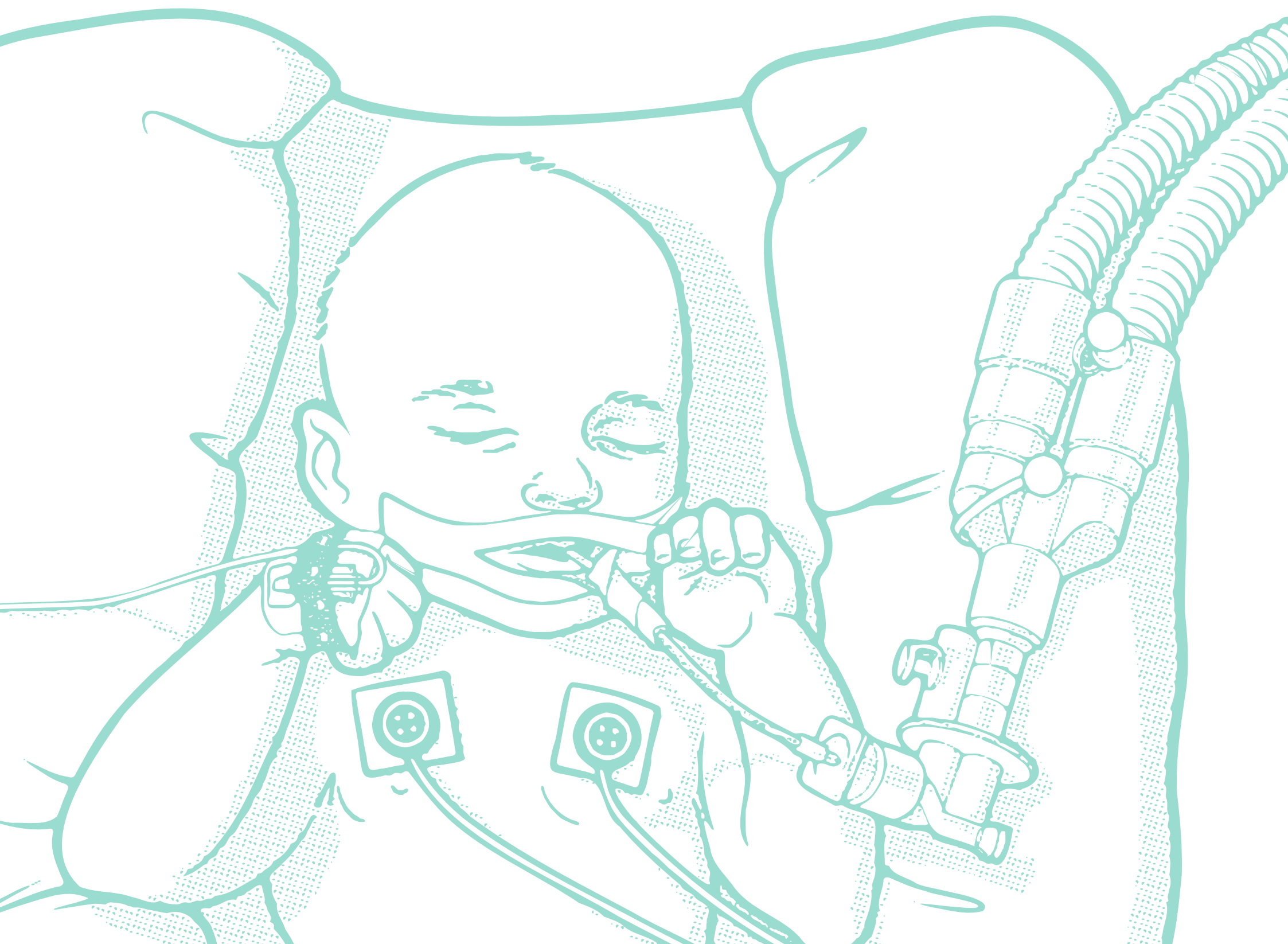


Medical Illustration work produced for the Royal Jubilee Maternity Service Neonatal Unit in 2025/26

Belfast Trust

- Document depicting exercises for parents/carers to carry out with babies suffering from **Brachial Plexus Birth Injury**
- Illustrations depicting the 3 types of **ventilation tubing** used in the Neonatal Unit, for assistance with parental communication, documentation and guidance on baby positioning
- Illustrated guide for pre-term babies suffering from **Intraventricular Haemorrhages**

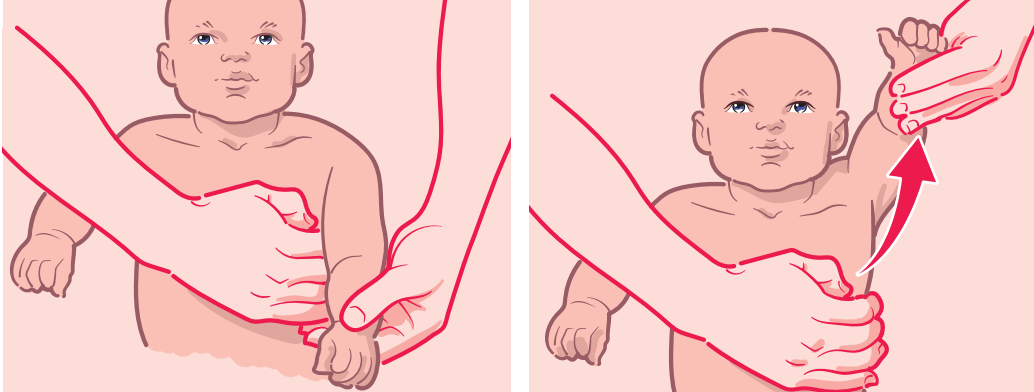
All art and design by Joseph P Kelly



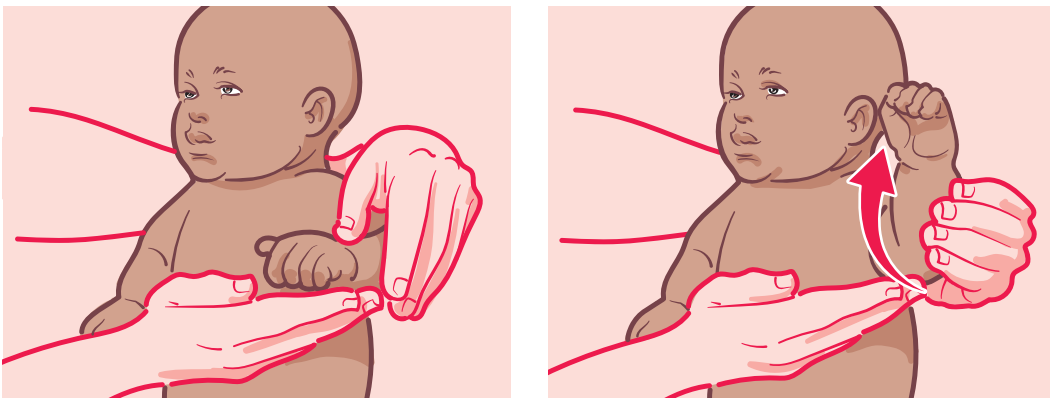
Range of Motion Exercises for Infants with Brachial Plexus Birth Injury

To help your baby, you should carry out these range of motion exercises regularly throughout the day. It can be helpful to link the exercises to daily activities such as nappy changes. The exercises should be completed softly and gently when your baby is calm.

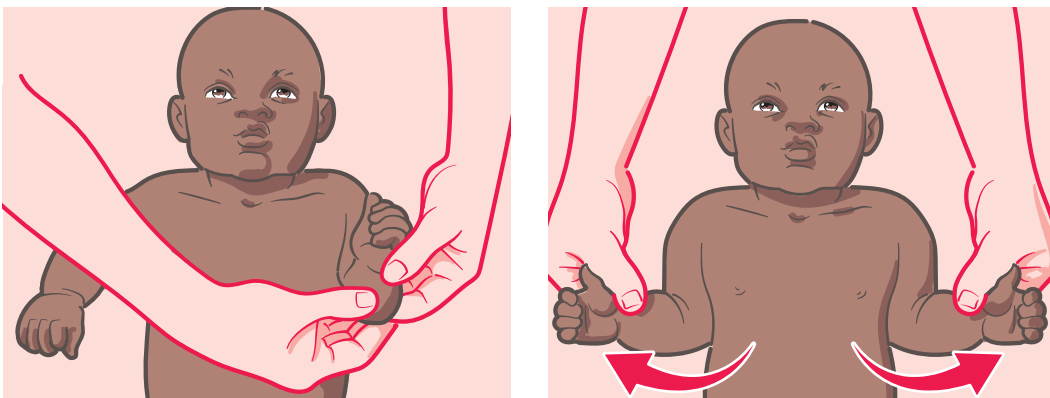
Shoulder Exercises



A. Gently grasp your baby's forearm and hold their shoulder blade down firmly with the palm of your hand. Then raise their arm slowly up over their head keeping the arm close to the ear and hold.

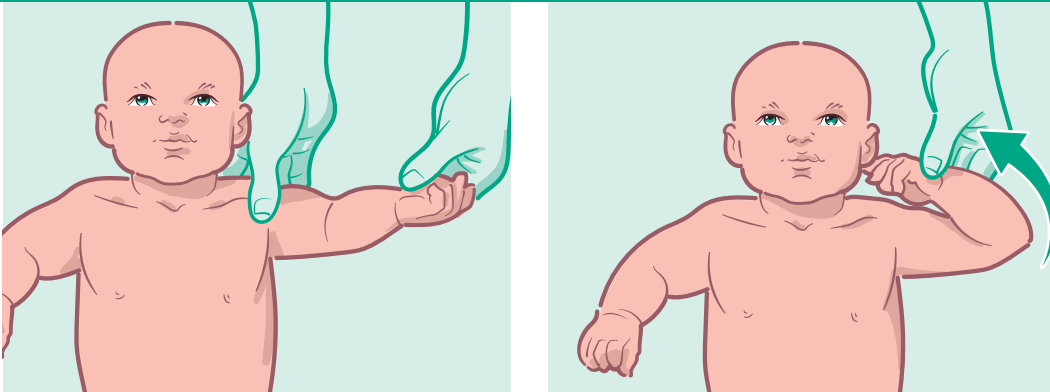


B. This exercise resembles a 'high five'. Raise your baby's shoulder out half way and bend the elbow to 90°. Maintaining this position, rotate the baby's arm back so that the hand is in the 'high five' position.

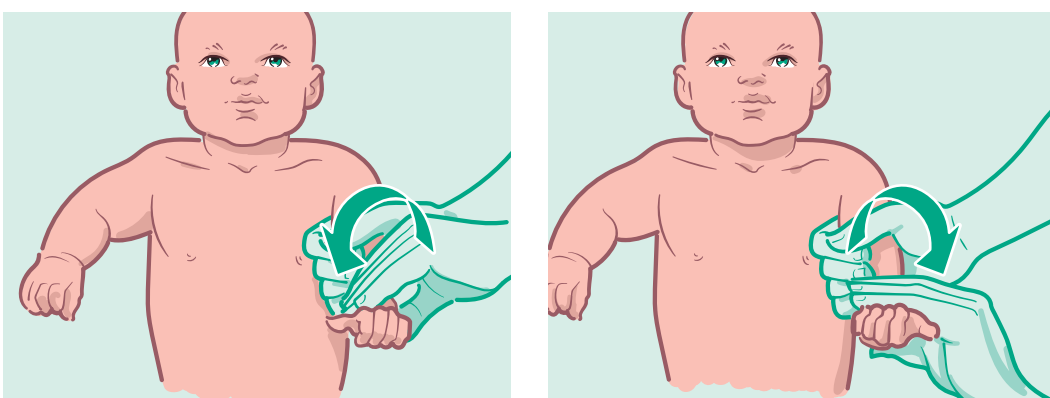


C. Bend both your baby's elbows to 90° and keep elbows tucked into the side of your baby's body. Turn the forearms out to the side and down towards the surface and hold. **This is probably the most important exercise.**

Elbow Exercises

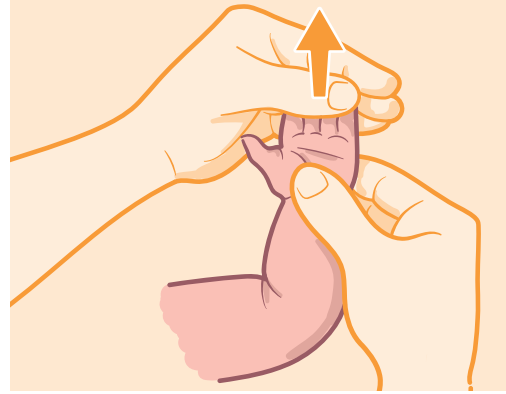


A. Keep your baby's palm turned up, hold above and below the elbow, gently but firmly straighten your baby's elbow and hold. Then bend your baby's elbow and hold.

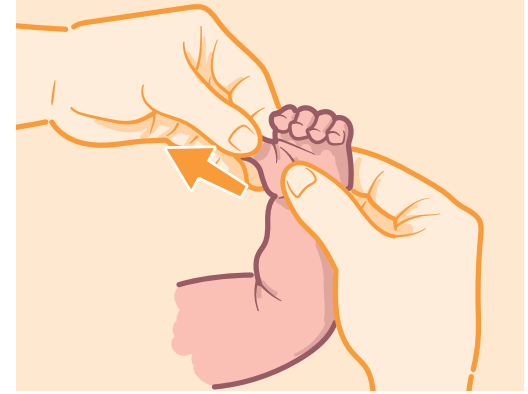


B. Keep your baby's elbow bent at 90° with their upper arm against the body. Start with your baby's palm turned down, then turn your baby's forearm up until the palm is facing upwards and hold. Then, turn your baby's forearm until the palm is facing down and hold.

Wrist and Finger Exercises



A. Gently grasp your baby's forearm and hold their shoulder blade down firmly with the palm of your hand. Then raise their arm slowly up over their head keeping the arm close to the ear and hold.

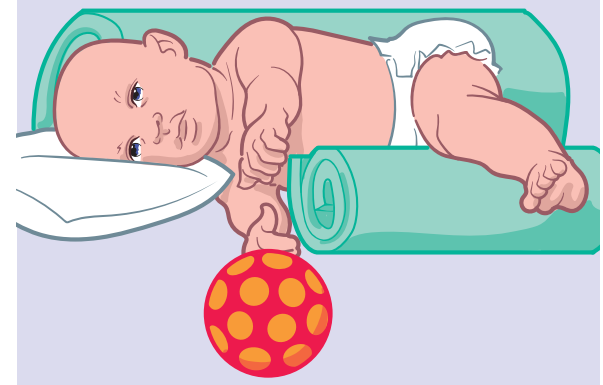


B. Use the same wrist position as above and straighten their thumb and hold.

Activity Exercises

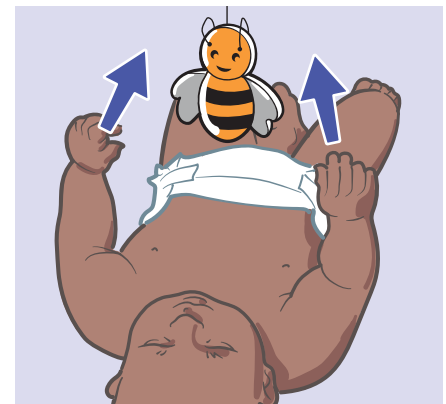
Side Lying

Place your baby on their side with their affected arm highest. Place a large rolled up towel snugly at the child's back and another at their front. Put toys in front of them to encourage activity of the uppermost affected arm. This position makes reaching easier because your baby does not have to lift their arm against gravity.



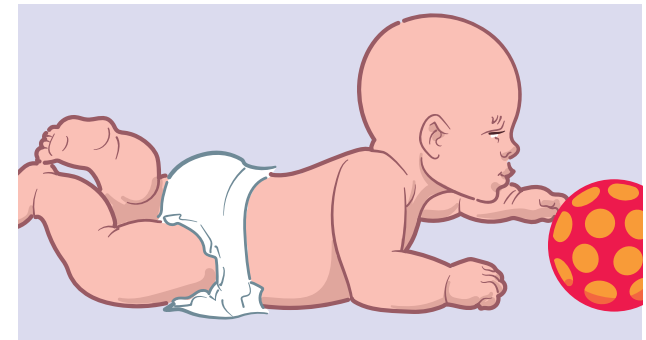
Lying on their back

Place your baby on the floor and then suspend or hold a toy above them. Encourage them to reach upwards particularly with the affected arm. Your baby must be able to reach the toy and you may need to gently hold back the unaffected arm at times. This encourages reaching skills.



Lying on their tummy

Place your baby on the floor on their tummy with their arms forward. Encourage them to lean on the affected arm and reach for a toy with the opposite arm. Then reverse the exercise so they are reaching for the toy with their affected arm. This allows practise of both supporting and reaching with the affected arm. If your baby's arm is very floppy a small towel/roll may be used under their chest to help support their weight.



Sitting

When sitting for short periods in an inclined position, e.g. a car seat, if your baby's arm falls backwards you will need to support the arm with a small blanket or towel. In sitting place your hands on your baby's arm or elbows and assist them in a two handed activity such as reaching for a toy or clapping. This encourages co-ordination between the unaffected and the affected arms.

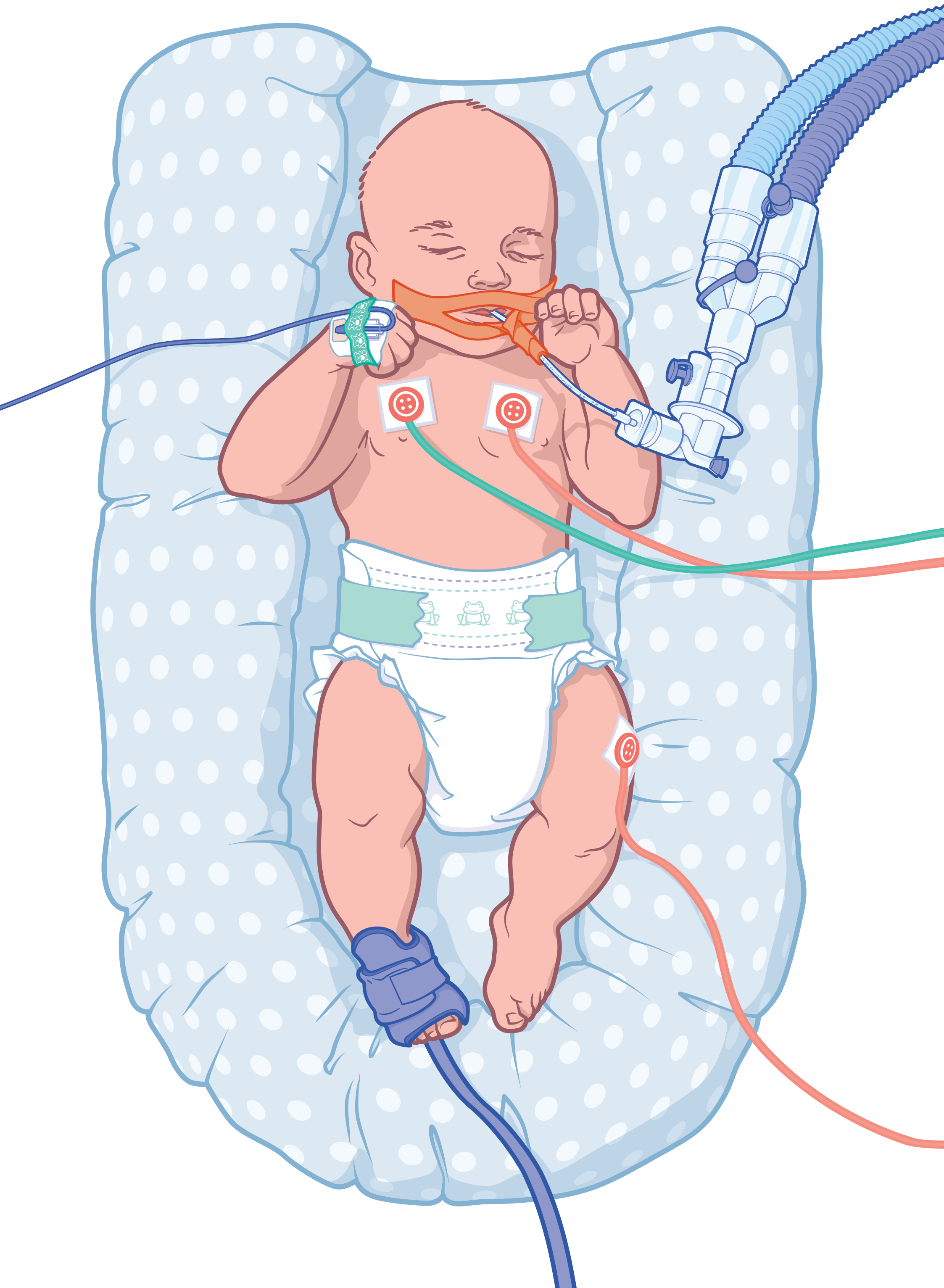


As sitting improves and your baby starts to sit without support, it is important to encourage them to support themselves using their arms as much as possible. It is likely that they will find this difficult and you may need to help them do this.

Activities

In the above positions you can encourage your baby to:

- explore and grasp textured baby toys;
- explore their own hair, face, body, legs and feet - assisting their arm movements if they are unable to do it themselves;
- reach out to 'bat' toy - helping your baby reach out as necessary;
- put two hands together - this can be on the breast or on the bottle when feeding;
- hold small rattles and toys - initially you will need to place these in your baby's hands.







Intraventricular Haemorrhages

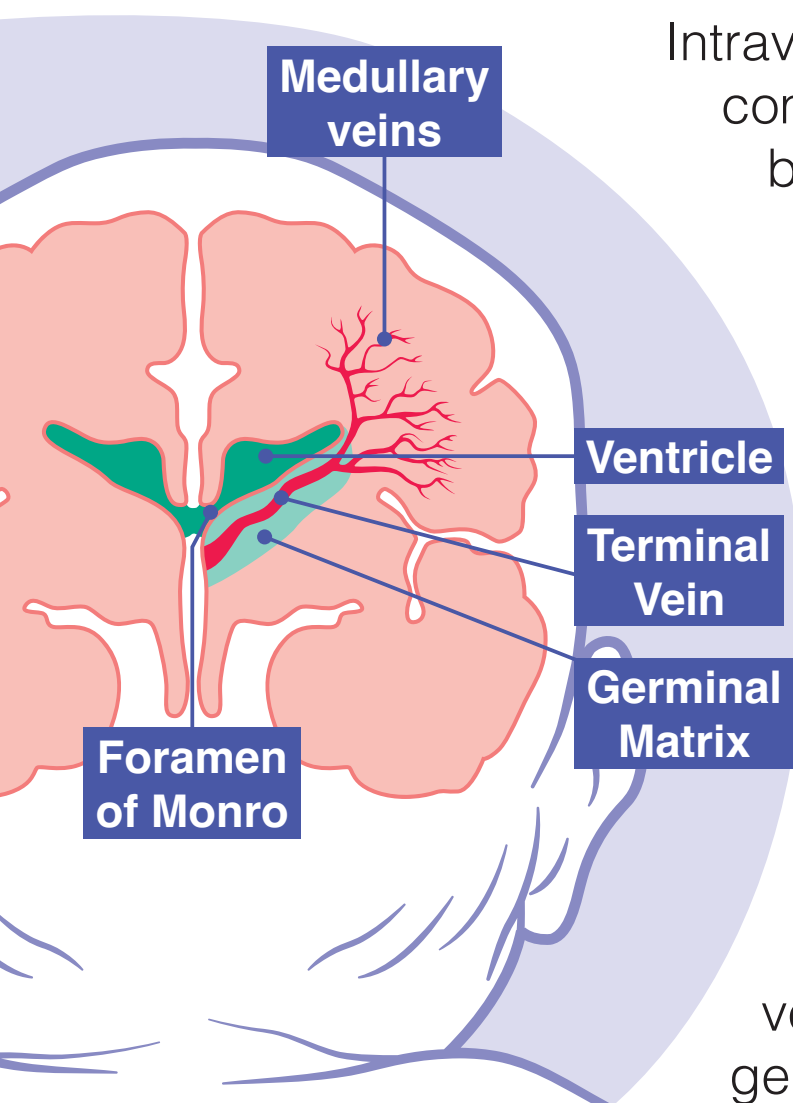
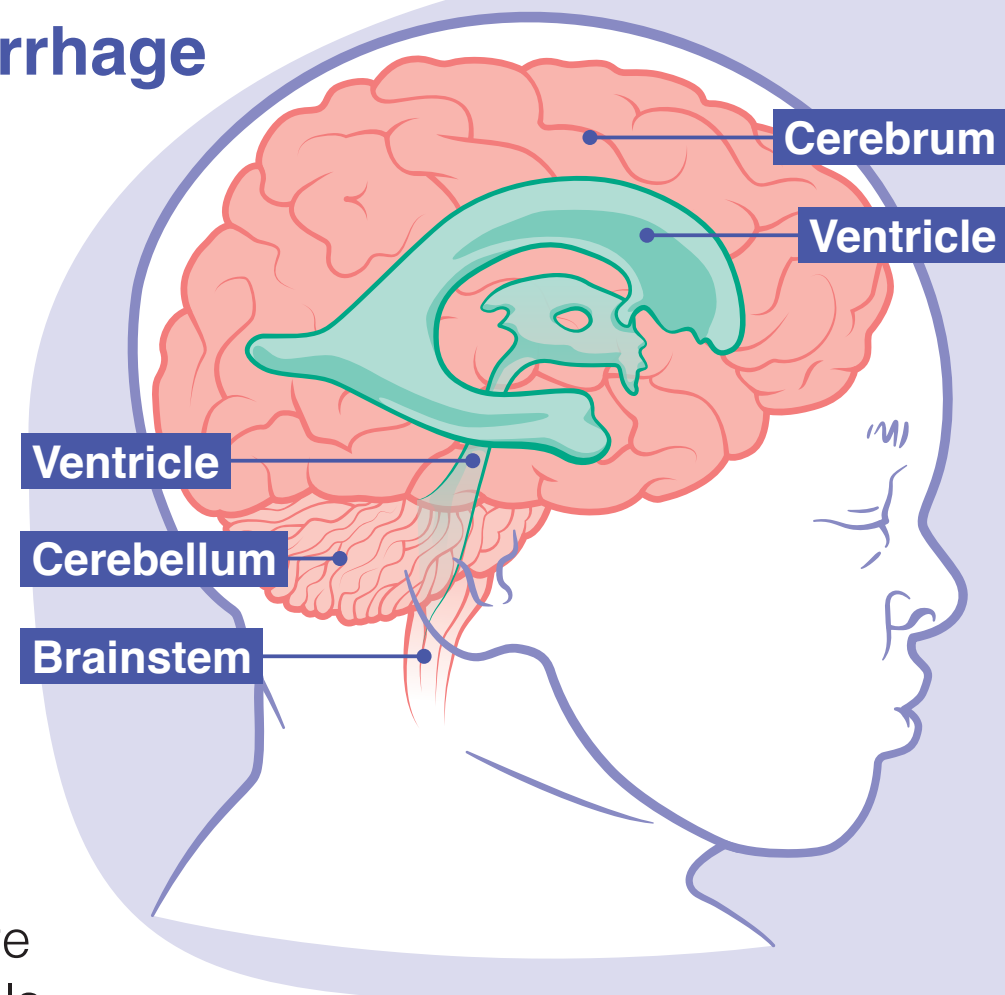
an illustrated guide

What is an Intraventricular Haemorrhage (IVH)?

Intraventricular haemorrhage describes bleeding inside the fluid filled **ventricles** in the baby's brain. These ventricles contain fluid that travels down to the baby's spinal cord through multiple channels, otherwise known as **foramens**.

The ventricles have very fragile lining which neighbours the **germinal matrix**.

The germinal matrix is where new brain cells are made, before they travel to other areas of the brain. It is also where new blood vessels are made. During development, these blood vessels are very immature and fragile.



Intraventricular haemorrhage is one of the commonest complications of prematurity, with up to a quarter of babies born under 30 weeks developing an IVH.

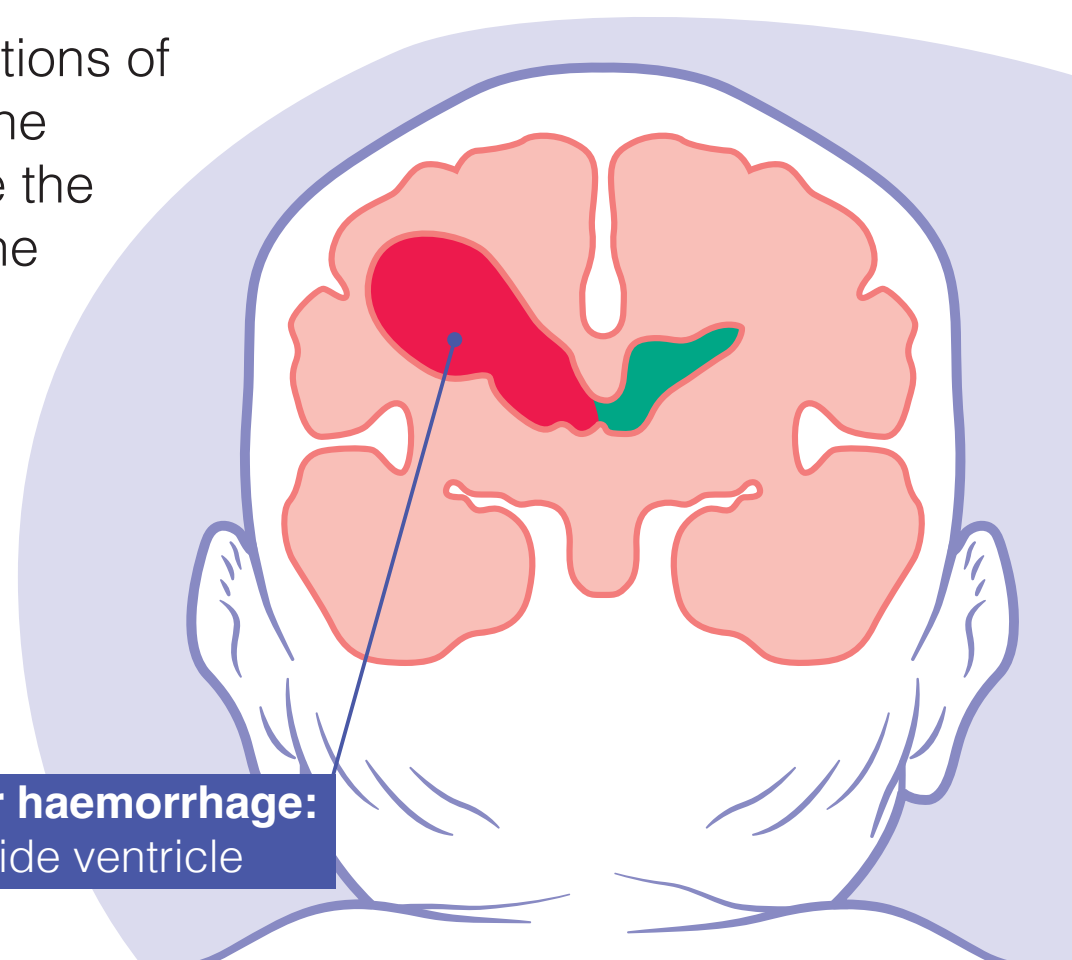
When a baby is born too early, unexpected changes happen to the baby.

Some of these changes, such as becoming cold after birth or receiving intravenous fluids too quickly can alter the blood flow to the baby's brain.

Preterm babies' bodies are not good at being able to regulate blood flow to their brain.

Large fluctuations of blood flow to the brain can cause the vessels around the germinal matrix to burst and bleed.

Because the germinal matrix is only separated from the ventricles by a thin membrane, bleeding can quickly spread from the germinal matrix to the brain ventricles.



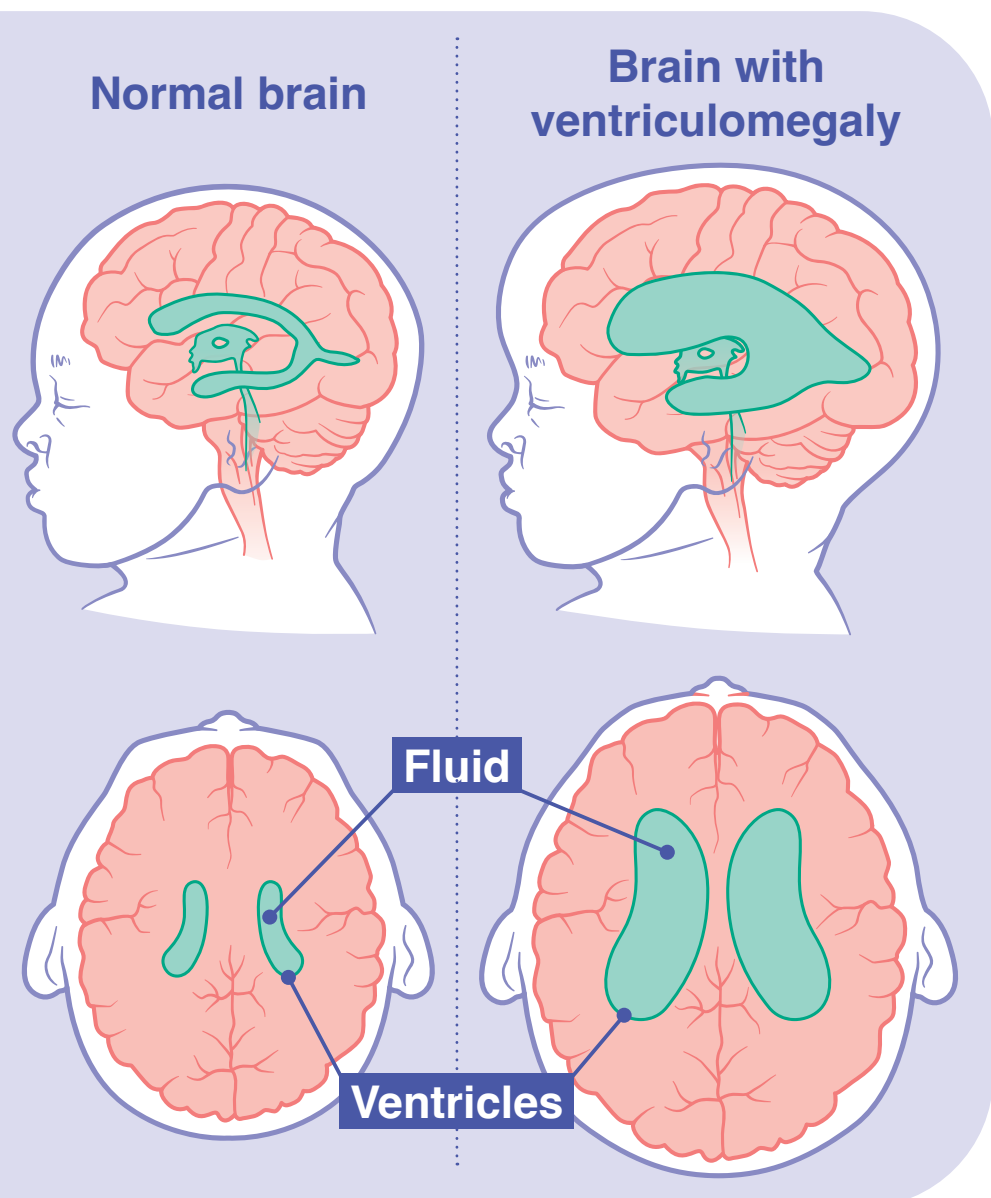
Intraventricular haemorrhage:
bleeding inside ventricle

Why does it matter?

Babies who had bleeding in their brains might not do as well in life, but this also depends on how early they were born and what other illnesses they might have suffered.

Babies who had small bleeds might need extra help in school when they become older.

Babies who had larger bleeds are prone to fluid accumulation in their brain, a condition called hydrocephalus.



This is when the ventricles enlarge as the flow of the cerebrospinal fluid (CSF) is obstructed, as the foramens get blocked by blood clots and debris.

If this happens, regular head ultrasound scans are performed as more treatment might be needed.

Babies who have an IVH might also develop bleeding in their brain tissue. About half of babies with bleeding inside their brain tissue have problems with movement when older. They are also more likely to have intellectual impairment and behavioural problems.

Some babies who have an IVH or bleeding in their brain tissue pass away.

What can be done to prevent IVHs?

Before a baby is born, transfer to a hospital with a large neonatal unit and giving mum steroid medication reduces a chance of a bleed happening after birth.

Once the baby is born, gentle care is essential.

Implementing a neuroprotection bundle, which concentrates on aspects of care aiming to reduce fluctuations of blood flow to the brain, has reduced the number of babies suffering from large IVHs in some hospitals.

Which babies receive the neuroprotection bundle?

All premature babies born under 30 weeks receive care as per the neuroprotection bundle, as these are the babies most likely to develop an IVH.

The neuroprotection bundle is implemented for the first week of life, as this is when an IVH is most likely to develop. Extra care is to be taken for the first 72 hours of life, as this is when the risk is particularly high.