



## GUIDELINE

# Ventriculoperitoneal (VP) Shunt or CSF Reservoir Insertion

<b>Scope (Staff):</b>	Nursing and Medical Staff
<b>Scope (Area):</b>	NICU KEMH, NICU PCH, NETS WA

### Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this [disclaimer](#)

## Aim

To reduce the risk of Cerebrospinal Fluid (CSF) shunt infections.

## Risk

Increased risk of CSF shunt infections that worsen the neurodevelopmental outcomes.

## Background

Insertion of a Ventriculoperitoneal (VP) shunt or CSF Reservoir is indicated for the management of infantile hydrocephalus. Hydrocephalus is defined as excess cerebrospinal fluid (CSF) accumulation in the brain due to disturbance of the formation, flow or absorption of CSF.

Infantile hydrocephalus is associated with the following:

- Aqueduct Stenosis, Spina Bifida and Chiari II malformation.
- Dandy-Walker syndrome, Encephaloceles, Viral or Parasitic infections, Arachnoid Cysts, Intracranial Neoplasm's and Vascular Problems.
- Perinatal Intraventricular Haemorrhage (IVH) and Meningitis.
- Trauma, closed head injury.

(Intraventricular Haemorrhage, Aqueduct Stenosis and myelomeningocele are the most frequent of these causes).

## Key Points

- Antibiotic prophylaxis with [Vancomycin](#) and [Cefotaxime](#) should be commenced 2 hours prior to surgery and then continued for 48 hours.
- Ensure parents have received education and written information about infection or blockage of shunt and on the care of their infant at home after discharge as this will enable parents to identify the signs of infection and malfunction of the shunt early. [VP shunt – Care at home](#)

## Shunt Characterisation

The VP Shunts that are used are antibiotic impregnated (Rifampicin and Clindamycin). Studies have shown that antibiotic impregnated catheters decrease the risk of CSF shunt infections. Shunts usually consist of three parts:

1. **Proximal end** that is radiopaque and is placed into the ventricle of the brain. This end has multiple small perforations.
2. **Valve** - this allows for unidirectional flow. Some shunts can be adjusted to various opening pressures (called programmable shunts). Usually has a reservoir that allows for checking shunt pressure and sampling CSF.
3. **Distal end** that is placed into the peritoneum by tracking the tubing subcutaneously.

## Pre-Operative Investigations and Management

Preferably start 7 days prior to surgery. However, urgent shunt surgeries should not be postponed for the sake of pre-operative investigations.

Specific Care	Additional Information
1. All Infants requiring shunt surgery for open spina bifida must be managed with <b>Latex Free</b> care.	Including latex free products i.e. dummies, dressing etc.
2. Screen nasal and any skin lesions for the presence of Methicillin Resistant Staphylococcus aureus (MRSA) and Methicillin Sensitive Staphylococcus Aureus (MSSA)	Consult with a clinical microbiologist if results are positive before proceeding to surgery.
3. Pre-operative chlorhexidine wash with 1% chlorhexidine to be attended prior to theatre.	<a href="#">Chlorhexidine Wash Procedure</a>
4. Two hours prior to surgery, administer IV <a href="#">Vancomycin</a> 15 mg/kg and <a href="#">Cefotaxime</a> IV 50 mg/kg	

## Intra-Operative Management

During surgery, after induction of anaesthesia, ensure that Vancomycin has been completed and flushed through the line. Then administer IV [Cefotaxime](#) 50 mg/kg. If Vancomycin has not been administered pre-operatively, reverse the order of antibiotics given. Intra-operative antibiotics have been shown to reduce the risk of shunt or reservoir infections.

## Post-Operative Management

Also refer to [Post-Operative Handover](#) and [Post-Operative Care](#) guidelines.

Specific Care	Additional Information
1. Continue antibiotics for 48 hours post-operatively, give 8 hourly <a href="#">Cefotaxime</a> 50 mg/kg	First dose to be given 8 hours post the administration of the intra-operative dose.
2. Administer IV <a href="#">Vancomycin</a> at 15 mg/kg/dose 8 hourly irrespective of gestation.	First dose to be given 8 hours post the administration of the intra-operative dose.
3. Hourly neurological observations for 24 hours to be commenced on return to the unit.	Use MR494 Neonatal Neurological Observations Chart.
4. Ensure head and abdominal dressings remain dry and intact. Observe for the accumulation of CSF beneath the skin leading to soft 'boggy' swelling near the surgical wound on the scalp.	A CSF leak or blockage is associated with the increased risk of shunt infection. If swelling is noted, call the neurosurgeon for review immediately.
5. Scalp and abdominal dressings are to be taken down 48-72 hours post-surgery. Remove the dressings only after discussing with the neurosurgeons.	Dressings can be removed earlier if the wound is soaked through with blood or there is concern for the wound.
6. After the dressing is removed, clean the area surrounding the surgical sites with 1% chlorhexidine wipes three times a day for three days or until discharged (if before 3 days).	To minimise the colonisation of bacteria near the surgical wound.
7. Keep the wound dry for 7 days. Sponging around the area is allowed, if the wound becomes wet then, dry off immediately. If the dressing	All sutures are dissolvable.

Specific Care	Additional Information
becomes wet, then change the dressings.	
8. Continue with Latex Free care if indicated.	


Related CAHS internal policies, procedures and guidelines
<p>Neonatology Clinical Guidelines</p> <ul style="list-style-type: none"> <li>• <a href="#">Chlorhexidine Wash Procedure</a></li> <li>• <a href="#">Post-Operative Care</a></li> <li>• <a href="#">Post-Operative Handover</a></li> <li>• <a href="#">Pre-Operative Care</a></li> </ul> <p><a href="#">Neonatology Medication Protocols</a></p>

References
<ol style="list-style-type: none"> <li>1. Bernardo O Ratilal, João Costa, Cristina Sampaio. Antibiotic prophylaxis for surgical introduction of intracranial ventricular shunts. Cochrane library; 2006</li> <li>2. Tamburrini G, Frsassanito P, Jakavaki K et al. Myelomeningocele: the management of the associated hydrocephalus. Child's Nervous System 2013 Sep;29(9):1569-79</li> <li>3. Thomas R, Lee S, Patole S, Rao S. Antibiotic-impregnated catheters for the prevention of CSF shunt infections: a systematic review and meta-analysis. Br J Neurosurg. 2012 Apr;26(2):175-84.</li> <li>4. Zhou WX et al Systematic Review and Meta-Analysis of Antibiotic-Impregnated Shunt Catheters on Anti-Infective Effect of Hydrocephalus Shunt. J Korean Neurosurg Soc. 2021 Mar;64(2):297-308.</li> <li>5. Mallucci CL et al. Silver-impregnated, antibiotic-impregnated or non-impregnated ventriculoperitoneal shunts to prevent shunt infection: the BASICS three-arm RCT. Health Technol Assess. 2020 Mar;24(17):1-114.</li> <li>6. Klimo P Jr, Van Poppel M, Thompson CJ et al; Pediatric Hydrocephalus Systematic Review and Evidence-Based Guidelines Task Force. Pediatric hydrocephalus: systematic literature review and evidence-based guidelines. Part 6: Preoperative antibiotics for shunt surgery in children with hydrocephalus: a systematic review and meta-analysis. J Neurosurg Pediatr. 2014 Nov;14 Suppl 1:44-52. doi: 10.3171/2014.7.PEDS14326.</li> <li>7. Jaeger W, Lee S, Vineet D, Keil A, Agarwal N, Rao S. Ventriculoperitonealshunts in neonates: a retrospective study of outcomes with antibiotic-impregnated catheters and a modified peri-operative antibiotic protocol. Br J Neurosurg. 2017 Dec;31(6):672-676.</li> </ol>

**Useful resources**

[VP shunt – Care at home](#)

This document can be made available in alternative formats on request.

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