Shunt Malfunction

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What is a Clinical Pathway?

An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective and consistent patient care.
Objectives of Pathway

• To improve recognition of shunt malfunction on presentation to ED
• To initiate appropriate care for patient with suspected shunt malfunction
• To prevent delay in treatment and management
• Improve patient and family satisfaction
• TO IMPROVE STANDARD OF CARE
Why do we need this pathway?

- To change practice for these select group of patients with early recognition of potential shunt malfunction and early appropriate imaging and care
- To guide care for these children
- To ensure standard of care is successfully implemented for the safety of the patient
Ventriculoperitoneal (VP) shunt insertion remains the mainstay of treatment for hydrocephalus despite a high rate of complications.

In the United States alone, more than 30,000 procedures to relieve hydrocephalus are performed every year.

The 1-year failure rate for VP shunts had been reported at around 40-50% for pediatric patients.

VP shunt malfunction remains the most frequent reason for shunt revisions and one of the most frequent complications.

Early recognition and treatment improves patient outcomes and decreases hospital stays.
This is the Shunt Malfunction – Emergency Department Clinical Pathway.

We will be reviewing each component in the following slides.

The goal of the Emergency Department Pathway is to rapidly identify and diagnose patients with shunt malfunction so they can be prepared for surgery as soon as possible.
This is the Shunt Malfunctions – Inpatient Clinical Pathway.

We will be reviewing each component in the following slides.

The goal of the Inpatient pathway is to guide post-operative care of patients who underwent surgical correction of a shunt malfunction.
Children may present with different symptoms based on their age.
- All children under 2 years of age should have a head circumference documented.
- Providers should complete a thorough history and physical exam.
- See appendix A below.
Inclusion Criteria: A child that presents with a pre-existing shunt (VP/VA/Vpleural) AND has symptoms associated with malfunction (see below)
- **Infants:** Enlargement of head, full and tense fontanelle while positioned upright and calm, prominent scalp veins, swelling along the shunt tract, vomiting, irritability, sleepiness, downward deviation of the eyes
- **Toddlers:** enlargement of head, vomiting, headache, irritability, sleepiness, loss of previous abilities (sensory or motor function)
- **Children and adults:** vomiting, headache, vision problems, photophobia, irritability, sleepiness, personality change, difficulty in waking up or staying awake

Exclusion Criteria: Concern for neurosurgical shunt infection (see shunt infection pathway), identification of alternate source for symptoms, or symptoms not related to shunt malfunction as defined

**Appendix A:** A document that provides guidelines for pertinent history and physical exam factors which will be important for correct diagnosis.
Initial management includes obtaining age-appropriate imaging, sending screening lab work, and making the patients NPO.
- Imaging studies are essential to help rule out shunt infection

Patients will be admitted to either the PICU or Med/Surg unit depending on their clinical stability.
Once a patient is identified as having a shunt malfunction they are admitted or taken to the OR and the Inpatient Pathway is initiated.
The goal of the Inpatient pathway is to guide post-operative care of patients who underwent surgical correction of a shunt malfunction.
Antibiotics are only given for the first 24 hours post-operatively, unless otherwise indicated.

Antibiotics to be given for only 24 hours post-operatively unless otherwise indicated.

**Cefazolin**
- 90-100 mg/kg/day div q8hr (max 2000 mg/dose)
- OR

**Nafcillin**
- 200 mg/kg/day div q6hr (max 12 g/day); adult dose 2g q6hr

*If β-Lactam allergy:*
- **Vancomycin**
  - 15 mg/kg/dose q6hr (≥18 yrs old; q8hr) max initial dose 1 g/dose
NSAIDs such as Tylenol and Toradol/Motrin are the mainstay of pain control post operatively. Children with active or history of renal disease will need special consideration.
Patients will need typical post anesthesia nursing care but with close observation of the surgical sites for leakage.
PT and OT are initiated on post operative day 1 to encourage early movement.
There is NO routine blood work required post operatively.

Diet is advanced as tolerated.

Bowel regimen is essential and should be started as soon as possible post procedure.
Prior to discharge, patients must:

- Be afebrile for 24 hours with stable vital signs.
- Tolerating their home diet
- Have good pain management with oral medications
- Have a bowel movement

**Discharge Criteria:**

- Baseline neurological examination
- Pain well-controlled on oral medication
- Afebrile x 24 hours
- Bowel movement
- Taking adequate fluid and nutrition orally
- Cleared by PT & OT

**Discharge Medications:**

- **Ibuprofen** 10 mg/kg q6hr PRN (max 600 mg/dose) for mild/moderate pain
- **Acetaminophen** 12.5 mg/kg q4hr PRN (max 650 mg/dose, 4g/day) for mild/moderate pain
- **Hydrocodone/acetaminophen** 0.2 mL/kg/dose of hydrocodone q3hr PRN (max 5-10 mg/dose) for severe pain
- **Polyethylene glycol** and/or **Docusate** to prevent constipation

**Discharge Instructions:**

- Call NSG for fever > 101.5, vomiting >3x in 12 hr period, excessive irritability or sleepiness, severe headache
- Follow up outpatient 2-3 weeks after discharge
Review of Key Points

- Appropriate imaging to rule out shunt malfunction
- Identification of severe shunt malfunction requiring immediate surgical intervention
- Pre operative care to facilitate timely transfer to OR
Quality Metrics

- Percent of patients with pathway order set usage
- Percent of patients with deep wound infections
- Percent of patients with superficial wound infections
- Number of patients with organ space infection within 30 days of principal operative procedure
- Number of patients with shunt malfunction within 90 days of principal operative procedure
- Percentage of patients with cerebrospinal fluid leak
- Number of readmissions within 30 days
- Number of patients with return to the OR within 30 days
References


Pathway Contacts

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About Connecticut Children’s Clinical Pathways Program

Clinical pathways guide the management of patients to optimize consistent use of evidence-based practice. Clinical pathways have been shown to improve guideline adherence and quality outcomes, while decreasing length of stay and cost. Here at Connecticut Children’s, our Clinical Pathways Program aims to deliver evidence-based, high value care to the greatest number of children in a diversity of patient settings. These pathways serve as a guide for providers and do not replace clinical judgment.