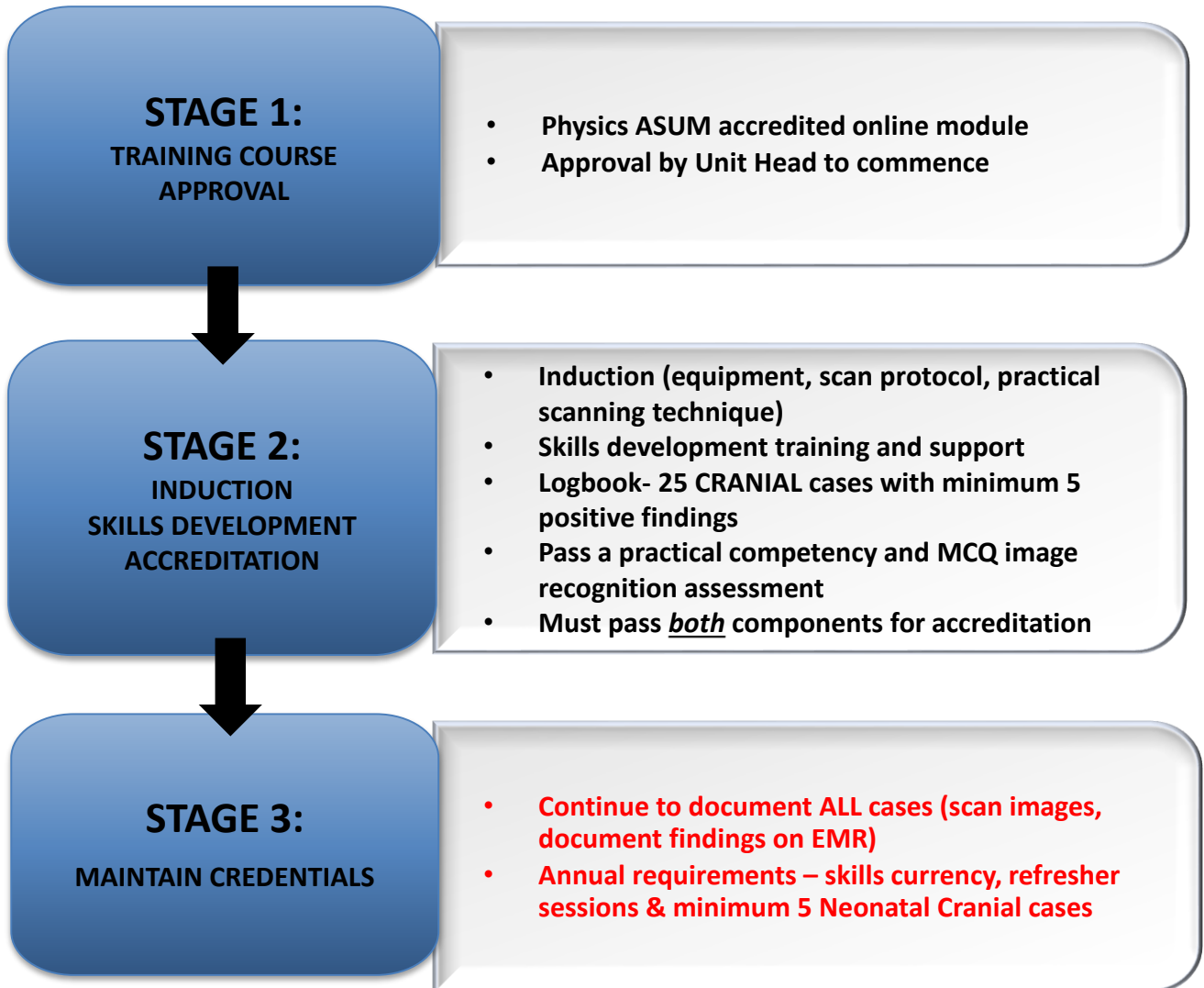- Clinician logbooks
- Quality auditing & clinician feedback

Sita Matheis-Hodges (Sonographer Educator)
Sita.Matheis-Hodges@monashhealth.org

Glenda McLean (Sonographer Educator)
Glenda.McLean@monashhealth.org

Keith Vanhaltren (Sonographer Educator)
Keith.Vanhaltren@monashhealth.org

Program Email: pocusprogram@monashhealth.org
Program Website: www.pocusprogram.com

Monash Newborn Neonatal Cranial Ultrasound Credentialing

STAGE 1:
TRAINING COURSE APPROVAL

- Physics ASUM accredited online module
- Approval by Unit Head to commence

STAGE 2:
INDUCTION
SKILLS DEVELOPMENT
ACCREDITATION

- Induction (equipment, scan protocol, practical scanning technique)
- Skills development training and support
- Logbook- 25 CRANIAL cases with minimum 5 positive findings
- Pass a practical competency and MCQ image recognition assessment
- Must pass _both_ components for accreditation

STAGE 3:
MAINTAIN CREDENTIALS

- Continue to document ALL cases (scan images, document findings on EMR)
- Annual requirements – skills currency, refresher sessions & minimum 5 Neonatal Cranial cases

Document all findings on EMR

Monash PoCUS
Training & Credentialing Cycle

- **ASUM approved PoCUS course (external)**
- **Online physics module**
- **Monash PoCUS program training, skill development, logbook etc.**

quality audit

& feedback

quality audit

& feedback

CREDENTIAL & SKILLS MAINTENANCE (ongoing)

COMPETENCY ASSESSMENT & CREDENTIALING (MONASH)

quality audit

& feedback
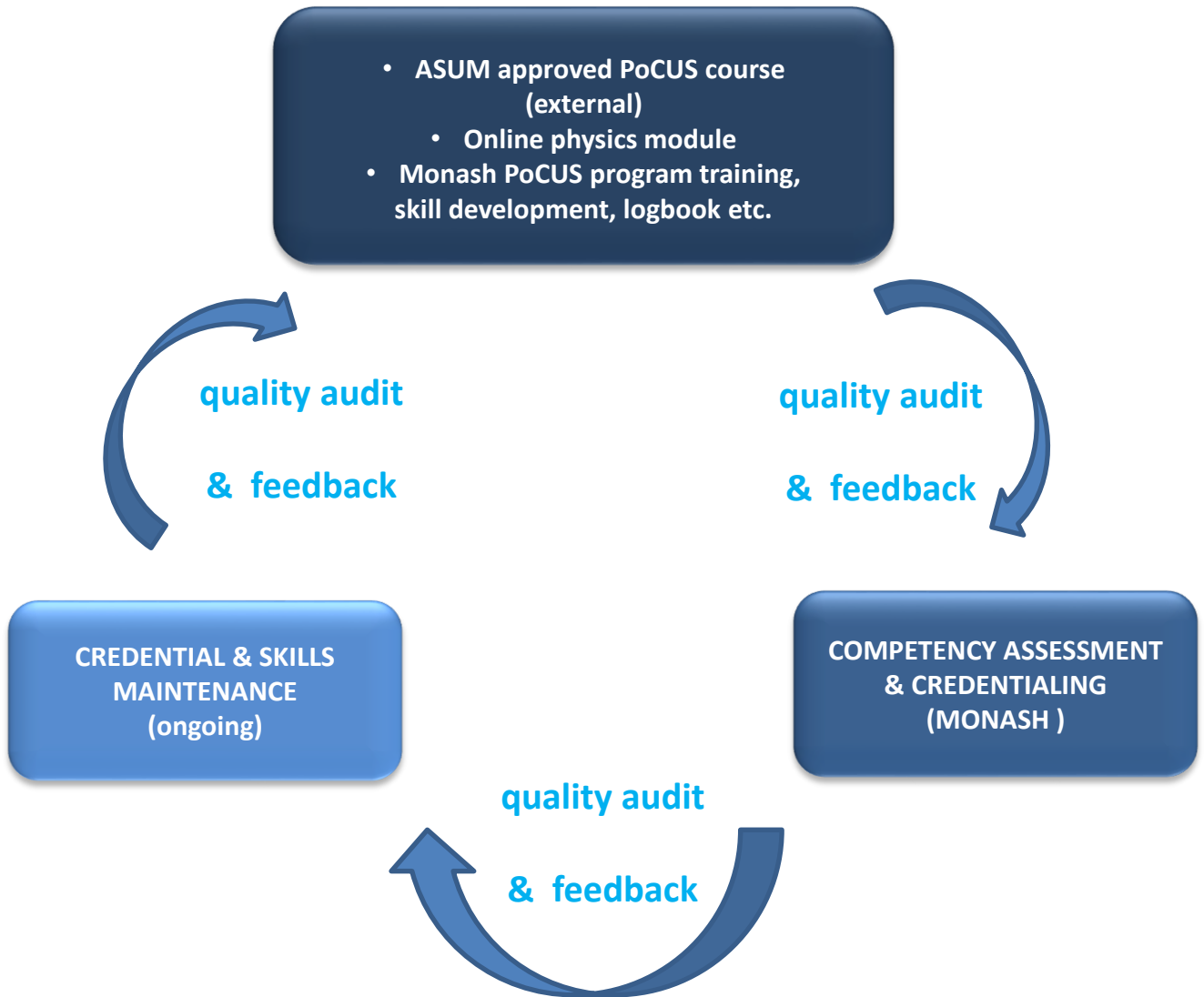
Online training bookings
http://pocusprogram.simplybook.me

SAMSUNG KNOBOLOGY

1. Gain
2. TGC
3. Depth (press to change)
4. Focal Zone (press to change
5. Freeze
6. Acquire (save image)
7. Patient ID
8. Transducer & Preset (exam) selection
9. Set/Activate
10. Measure (calipers)
11. Erase (calipers or text)
12. Text (labelling)
13. End Exam (archive)

ENTERING PATIENT DETAILS

Prior to scanning you must enter the patient details, study description and sonographer into the required fields.

This will enable us to send the images to PACS, perform auditing and collect data to create your personal physician logbooks.

Note: If the patient has been scanned previously the machine will automatically pre fill the patient details for you. You **MUST** delete the characters in the Accession # field to prevent your scan going into the previous study.

INFECTION CONTROL

- Only use detergent or water based cleaning wipes to clean ultrasound transducers, cords & consoles (NOT alcohol)

- Wipe off excess gel from transducers BEFORE using cleaning wipes to clean thoroughly

- Wipe machine console and probes over with a dampened microfiber cloth to remove residue of detergent wipe

- ALWAYS use dedicated transducer covers for procedures or when in contact with fluids/blood/exposed body tissues (NOT Tegaderm)

EQUIPMENT CARE

- Store transducers correctly in holders

- Do not drop or knock transducers

- Keep cords and cables tangle free & off the floor

- Do not run over cords!

- **Ensure machine is returned to parking area with POWER CORD PLUGGED IN**

PLEASE REPORT ALL FAULTS/DAMAGE IMMEDIATELY
Call ultrasound department on ext. 23028

CRANIAL Ultrasound Safety Recommendations

Scan time should <u>not</u> exceed <u>6 minutes</u>

Use 'NICU Cranial' machine preset to ensure appropriate output power settings are utilised
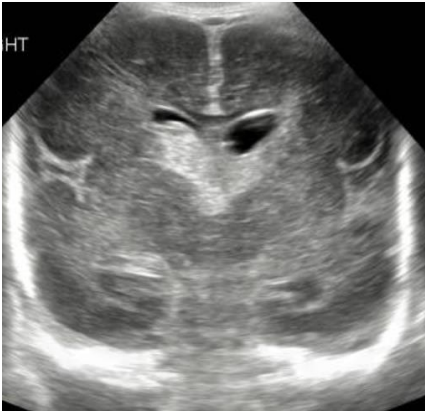
<u>Why?</u>

- **Potential for focal increase in temperature as the transducer sits very close to the surface of the brain**

- **The bone soft tissue interface (i.e. the anterior fontanelle) is where acoustic energy absorption is at its maximum**

- **Excessive tissue heating from a prolonged scan time in essentially the same position (anterior fontanelle) can cause damage to the underlying neurons**
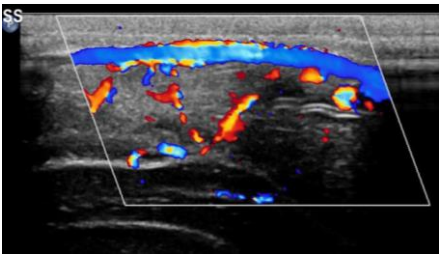
<u>Do not use the cardiac or research machines to scan cranial cases. Power levels are not configured for safe cranial scanning.</u>

Neonatal Cranial Image Series

Plane 1 – CORONAL: MIDDLE CEREBAL ARTERIES (MCAs)

- Use the curvilinear (C9-4) transducer on '**NICU Cranial**' preset
- Place transducer on anterior fontanelle, ensuring the transducer marker is positioned to the anatomical right of the patient (marker at 3 o'clock)
- Increase depth to ensure entire brain is demonstrated on the image
- Assess the entire brain parenchyma by sweeping anteriorly (towards the face) and then as far posteriorly as possible
- Obtain a coronal view of brain at level of MCAs
- Anatomy visualised should include the MCAs, frontal horns of lateral ventricles and corpus callosum
- Identify presence/absence parenchymal haemorrhage
- Labelled CORONAL RIGHT (right must be on anatomical right of patient)

Neonatal Cranial Image Series

Plane 2 – CORONAL: THIRD VENTRICLE

- Angle the probe slightly posteriorly until a coronal view of the brain is obtained at level of the third ventricle
- Demonstrate the third and lateral ventricles, corpus callosum, caudate nucleus, cavum septum pellucidum (CSP) and Sylvian fissures
- Identify presence/absence of subependymal haemorrhage (SEH), intraventricular haemorrhage (IVH) and parenchymal haemorrhage
- Look just below the ventricles for evidence of germinal matrix haemorrhage (GMH)
- Labelled CORONAL RIGHT (right must be anatomical right of patient)

Neonatal Cranial Image Series

Plane 3 – CORONAL: TENTORIUM CEREBELLI

- Continue angling the probe posteriorly until a coronal view of the brain is obtained at the level of the tentorium cerebelli
- Demonstrate the tentorium cerebelli, lateral ventricles and falx cerebri
- Identify presence/absence of IVH and parenchymal haemorrhage
- Labelled CORONAL RIGHT (right must be anatomical right of patient)

Neonatal Cranial Image Series

- Continue angling the probe posteriorly until a coronal view of the posterior parenchyma of the brain is obtained
- Demonstrate the falx cerebri and occipital lobes
- Identify presence/absence of parenchymal haemorrhage
- Assess the surrounding periventricular white matter for areas of gross increased echogenicity (brighter than choroid)
- Labelled CORONAL RIGHT (right must be anatomical right of patient)

Neonatal Cranial Image Series

Plane 5 – RIGHT SAGITTAL: CAUDOTHALAMIC (CT) GROOVE

- With the transducer in the anterior fontanelle, turn the transducer so the marker on the transducer is now pointing to 12 o'clock (towards the face).
- Fan the probe to the patients right side until a longitudinal view right sagittal caudothalamic (CT) groove is demonstrated
- Include the entire depth of the brain in image
- Demonstrate the ventricle, caudate nucleus, thalamus and CT groove
- Distinguish choroid from haemorrhage
- Identify presence/absence of SEH, IVH and parenchymal haemorrhage
- Labelled SAG RIGHT

Neonatal Cranial Image Series

Plane 6 – SAGITTAL MIDLINE
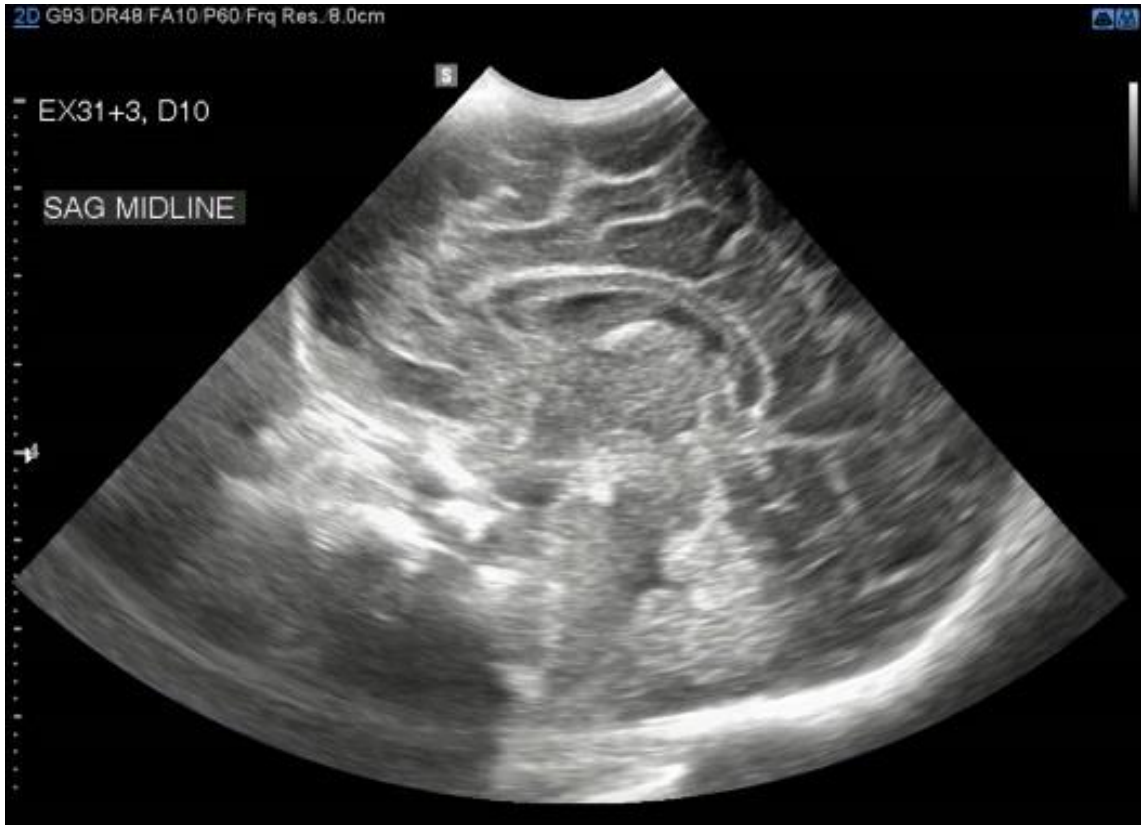
- Fan the probe to the medially obtaining a longitudinal view midline brain
- Include the entire depth of the brain in image
- Demonstrate the corpus callosum, septum pellucidum, third and fourth ventricle and cerebellar vermis
- Identify presence/absence of parenchymal haemorrhage
- Labelled SAG MIDLINE

Neonatal Cranial Image Series

Plane 7 – LEFT SAGITTAL: CAUDOTHALAMIC GROOVE

- Continue fanning the probe to the patients left obtaining a longitudinal view left sagittal CT groove
- Include the entire depth of the brain in image
- Demonstrate the ventricle, caudate nucleus, thalamus and CT groove
- Distinguish choroid from haemorrhage
- Identify presence/absence of SEH, IVH and parenchymal haemorrhage
- Labelled SAG LEFT

Alternate Neonatal Cranial Views

- If pathology is found use depth, gain, TGC & focal zone to improve image detail for the region of interest
- Document all pathology in two planes i.e coronal and sagittal
- Annotate images with RIGHT/LEFT

Grading of Neonatal Intracranial Haemorrhage

| Papile* | | Volpe† | |
Grade	Description	Grade	Description
Grade 1	Germinal matrix hemorrhage	Grade I	Germinal matrix hemorrhage with no or minimal hemorrhage
Grade 2	Blood within but not distending ventricular system	Grade II	IVH (10–50% of ventricular area)
Grade 3	Blood filling and distending ventricular system	Grade III	IVH (>50% of ventricular area; usually distends ventricle)
Grade 4	Parenchymal involvement of hemorrhage	Severe + periventricular hemorrhagic infarction	Grade III IVH with periventricular hemorrhagic infarction

* (Data from Papile LS, Burstein J, Burstein R. Incidence and evolution of the subependymal intraventricular hemorrhage: A study of infants with weights less than 1500 grams. J Pediatr 1978;92:529.)
† (Data from Volpe JJ. Neurology of the newborn, 3rd edn. Philadelphia: WB Saunders, 1995:424–428.)

At Monash Health we grade haemorrhages from grade 1-3. Grade 4, historically thought to be an extension of the SEH, has since been recognised to be a separate process not involving the germinal matrix.

These parenchymal (grade 4) haemorrhages are thought to be due to haemorrhagic venous infarction, as a result of compression of the brain parenchyma by distention of a ventricle.

Grading of Neonatal Intracranial Haemorrhage
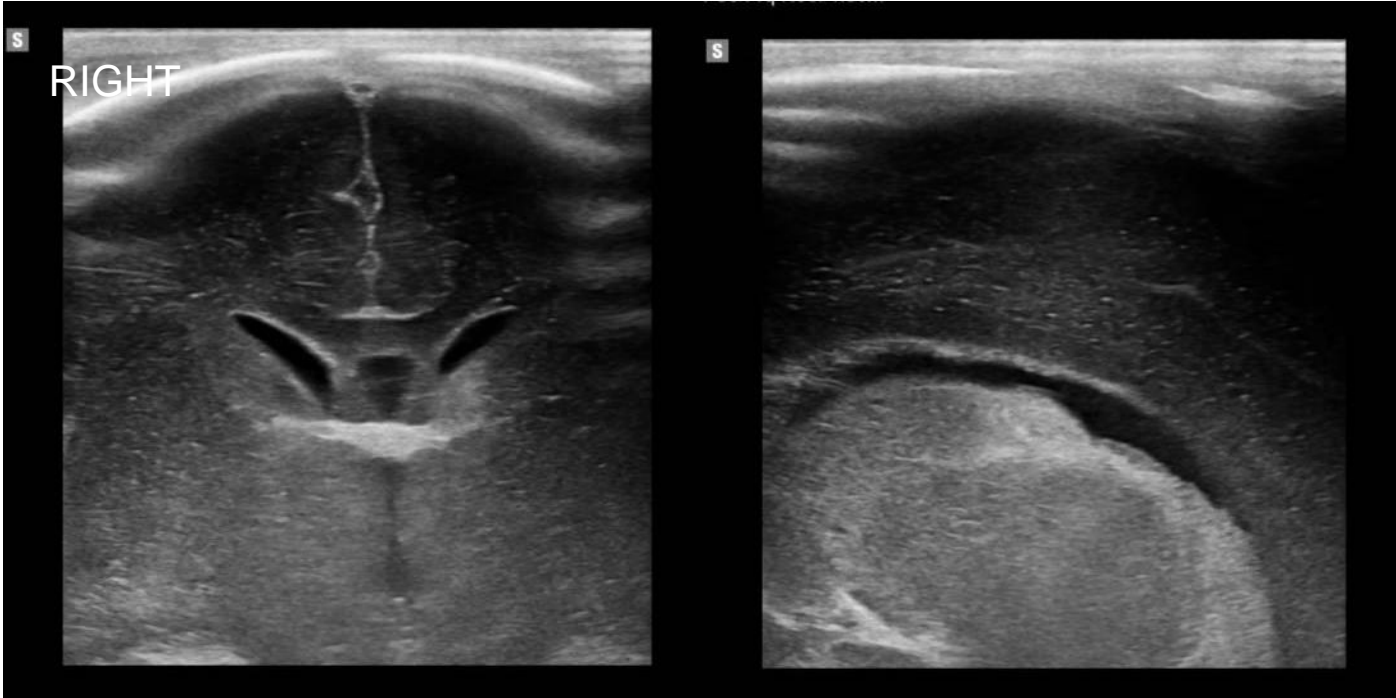
Grade 1 haemorrhage. Germinal matrix haemorrhage (GMH) which is confined to the CT groove. No extension into the ventricle, no ventricular distension.

Grading of Neonatal Intracranial Haemorrhage

Grade 2 haemorrhage. GMH which has extended into <50% of the ventricle. No ventricular distension.

Grading of Neonatal Intracranial Haemorrhage

RIGHT
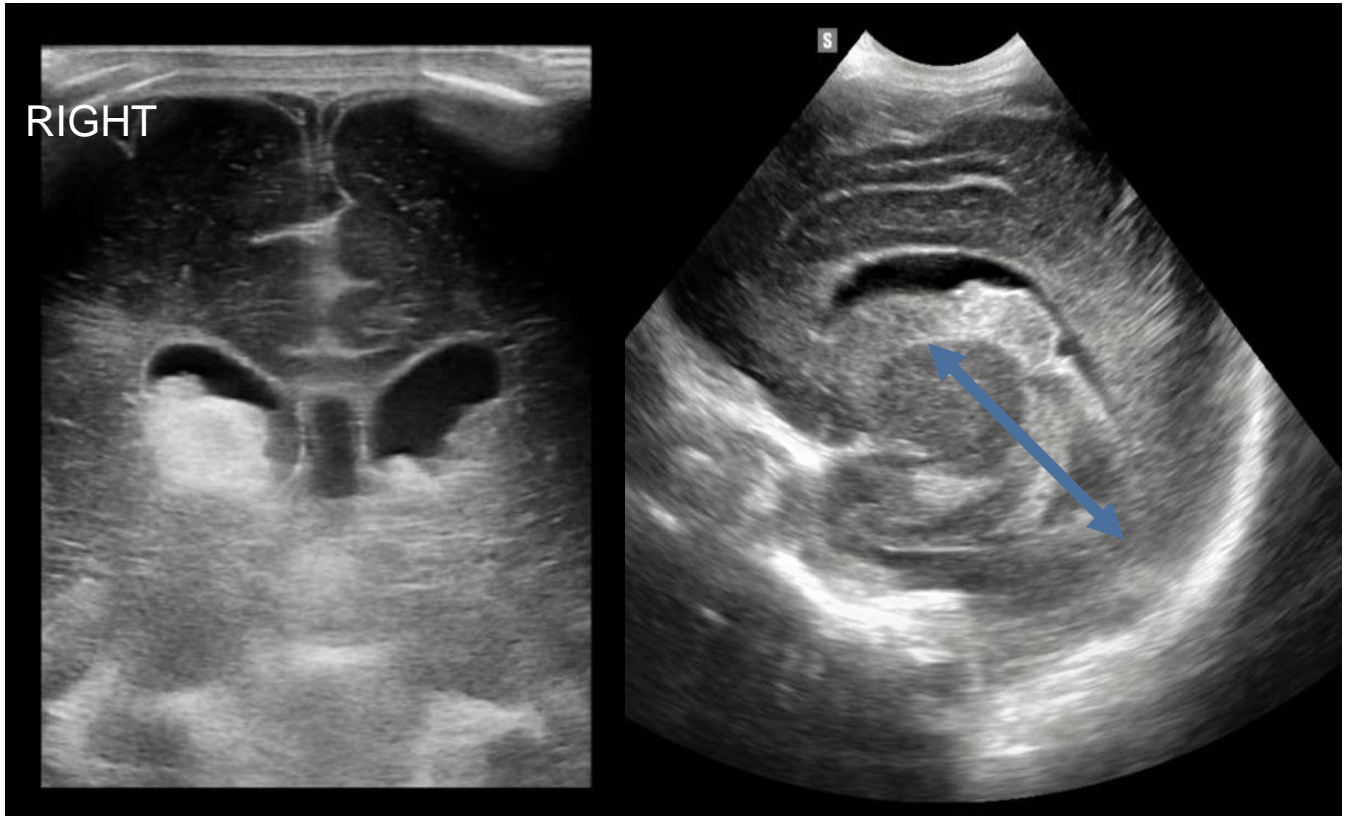
Grade 3 haemorrhage. GMH which has extended into >50% of the ventricle *with* ventricular distension.

Grading of Neonatal Intracranial Haemorrhage
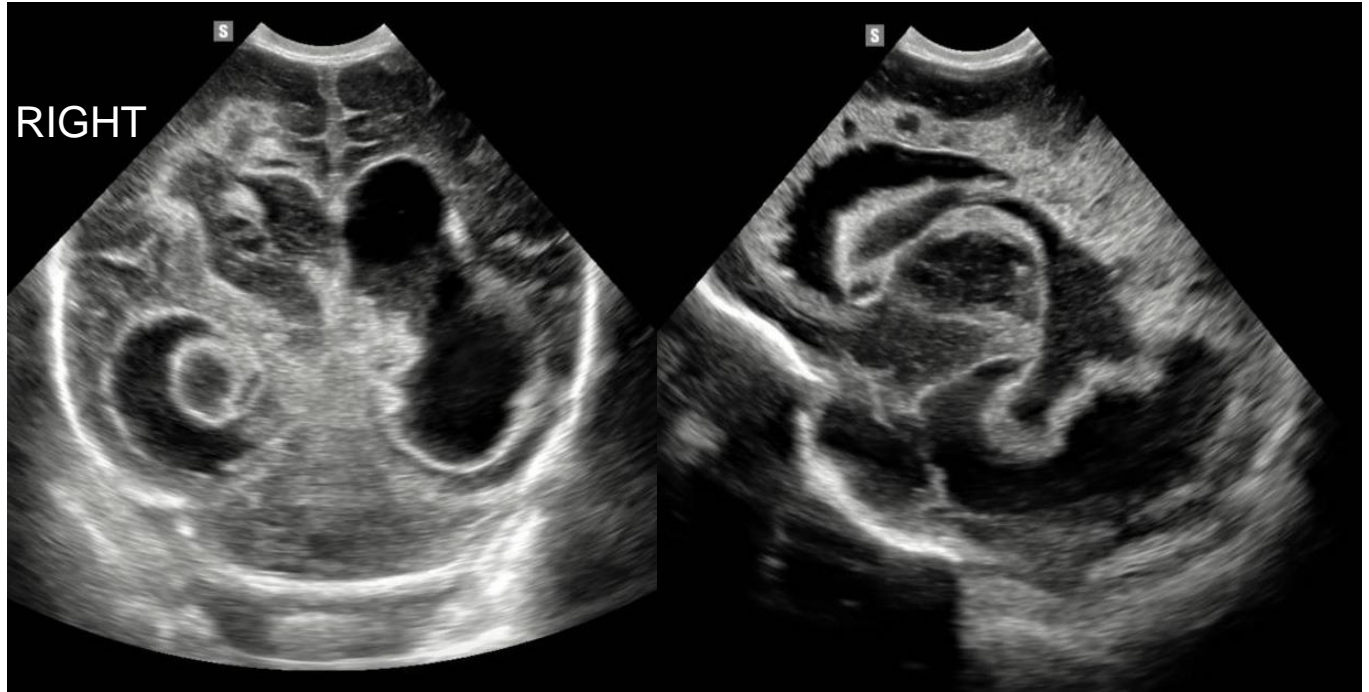
Grade 4 haemorrhage/ parenchymal haemorrhage. May be associated with IVH but can also be seen independently from it.

Recording Findings

All PoCUS examinations **must** be documented with images and clinician record of scan findings.

Record your examination on EMR under the AdHoc tool in the top left of the screen, select PoCUS and then LIMTED CRANIAL under the NICU heading.

Recording Findings

Important notes:

- Description of bleeds *only* to prevent contradictory results with formal imaging
- No clinical management decisions or interventional procedures should be based on PoCUS findings without engagement of ultrasound accredited NICU Consultant and formal imaging confirmation

PoCUS Program Processes

Perform scan

Document scan (EMR)

PACS upload

Clinician elogbook

Quality audit

Feedback