

# Clinical Guideline for the care of children with Hydrocephalus or blocked ventricular shunt

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<b>Relevant national or international Guidance e.g. NICE, SIGN, BTS, BSPED</b>	<b>Safe &amp; Sustainable paediatric neurosurgery</b>
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**Does this document replace or revise an existing document? No**  
If so please state existing document(s)

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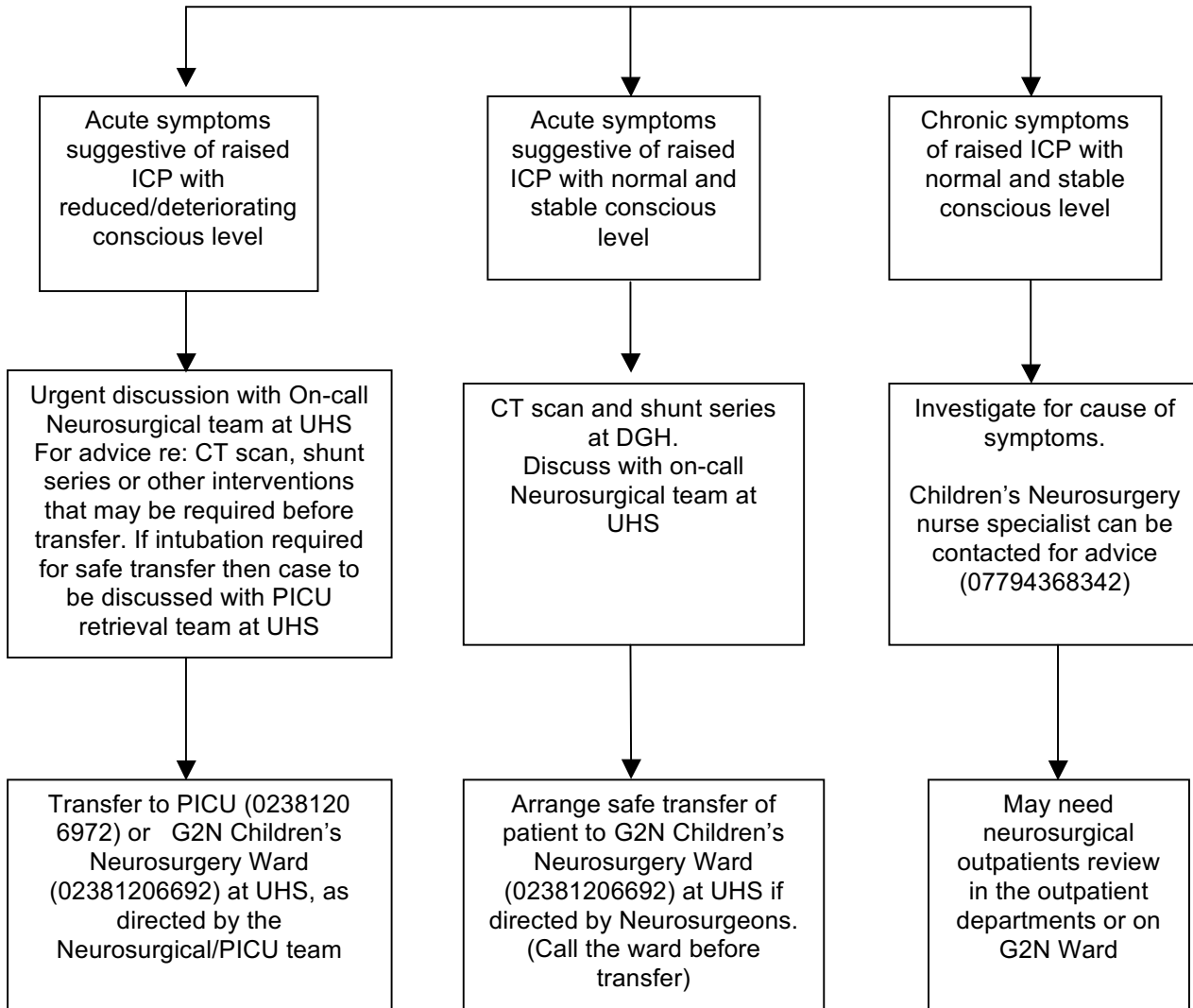
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**Flowchart for the management of a child with a suspected hydrocephalus or blocked ventricular shunt in district general hospitals (DGH)**



# 1

## 1.1 Introduction

The purpose of this document is to provide regional guidelines for doctors, nurses and allied professionals in the in the clinical management of children (birth -18yrs) with acute hydrocephalus or dysfunction of ventricular peritoneal (VP), ventricular pleural and ventricular atrial (VA) shunts. This guideline identifies the pathway for management of a patient with hydrocephalus or suspected shunt blockage, but should not replace clinical assessment.

Hydrocephalus can develop slowly or quickly as a result of a disparity in the amount of cerebral spinal fluid (CSF) being produced compared to the amount being absorbed. This disparity leads to an increase in the pressure in the ventricles compared to the subarachnoid space. When the pressure in the ventricle rises relative to the subarachnoid space pressure the ventricles may become enlarged but this may not be the case. The consequence of a build up of pressure in the ventricle is a build up of pressure in the intracranial compartment and it is this that leads to the variety of symptoms we see.

If hydrocephalus is not treated the intracranial pressure continues to increase and in severe cases, this can result in permanent brain damage, blindness and death.

## 1.2 Scope

This guideline applies to all children and young people for whom a hospital admission is required. This guideline applies to all health providers in the regional District General Hospitals (DGH) in the Wessex region and within University Hospital Southampton (UHS) NHS Foundation Trust.

## 1.3 Purpose

The purpose is to provide standardised care throughout the region and improve patient safety and clinical outcomes.

## 1.4 Definitions: Glossary of abbreviations

VP shunt – Ventricular Peritoneal shunt.

VA shunt – Ventricular Atrial shunt

ICP – Intracranial Pressure

CSF – Cerebral Spinal Fluid

EVD – External Ventricular Drain

GCS – Glasgow Coma Score

ETV - Endoscopic Third Ventriculostomy

DGH – District General Hospital

UHS – University Hospital Southampton (NHS Foundation Trust)

## 2.1 Symptoms of hydrocephalus or blocked shunt

The presentation of patients with hydrocephalus or a blocked shunt can vary, both in terms of symptoms and speed of onset. Symptoms that are typical of shunt dysfunction include

- Drowsiness
- Headache
- Vomiting
- Irritability

However, it is important to note that symptoms can be very subtle or unusual. In general terms, if the patient or the parent feels there is shunt dysfunction, advice should be sought from the paediatric neurosurgical centre in Southampton Children's Hospital.

The child may complain of headache or nausea and may vomit, often in the morning. Babies may have symptoms such as increasing head size, tense bulging fontanelle, a high pitched cry, irritability, sun-setting eyes or distended scalp veins.

Other symptoms that may be particular to the child could include seizures and cranial nerve palsies, such as a squint.

Children with increased intracranial pressure may demonstrate a compromise in systemic perfusion (Hazinski 2009). The child may be tachycardic or bradycardic and the skin may be mottled in appearance.

Evaluation of the level of consciousness is a vital aspect of the assessment of a child with raised intracranial pressure. The Glasgow Coma Scale (GCS) assessment tool should be used in conjunction with the recording of vital signs, pupil reactions and limb movement. In paediatric practice a modification of the original GCS has been made so that the assessment is more relevant to child development (Patterson et al 1992). Often children only have a drop in their level of consciousness in the latter stages and so any patient with a shunt who has a reduced level of consciousness should be treated as a medical emergency.

## 2.2 Management (See Flowchart)

- Shunts dysfunction or failed endoscopic third ventriculostomy (ETV), should be assumed until proven otherwise in a child who presents unwell and has a shunt in situ or has had a previous ETV.
- Children with who have had insertion of a VP/VA/VPlural shunt and ETV have open access to the Children's Neurosurgical Ward (Appendix A). Telephone advice can be gained from the children's neurosurgery nurse specialist on 07794368342 or from G2N (Children's Neurosurgery) Ward on 02381206692. Children who are deteriorating neurologically or are unstable will be directed to their nearest A&E (Flowchart). Safe transfer can then be arranged to UHS, as indicated by the on-call neurosurgery team.
- The parents and carers' assessment of the child with a long term shunt is of great importance.
- The child should be observed with frequent neurological and Glasgow coma score assessments. The presence of drowsiness, headache and vomiting are likely to be caused by shunt dysfunction.

- Clinicians are encouraged to seek advice from the on-call paediatric neurosurgical consultant, the on the call neurosurgery registrar (Bleep 2877 at UHS) or the paediatric neurosurgical ward (G2Neuro on extension 6692). If there is difficulty accessing a doctor during the hours of 8am to 4pm then the children's neurosurgery nurse specialist can be phoned directly on 07794368342
- CT brain scan and shunt series X-rays should be obtained in a timely manner. A shunt series for a VP shunt comprises of an AP and lateral skull and neck X-ray, AP chest X-ray and AP abdominal X-ray so the whole shunt tubing can be followed throughout its course. If the child has a VA or VPleural shunt then abdominal x-ray is not required. It should be remembered that 15% of shunt blockages do not produce a change in the scan appearance (Thompson 2007). Scans should be made available for review by the neurosurgical team at UHS.
- Where there is suspicion of shunt dysfunction and the child remains clinically stable and conscious then urgent transfer to G2N will be arranged as directed by the on-call neurosurgery team.
- Where there is suspicion of shunt dysfunction and there is a clinical deterioration or reduced conscious level then the child may require urgent intubation and ventilation for transfer directly to neurosurgical theatres or to Paediatric Intensive Care (PICU) at UHS. In this situation there should be early discussion with PICU/Southampton Oxford Retrieval Team and/or the neurosurgical team. (See 2.3 below – *Related Documents for referral & transfer forms*). In critical situations it may be necessary to attempt CSF drainage (by means of a shunt 'tap' or direct cannulation of the ventricle) prior to transfer. This should only be attempted after discussion with the on-call paediatric neurosurgical consultant.
- If the CT scan is not diagnostic of shunt dysfunction but the child remains clinically unwell then transfer to G2N Children's Neurosurgical Ward may be appropriate after discussion with on-call neurosurgery team. ICP monitoring may be considered (Appendix B). Also continue to investigate for alternative causes. Contact G2N (Children's Neurosurgery) Ward prior to transfer – on 0238120 6692

### 2.3 Related Documents

<http://www.sort.nhs.uk/Media/Guidelines/Referral-forms/Wessex-PICU-Network-interhospital-transfer-form-May16.pdf>

<http://www.sort.nhs.uk/Media/Guidelines/Checklistforventilatedpatientspriortotransfer.pdf>

<http://www.sort.nhs.uk/Media/Guidelines/Referral-forms/SORT-referral-and-retrieval-form.pdf>

<http://www.uhs.nhs.uk/Media/Controlleddocuments/Patientinformation/Childhealth/Hydrocephalus-patientinformation.pdf>

### **3 Implementation**

This guideline applies to all clinical staff employed or contracted by University Hospital Southampton (UHS) Foundation Trust and medical staff within the regional district general hospitals, who care for children, aged 0-18. Staff have a responsibility to ensure that they are aware of this guideline and its contents. They should clearly document their rationale if they have not complied with the recommendations detailed in this guideline. It is the responsibility of department managers, consultants, team leaders and education leaders to ensure staff are aware of this guideline. This guideline will be available via the PIER website

### **4 Process for Monitoring Effectiveness**

### **5 References**

Hazinski, M.F. (2009) *Nursing Care of the Clinically ill Child*. Mosby Year Book London.

Jennett B, Teasdale G (1974) Assessment of coma and impaired consciousness. *Lancet* **2**: 81 –84

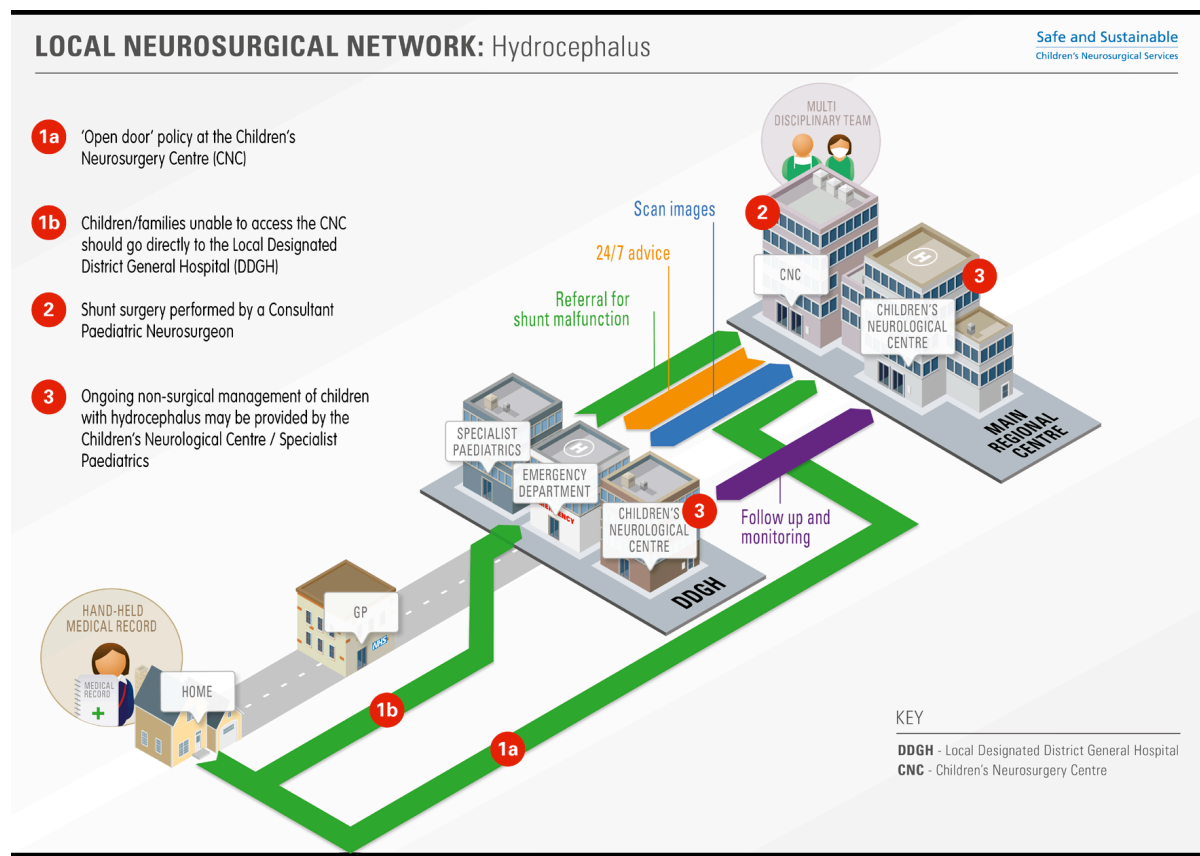
Paterson, R.J., Brown, G.W. Salaai-Scotter, M. Middaugh, D. (1992) Head injury in the conscious child. *Am J Nurs* Vol 92 (8): pg 22–27

Thompson, D. (2007) *Clinical Guideline Shunt Blockage*. Great Ormond Street Hospital for Children NHS Trust.

### **6 Appendices**

## Appendix A

### Safe & Sustainable - CHILDREN'S NEUROSCIENCE NETWORKS (FOR THE NEUROSURGICAL CHILD) - A FRAMEWORK FOR SERVICES IN ENGLAND



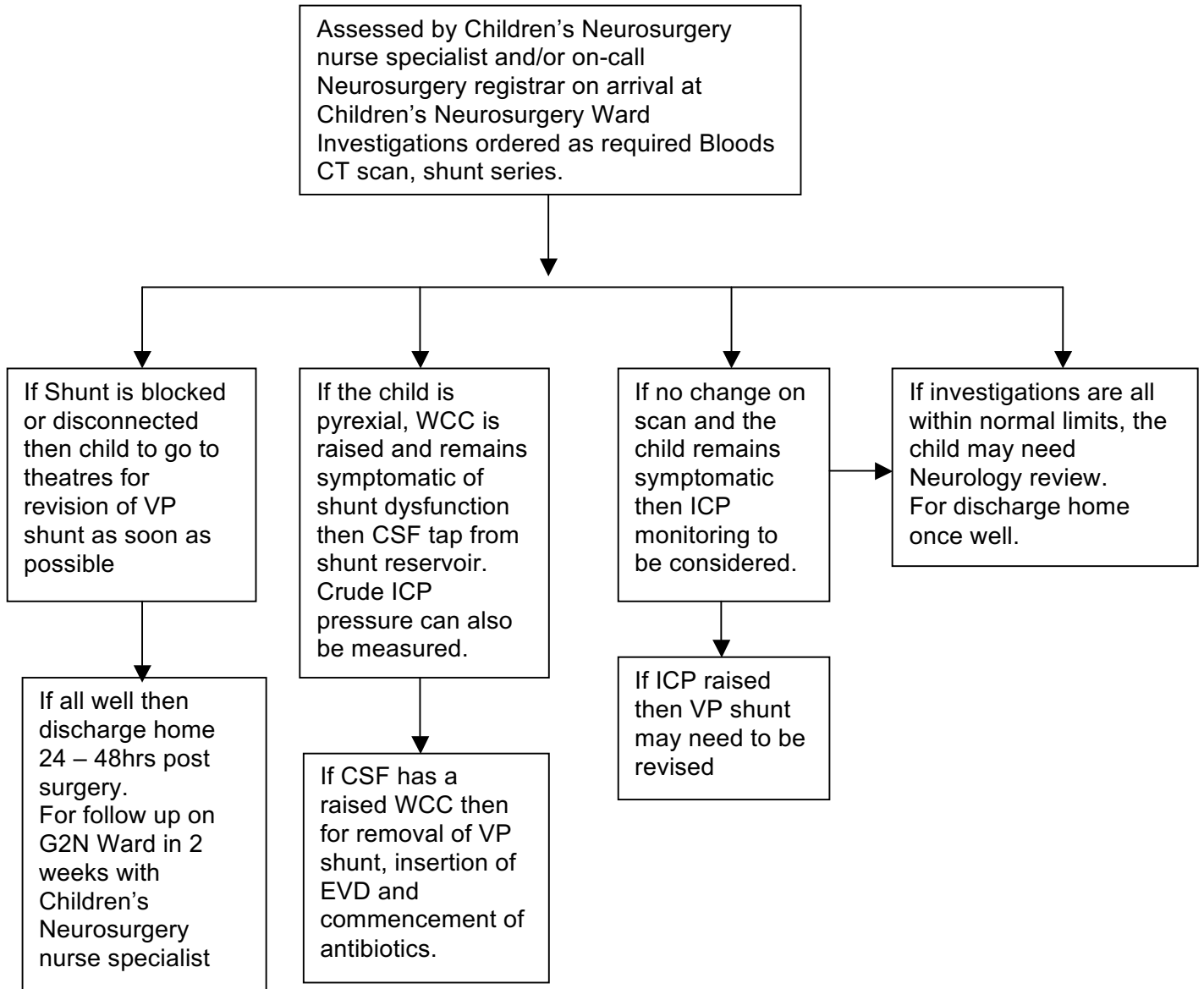
[http://www.webarchive.org.uk/wayback/archive/20130328001627/http://www.specialisedservices.nhs.uk/library/31/Childrens Neuroscience Networks for the Neurosurgical child A Framework for services in England February 2012 1.pdf](http://www.webarchive.org.uk/wayback/archive/20130328001627/http://www.specialisedservices.nhs.uk/library/31/Childrens%20Neuroscience%20Networks%20for%20the%20Neurosurgical%20child%20A%20Framework%20for%20services%20in%20England%20February%202012%201.pdf)

[http://www.webarchive.org.uk/wayback/archive/20130328001629/http://www.specialisedservices.nhs.uk/library/31/Childrens Neuroscience Networks for the Neurosurgical child Specification Standards February 2012 1.pdf](http://www.webarchive.org.uk/wayback/archive/20130328001629/http://www.specialisedservices.nhs.uk/library/31/Childrens%20Neuroscience%20Networks%20for%20the%20Neurosurgical%20child%20Specification%20Standards%20February%202012%201.pdf)



**Appendix B**

**Management of a Child with a suspected Blocked VP Shunt on G2N  
Children's Neurosurgery ward**



## Appendix C

### Documentation of regional consultation:

Trust	Name of person consulted* (print)	Designation	Signature
Chichester	Mike Linney	Consultant Paediatrician	
Dorchester	Penny Mancais	Consultant Paediatrician	
Hampshire Hospitals Foundation Trust	Gabriel Whitlingham	Consultant Paediatrician	
Poole	Delyth Howard & Munir Hussain	Consultant Paediatrician	
Portsmouth	Amanda Freeman	Consultant Paediatrician	
Salisbury	Jim Baird	Consultant Paediatrician	
Southampton	Ryan Waters & Aabir Chakraborty	Consultant Neurosurgeons	
	Kate Pryde	Consultant Paediatrician	
	Katherine Forrest	Consultant Paediatric Neurologist	
IOW	Bettina Harms	Consultant Paediatrician	

\*this person agrees they have read the guidelines, consulted with relevant colleagues and members of MDT, managers and patients, young people & their families as appropriate. Any queries raised during consultation and review process should be documented with responses and any changes made to the guideline.

This Guideline was discussed at the Wessex Paediatric Neurosciences Clinical Network WPNCN Meeting on 27/09/16, where many of the above were present to discuss. After the meeting adjustments were made and a new version of the guideline was sent out to the entire group. All of the above names were included in this group and asked to feedback.