1.0 Introduction

Hydrocephalus is a condition that can occur in the neonatal population secondary to intraventricular hemorrhage (IVH), meningitis, or other causes. Ventricular access devices (VAD) may be implanted to allow for serial CSF aspiration to decompress the ventricular system and prevent or manage symptoms of increased intracranial pressure in the neonate.

The use of VADs in neonates can be associated with certain risks including infection, skin breakdown, and over drainage. This document was created based on a review of the available evidence in an attempt to minimize VAD-related complication and facilitate treatment.

Target Users
- All health care providers involved in caring for children with implanted ventricular reservoirs including nurses, nurse practitioners, and physicians.

Target Patient Population
- Premature and term neonates and infants with implanted VAD for the management of hydrocephalus and IVH

2.0 Glossary
- Intraventricular hemorrhage (IVH)
- Post-hemorrhagic hydrocephalus (PHH)
- Post hemorrhagic ventricular dilatation (PHVD)
- Germinal Matrix
- Cerebrospinal fluid (CSF)
- Ventricular Access Device (VAD)

3.0 Clinical Practice Recommendations

All recommendations are a Grade C (based Expert opinion, experience of a consensus panel) unless otherwise stated within the document.

3.1 Determine need for procedure
- Review patient’s history for signs and symptoms of hydrocephalus including bradycardia, apneic events, poor feeding, lethargy, and head growth
Ventricular Reservoir tapping

- Perform focused clinical assessment including subjective fontanelle and cranial sutures assessment, head circumference measurement, and assessment for collection around surgical site
- Review recent cranial imaging and laboratory values

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<tr>
<th>Indications (any of the following)</th>
<th>Contraindications</th>
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<td>・ Signs or symptoms of hydrocephalus including: apnea, bradycardia, poor feeding, lethargy, increased head circumference</td>
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<td>・ To obtain CSF sample for investigations</td>
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<td>・ Based on measurement markers on ultrasound</td>
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<td>・ Clinical instability of vital signs</td>
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<td>・ Coagulopathy</td>
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<td>・ Electrolyte imbalance</td>
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<td>・ Local signs of infection or skin breakdown related to reservoir</td>
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<td>・ Concerns of CSF over-drainage clinically or on imaging</td>
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3.2 Consider analgesia
- Non-pharmacological techniques or oral sucrose are usually sufficient

PLEASE REFER TO STANDARD WORK DOCUMENT FOR STEP BY STEP PROCESS OF VAD TAPPING

4.0 Implementation and Evaluation

Implementation:

Previous practice at Sick Kids has been for Neurosurgical trainees and NPs to perform ventricular reservoir taps on all patients including neonates. There has historically been variation in practice regarding the details of the procedure. After review of the relevant literature, decision was made to standardize the VAD tap procedure using evidence-based practice and to train a group of NICU nurse practitioners to perform the majority of the procedures with bedside NICU nurses assisting.

A small group of NICU NPs will review this document in preparation for performing this procedure. Each individual will observe the procedure being done 1-2 times or more if needed. They will then perform
supervised taps 1-2 times or until competence is reached. Neurosurgery NP/MD team will be available as resources as needed.

**Evaluation:**

The main change in practice that will be occurring with implementation of this guideline is an increase in the sterility of the procedure and the delegation of the procedure to a core group of well-trained individuals. Therefore it is anticipated that the rates of VAD-related complications could only decrease or remain stable.

There will continue to be ongoing surveillance of VAD-related complications including infections, skin breakdown, and CSF leak by the infection control and quality teams in conjunction with the NICU and Neurosurgical medical teams. These data will continue to be reviewed on a regular basis for trends and any concerns will be addressed accordingly.

**5.0 References**

4. HCRN Ventricular Reservoir Tapping Protocol.

**6.0 Guideline Group and Reviewers**

**Guideline Group Membership:**
1. Sara Breitbart, NP-Paediatrics
2. Diane Wilson, NP
3. Fatma Rajwani, PT, Quality Management.

**Internal Reviewers:**
1. Christine Elliot, RN, Quality Leader
2. Kyong-Soon Lee
3. Abhaya Kulkarni MD, PhD, FRCSC

**External Reviewers:**
1. Kelly Bullivant NP-Paediatrics, Alberta Children’s Hospital
2. Jay Riva-Cambrin MD, MSc, FRCSC

**Attachments:**

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