SSM Health Cardinal Glennon Children's Hospital

Evaluation and Management of Intraventricular Hemorrhage (IVH) and Post-hemorrhagic Ventricular Dilation (PHVD) in the NICU

Clinical Practice Guideline

Approved by SSM Health Cardinal Glennon Clinical Practice Guidelines Committee February 22, 2024

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Screening, Evaluation, and Management of Intra-Ventricular Hemorrhage (IVH) and Post-Hemorrhagic Ventricular Dilation (PHVD) in Infants ≤ 32 Weeks Gestation Clinical Practice Guideline

Screening for and Evaluation of Intra-Ventricular Hemorrhage (IVH)

Risk Factors for Development of IVH
- Gestational Age ≤ 26 weeks at birth
- Placental Abruption
- Need for vigorous resuscitation (chest compressions, epinephrine)
- Hypotension requiring pressor support
- Severe acidosis
- Mechanical Ventilation beyond 48 hours
- Confirmed sepsis
- Pneumothorax

Infants ≤ 32 weeks at birth *with* risk factors

Routine Screening

Obtain Cranial Ultrasound at the following intervals:
- Day of Life # 1
- Day of Life # 3
- Day of Life # 7-10
- Day of Life # 30
- Term Equivalent Age OR Prior to Discharge
  - MRI recommended if NICU course includes Grade II or higher IVH, necrotizing enterocolitis, sepsis, or severe bronchopulmonary dysplasia

Infants ≤ 32 weeks at birth *without* risk factors

Routine Screening

Obtain Cranial Ultrasound at the following intervals:
- Day of Life # 7-10
- Day of Life # 30
- Term Equivalent Age OR Prior to Discharge
  - MRI recommended if NICU course includes Grade II or higher IVH, necrotizing enterocolitis, sepsis, or severe bronchopulmonary dysplasia

IVH Detected?

NO → Continue Routine Screening as above based on presence of risk factors

YES

IVH ≤ Grade II

NO →
- Obtain Cranial Ultrasound twice per week (Sunday/Thursday)
- Consult Pediatric Neurosurgery
- Refer to Page 2 (Management of PHVD)

YES

Obtain Cranial Ultrasound twice per week (Sunday/Thursday)

IVH stable or resolving?

NO → back to IVH ≤ Grade II

YES

Resume Routine Screening as above based on presence of risk factors

SSMHealth Cardinal Glennon Access Center Transfer Line
888-229-2424

Resources
a. El-Dib M, et al. Management of Post-Hemorrhagic Ventricular Dilation in the Infant Born Preterm. *J Pediatr.* 2020 Nov; 226:16-27.
b. Bock HC, et al. Early Surgical Management and Long-Term Surgical Outcome for Intraventricular Hemorrhage-Related Posthemorrhagic Hydrocephalus in Shunt-Treated Premature Infants. *J Neurosurg Pediatr.* 2018 Jul; 22(1):61-67.
c. Cizmeci MN, et al. Assessment of Brain Injury and Brain Volumes after Posthemorrhagic Ventricular Dilation: A Nested Substudy of the Randomized Controlled ELVIS Trial. *J Pediatr.* 2019 May; 208:191-197.
d. Davies MW, et al. Reference Ranges for the Linear Dimensions of the Intracranial Ventricles in Preterm Neonates. *Arch Dis Child Fetal Neonatal Ed.* 2000 May; 82(3):F218-23.
e. Cizmeci MN, et al. Randomized Controlled Early versus Late Ventricular Intervention Study in Posthemorrhagic Ventricular Dilation: Outcome at 2 Years. *J Pediatr.* 2020 Nov; 226:28-35.

Owners/Authors (Department)
Anne Gildehaus, MSN, APRN, CPNP-AC (Pediatric Neurosurgery)
Joanna Kemp, MD (Pediatric Neurosurgery)
Philippe Mercier, MD (Pediatric Neurosurgery)
Amit Mathur, MD (Neonatology)
Kaitlyn Stumpe, RN (Pediatric Neurology)

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February 22, 2024
Committee Chair: Andrew Ellis, MD (Andrew.Ellis@ssmhealth.com)

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Evaluation and Management of Post-Hemorrhagic Ventricular Dilation (PHVD)

Assess Ventricular Index (VI)

VI < 97th Percentile
AND
Anterior Horn Width < 6mm
AND
No Clinical Criteria suggestive of PHVD (*see Box 1*)

YES → **Low Risk of PHVD**
- Obtain Cranial Ultrasound twice weekly (Sunday/Thursday)
- Once stable for 2 weeks, return to routine imaging (*see Page 1, Screening and Evaluation of IVH*)

NO → **VI < 97th Percentile + 4mm**
AND
Anterior Horn Width 6mm to 10mm
AND
No Clinical Criteria Suggestive of PHVD (*see Box 1*)

YES → **Moderate Risk of PHVD**
- Transfer to Neurosurgery Center
- Serial Lumbar Puncture 2-3 times (every day to every other day)
- Obtain Cranial Ultrasound 2-3 times per week

Ventricle Size Stable or Improving per Neurosurgical Assessment?

YES →
- Obtain weekly Cranial Ultrasound for 4 weeks, then per routine (*see Page 1, Screening and Evaluation of IVH*)

NO → **Neurosurgical Intervention**

- Infant Weight ≤ 800 grams
  - Anterior Fontanelle Tap until stable
- Infant Weight > 800 grams
  - Reservoir Placement
  - Serial taps until stable

NO → **Severe Risk of PHVD**
VI ≥ 97th percentile + 4mm AND Anterior Horn Width > 10mm
OR
Any Clinical Criteria Suggestive of PHVD (*see Box 1*)

Box 1: Clinical Criteria Suggestive of PHVD
- Head circumference growth > 2cm per week
- Separated sutures
- Bulging fontanelle

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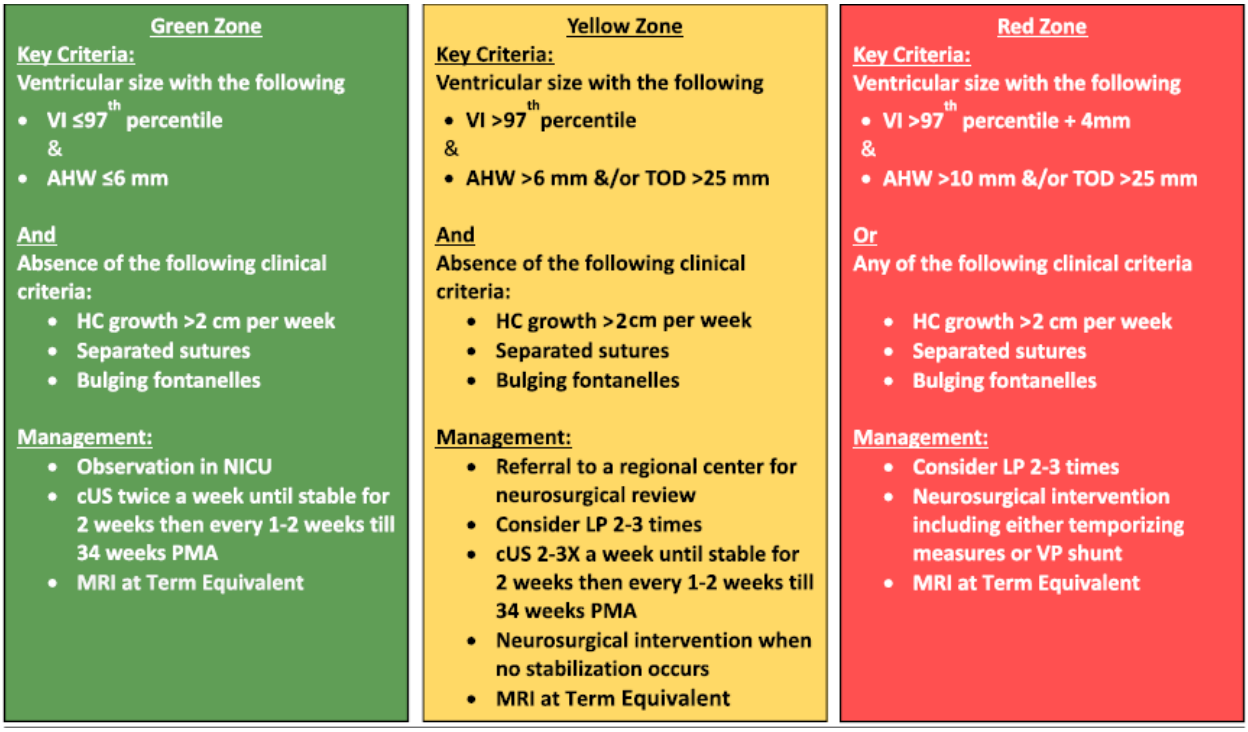
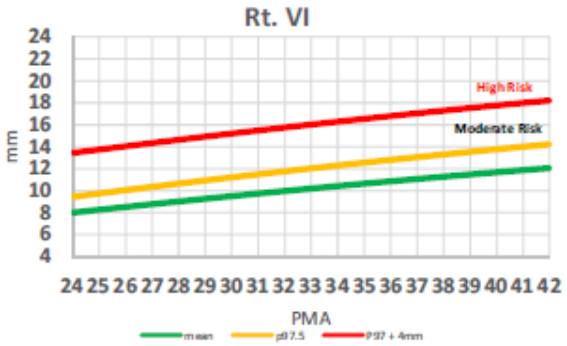
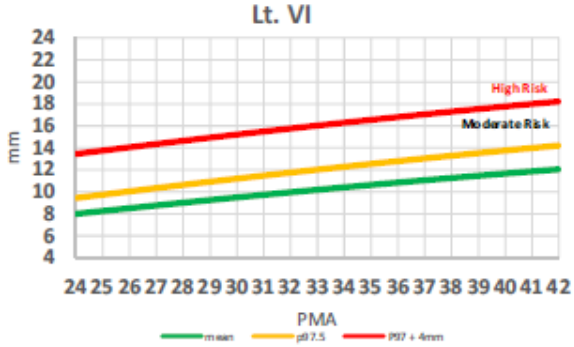


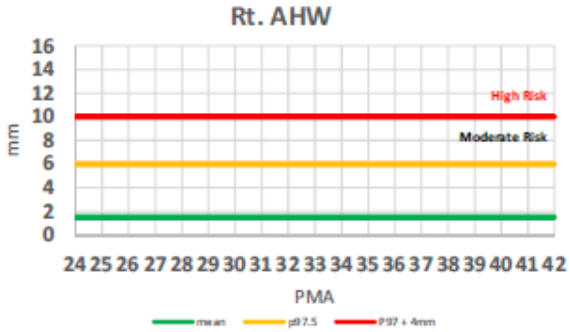
 El-Dib M, Limbrick DD Jr, Inder T, Whitelaw A, Kulkarni AV, Warf B, Volpe JJ, de Vries LS. Management of Post-hemorrhagic Ventricular Dilatation in the Infant Born Preterm. *J Pediatr*. 2020 Nov;226:16-27.

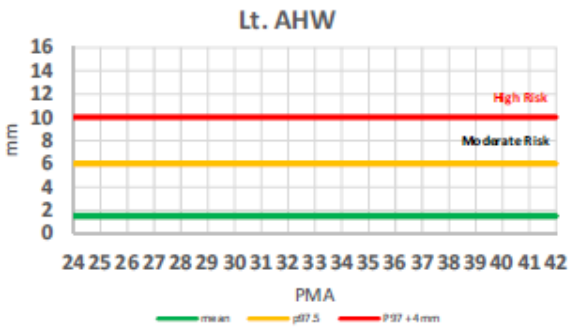
Name:
DOB:

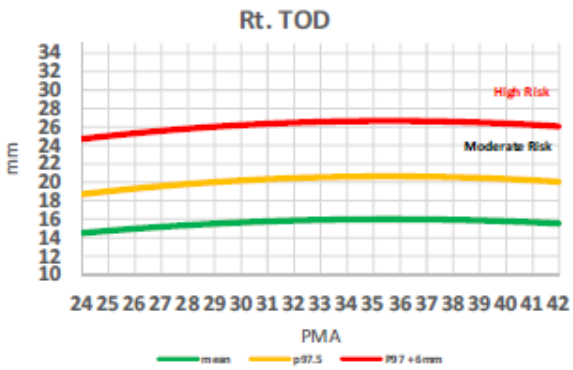
Ventricular Measurement Risk Zones

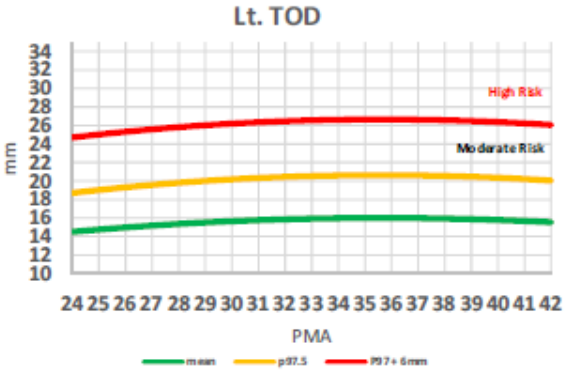












Date	PMA	Rt. VI	Rt. AHW	Rt. TOD	Lt. VI	Lt. AHW	Lt. TOD