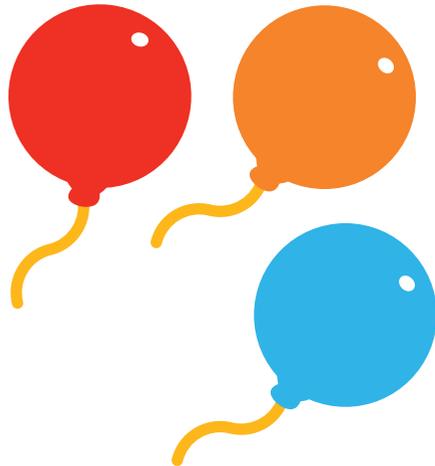


Paediatric Neurosciences

External Ventricular Drains

Information for parents and carers



Leeds children's
hospital

caring about children

On Ward L52, the Paediatric Intensive Care Unit (PICU) and the High Dependency Unit (HDU), we care for children with External Ventricular Drains (EVD). External Ventricular Drains are a common Neurosurgical treatment seen across these units.

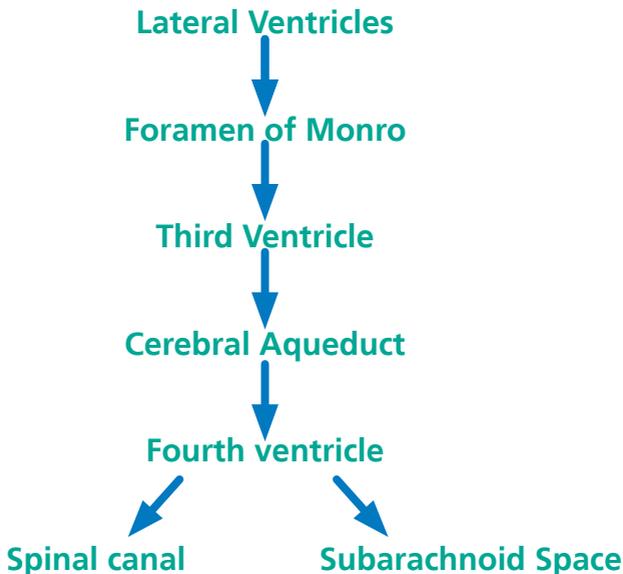
We appreciate the thought of your child having an External Ventricular Drain can be daunting, therefore this leaflet will provide you with information about EVDs and what to expect if your child needs one.

Your child will receive care from the Neurosurgical team whilst in hospital. The Neurosurgical team manage the surgical treatment of the External Ventricular Drain.

The Central Nervous System

To appreciate why your child needs an External Ventricular Drain, it is useful to understand the anatomy of the Central Nervous System. The Central Nervous System refers to the brain and spinal cord.

Within the brain lies the ventricular system; the ventricles are spaces filled with Cerebrospinal Fluid (CSF). CSF has several purposes; to provide protection to the Central Nervous System, supply nutrients to tissue and to remove any waste products. The ventricular system is made up of two lateral ventricles, the third ventricle and the fourth ventricle. CSF is produced in the lateral ventricles and flows throughout the ventricular system through channels called the Foramen of Monro and the Cerebral Aqueduct to the spinal canal and subarachnoid spaces around the brain.



External Ventricular Drain

The Neurosurgeons may decide that your child requires an External Ventricular Drain for one of the following reasons:

- To relieve increased Intracranial Pressure (ICP). ICP refers to the pressure inside the skull
- To divert infected CSF and enable the administration of antibiotics
- To divert blood-stain CSF (following a trauma or surgery)

Your child may have any of the above associated with acute hydrocephalus, a brain tumour, meningitis, an infected shunt or traumatic brain injury. The Neurosurgical team will more than likely order a CT or MRI scan before and after inserting an External Ventricular Drain.

An External Ventricular Drain is inserted to drain CSF from the lateral ventricles via a catheter. It is a closed system made up of the following components:

- A catheter inserted into the ventricles
- A port
- A collection chamber
- A pressure scale
- An external collection bag

Together, these components facilitate collection and monitoring of CSF, provide direct access for sampling CSF and the administration of antibiotics. The Neurosurgeons can also use the External Ventricular Drain to measure the pressure in your child's head at the bedside.

Neurosurgery

Insertion of an EVD is typically performed under general anaesthetic in the operating theatre. Your child will have to be fasted for the surgery to proceed.

As with any surgery, the Neurosurgeons will need you to sign a consent form to agree to the procedure. They will discuss why an External Ventricular Drain is needed and its intended benefits and potential risks.

The surgery for an insertion of an EVD lasts usually for 1 hour, although the duration of any operation can never be guaranteed.

All surgeries have risks. Those associated with External Ventricular Drains include infection, bleeding, fits or epilepsy, brain injury (including weakness, paralysis, and stroke), drain displacement or blocking. These will be explained to you by a Neurosurgeon. There are also risks associated with a General Anaesthetic; these will be explained to you by an Anaesthetist before the surgery.

During this surgery, the Neurosurgeon makes a cut in the skin usually towards the front of the head, just behind the hairline, and to one side of the midline. A hole is made in the skull and the EVD is then inserted into the ventricle (fluid space). The drain is then tunnelled under the skin of the scalp to one side, where it is secured.

Following the insertion of an External Ventricular Drain, your child will receive specialised post-operative care from nurses that are trained in how to look after them.

Post-Operative Care and Management of an External Ventricular Drain

Your child will be monitored very closely following surgery. There is a strict protocol that is followed by staff to ensure that your child receives optimal care for their recovery and to detect any potential deterioration or improvement in their condition.

Neurological Observations

Following Neurosurgery, it is essential for your child's neurological status to be assessed regularly by a Nurse. This enables early detection of any complications. This will include monitoring their conscious level, pupil reaction and motor strength; as well as standard vital sign observations which include heart rate, respiratory rate, blood pressure, temperature and oxygen saturations. This allows Nursing staff to monitor for signs of under/over drainage of CSF and that the drain is working as desired. Many children will want to sleep after surgery; however, your child will need to be woken frequently for the first 12 hours of the post-operative period. This can be frustrating for your child, but it is the best way for Nursing staff to assess their conscious level and how well the drain is working.

Whilst doing these observations, the Nursing staff will pay close attention to the colour of your child's CSF as well as the rate of fluid drainage. CSF is usually clear and colourless. If the CSF is a pink/red colour it may indicate there is a bleed somewhere. If the CSF is cloudy it may mean that there is an infection.

Drain Management

The EVD will be fastened to an IV pole at the bedside. The position of the drain is important and needs to be level with the tragus of the ear if your child is laid flat or the midpoint between the eyebrows if laid on their side. This is to allow the rate of CSF drainage to be carefully controlled to prevent over or under drainage. Nursing staff can use a small laser pointer to ensure the EVD is levelled correctly. The drip chamber will also need to be set at a prescribed height along the pressure scale as per Neurosurgical instruction. Any changes to the prescribed height will be made by a Neurosurgeon. This ensures that the desired level of drainage is achieved

Along the drain are clamps that are utilised to stop the flow of CSF if necessary. The clamping of the EVD must only be done by the Nurses or medical staff; parents and children must not change the settings or clamp/unclamp the drain. The drain will be clamped on some occasions; for example if your child is vomiting, crying, mobilising or transferring to another department as this can cause over-drainage of CSF. The Nursing staff and Neurosurgical teams will manage the EVD and will explain the care to you.

Antibiotics and Sampling

Should there be an infection in the CSF; samples may be taken from a port along the drain on a regular basis. Your child will be prescribed antibiotics and will be administered either via an Intrathecal route (directly into the CSF via a port) or Intravenously. Sometimes they will be given antibiotics via both routes. Intrathecal antibiotic therapy and CSF sampling is usually done by a Neurosurgeon.

If your child needs intravenous antibiotics for a few days, the Neurosurgeons may arrange for a central line to be inserted rather than a cannula.

Fluid Balance

Whilst your child has an External Ventricular Drain, the nurses will be monitoring how much CSF is drained per hour. This allows nurses to assess the amount of CSF lost. CSF contains an electrolyte called sodium and therefore a decision may be made to replace these losses with an intravenous infusion of 0.9% Saline to maintain the correct levels in the body. In older children, sodium levels can sometimes be maintained through their diet. To monitor these levels, a doctor will need to take blood samples.

Wound Care

The EVD is sutured in place and usually a clear dressing is placed on top to ensure it remains secure. This suture is removed when the drain is removed. The EVD site will be checked regularly by a Nurse to make sure there are no leaks.

Removal of External Ventricular Drain

An EVD is sometimes needed for only a few days but can also be required for several weeks, depending on the reason for its insertion. Your neurosurgeon will be able to update you on your child's progress and when the EVD might be removed. Usually the EVD will be "raised" to reduce drainage, and then clamped for 24-48 hours to ensure it is safe to be removed before it is actually taken out.

How you can help care for your child

Throughout your child's stay in hospital, Nursing staff will try to maintain their normal daily routine, including washing, dressing and play. Whilst your child has an External Ventricular Drain they may be limited to some activities. However, there are play specialists who will work with you and your child.



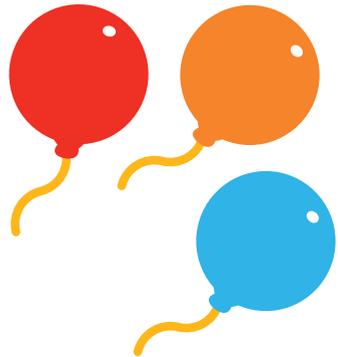
Contact details

Ward L52 0113 392 7452

References

Leeds Health Pathways. (2020). External Ventricular Drains - Best Clinical Practice [LHP Guideline 913].

<http://www.lhp.leedsth.nhs.uk/detail.aspx?id=913#12>





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