

General anaesthetics for heart operations

- information for families on what will happen, potential side effects, and the risks involved

This information sheet explains what to expect when your child comes for their heart operation at Great Ormond Street Hospital (GOSH), and how the anaesthetic team will be looking after your child before, during and at the end of the operation. It also explains the side effects and risks of which you need to be aware.

A **general anaesthetic** involves giving medicines so that your child will be unconscious and free of pain during the operation.

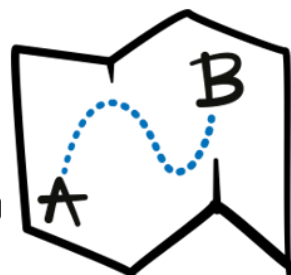
Anaesthetists are specialist doctors who give the anaesthetic medicines and look after your child during the operation. They stay with your child for the whole operation. As well as making sure children remain asleep and pain-free throughout the operation, the anaesthetist also has a number of things to do to make sure the operation is as safe as possible, such as monitoring the heart, blood pressure and breathing, and giving medicines. These will be explained in this leaflet.

Usually, at the end of the operation the anaesthetic team will transfer your child to the intensive care unit for further care while they recover from the operation. They will be kept sedated and pain-free during this transfer. Very occasionally it may be appropriate to wake your child up at the end of the procedure before transferring them to the intensive care unit or to the high dependency care unit.

Before the operation

An anaesthetist will visit you before the procedure to discuss your child's anaesthetic. This will happen even if you have already been seen in the Anaesthetic Pre-Operative Assessment clinic

(APOA). This is to assess general health, and to explain what is going to happen with the anaesthetic. They will also ask about previous experiences of anaesthesia. This is a good time to talk about any particular worries you or your child may have about the anaesthetic. You may find it



helpful to make a list of questions in advance that you want to ask.

If your child or other members of your family have had any previous difficulties with an anaesthetic, it is really important to tell the anaesthetist, and to bring any information about this that your family has.

The anaesthetist will also talk to you about the risks associated with the anaesthetic. Anaesthesia is very safe these days but problems, including very serious ones, can occur and it is important that you are aware of these. There is a section on these later in this leaflet.

Some heart operations are very likely to require a transfusion of blood or blood products and the anaesthetist needs to know if there are any objections to this.

On the day of your child's procedure

We will give you clear instructions about when to stop your child from eating and drinking. It is important for you and your child to follow these instructions. If there is food or liquid in your child's stomach during the anaesthetic, it could come up into the back of their throat and go down into their lungs.

Your child should take their usual medicines on the day of surgery, unless you have had instructions not to do this.

When you arrive at the hospital, your child will be weighed and measured. A nurse will check their temperature, pulse and breathing rate, and measure their oxygen levels and blood pressure.

It is standard practice to do a pregnancy test for any girl aged 12 years old or more by collecting a urine sample. Please ask your daughter (if she is

12 or older) not to have a wee on arrival at the hospital without talking to the nursing staff first. Please see the Royal College of Paediatrics and Child Health website if you want more information: <https://www.rcpch.ac.uk/resources/pre-procedure-pregnancy-checking-under-16s-guidance-clinicians>

Premedication ('pre-med')

These are medicines that are given before an anaesthetic. These can include pain-relief medicines or extra treatment for conditions such as asthma (please bring inhalers if your child has them).

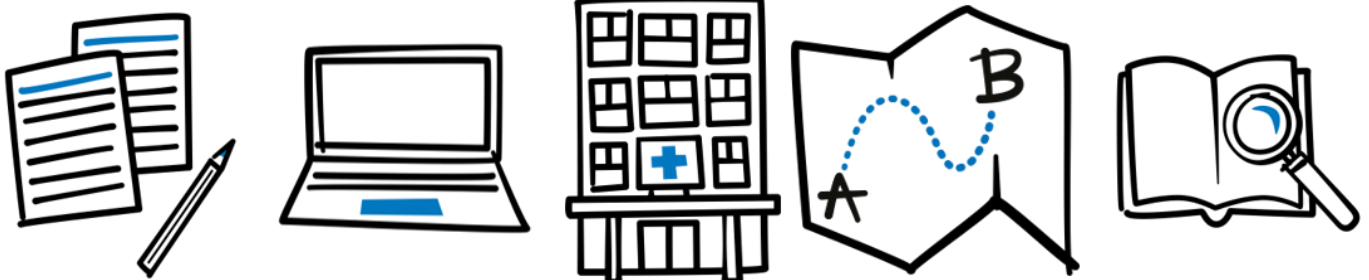
The anaesthetist may also discuss giving sedative medicine to help your child relax. These are not always given but can be helpful if a child is particularly anxious. Please ask APOA or your anaesthetist if you think this would help your child, or if any of the following apply:

- if either you or your child is very anxious about their procedure, or if they have been very upset about an anaesthetic in the past
- if your child has ever refused or spat out a sedative pre-med
- or if your child has had restraint for a procedure in the past.

Knowing about this in advance will help us to plan together to make your child's experience as good as possible.

Local anaesthetic cream

Many children will have 'magic cream' put on the back of their hands and covered with a clear dressing. This is a local anaesthetic cream (usually either 'Ametop' or 'EMLA') which numbs the skin to minimise any pain when a cannula is placed in your child's hand or arm (a cannula is a thin plastic tube that allows us to give medicines into a vein). The cream works well in nine out of



ten children. If the cream cannot be used, a cold spray can sometimes be used instead.

Going to the operating theatre

We will give you a gown for your child to wear when going to the operating theatre. If they will be upset about wearing a gown, they may be able to wear their own clothes or pyjamas. They can wear a nappy or pull-ups as needed. Your nurse will advise you what underwear can be worn.

Your child's anaesthetic

A nurse from the ward will accompany you and your child to the anaesthetic room. Your child will be able to take a toy or comforter. Mobile phones or tablets can be particularly useful to distract children with games or favourite films.

If you would like to, you are welcome to stay with your child to support them while they are given the anaesthetic. If you are feeling very anxious yourself, you do not have to do this. Another adult family member, a ward nurse, or a play therapist could go along instead.

The anaesthetic may be started while your child is lying on a trolley. Smaller children may be anaesthetised sitting on your lap. Staff would then help you to lift them onto the trolley.

The anaesthetist will either use gas from a facemask or tubing, or inject a medicine through a cannula to start the anaesthetic. This will have been discussed with you beforehand, although sometimes the plan may need to change if your child is not able to cooperate.

Most older children have an injection through a cannula in their hand or arm. If a cannula is used, your child will normally become unconscious and floppy very quickly. Sometimes the injection can feel cold or prickly in the arm. The anaesthetist will then use a mask to continue the anaesthetic and provide extra oxygen for safety.

If the anaesthetic is started with gas, the anaesthetist generally uses a mask to give the gas, or they may pass the gas through a cupped hand placed gently near your child's nose and mouth. Anaesthetic gases smell a bit like felt-tip pens.

It usually takes a little while (anything from few seconds to a couple of minutes) for the anaesthetic to take effect. It is quite normal for children to become restless during this time or for their breathing to sound different. They may even snore loudly. Staff will help you hold your child gently but firmly.

It is normal to feel upset at seeing your child be anaesthetised. The nurse who has come with you from the ward is there to support you. As soon as your child is asleep, they will take you back to the ward to allow the anaesthetic team to care for your child.

What happens next?

When your child is asleep, the anaesthetist has a few things which they need to do so that the operation is as safe as it can be.

A cannula is put in, if one has not been put in previously and a 'breathing tube' is inserted in their airway so that the anaesthetist can take over the breathing for the operation. In small children this tube usually goes into one of the nostrils while in older children it usually goes into the mouth.

At least two more cannulas are needed for heart operations. One of these goes into an artery (a blood vessel where you may have noticed a pulse) and this is called an **arterial line**. This provides continuous accurate blood pressure measurement which is essential during heart operations. This usually goes in the wrist or at the top of the leg.



The other cannula goes into a large vein, usually in the side of the neck or the top of the leg. This cannula, which is called a **central line**, will usually have several narrow tubes coming from it. This is for giving special heart medicines that cannot be given into small veins safely.

These lines are routine and necessary for heart operations, but they can have some complications such as bleeding or infection. They can also very occasionally cause serious complications from blockage of the blood vessels they are put in. These risks are explained in more detail in the accompanying leaflet '**Central lines and arterial lines**'. We usually use an ultrasound machine when inserting them to help us minimise the complications.

In some operations, a narrow nasogastric tube may be put into the stomach through the nostril. This helps to keep the stomach empty. Finally, a tube will be inserted into the bladder (urinary catheter) so that the function of the kidneys can be monitored.

Once these are all done, the operation can start.

Echocardiography in theatre

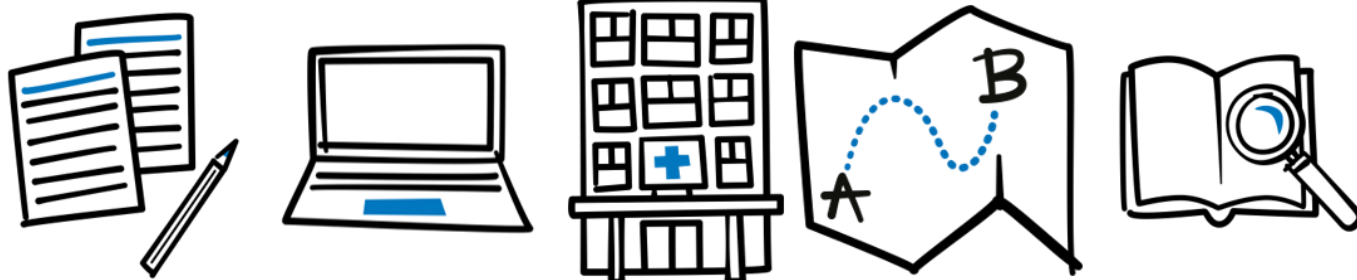
Some operations on the heart benefit from using an echocardiogram machine during the surgery. This is similar to an 'echo' done in clinic, but rather than a probe on the chest we use a smaller probe which goes through the mouth into the oesophagus (food pipe). This is called 'TOE' (transoesophageal echo) and helps the anaesthetic and surgical team see what is happening to the heart during the operation. If it is used, it is inserted after the patient is asleep. It carries a very small risk of damage to the oesophagus, tongue and teeth. A sore throat afterwards is the most common side-effect, and there may be some bruising or swelling of the lip.

After the operation

After heart operations, children are cared for on the cardiac intensive care unit (CICU) which you may have visited beforehand. The anaesthetic and surgical team will move your child up to the CICU. You may see your child being taken in but do not be alarmed if you are not allowed to see him or her straight away as the transfer equipment is running on batteries and it is important to get quickly and safely to CICU. You will be spoken with and allowed in as soon as the operating theatre team have handed over all the details to the CICU doctors and nurses. This can sometimes take half an hour or more.

Usually, children stay asleep for some time after a heart operation to allow the heart and lungs to recover from the surgery. This can be for a few hours or for several days, depending on the type of operation. Some children need to be kept deeply asleep, like an anaesthetic, but this will be explained at the time. Usually, children are just a bit sleepy and have a pain killer (morphine) given continuously into one of the intravenous lines. The lines and tubes which were explained earlier will still be in place and attached to a monitor that looks like a TV screen, showing all the important measurements as numbers and wavy lines. The breathing will be helped by a machine called a ventilator.

For some operations it may be appropriate to wake children up very early. The breathing tube will be removed very soon after the operation, either in the operating theatre or early on in the CICU. Your child will breathe for themselves but they might still be quite sleepy as a result of a long operation. For pain relief the anaesthetic team will have started morphine either as a continuous drip, or with a button that older children can press to administer their own pain relief. Other medicines may have been given for sickness and pain too.



Risks and side effects of an anaesthetic

Modern anaesthesia is generally very safe. Some side effects are common, and although serious problems are rare, it is important to be aware that they can occur.

Very serious risks

The most serious problems associated with anaesthesia, such as death, or brain damage leading to long-term disability, are usually very rare. Indeed, the risk of death due to a general anaesthetic for a child who is otherwise healthy is thought to be somewhere between 1 in 100,000 and 1 in a million. This is similar to the lifetime risk of being killed by lightning.

However, in babies and in children with significant heart disease the risks from the general anaesthetic may be substantially higher. This is particularly the case for children whose heart is already struggling and not pumping as well as it should be, or if there are problems getting enough blood to the lungs to pick up oxygen, for example. In some very severe cases of heart disease the risk of dying during or after the operation may be as high as 1 in 50.

It is not possible to determine this risk accurately for every child having cardiac surgery as there are so many factors involved, but when it is felt that the risks from the anaesthesia are higher than normal, the anaesthetist will want to be sure you are aware of this.

It is important to be aware that deaths, or brain damage, that do occur around the time of heart surgery are not usually directly caused by the anaesthetic but by other problems connected with the child's cardiac condition or the operation they are having. This is particularly the case in children having complex heart surgery, and the surgeons

will discuss the benefits and risks of the surgery with you.

Serious risks

Other serious problems are also rare. These include severe allergic or other reactions to a medicine, or injury to nerves. Nerve injury from an operation or procedure can cause numbness and/or weakness (this usually gets better over days or weeks but can be long-term), visual loss, or, very rarely, hearing loss.

Other potentially serious problems are seen more frequently but are still uncommon. These include dislodgement or damage to teeth, or a breathing complication needing treatment either during or after an anaesthetic.

As explained earlier, children having cardiac surgery will need to have an arterial line and a central venous line inserted which also have uncommon but potentially serious complications. It is also common to use a transoesophageal echo probe (TOE), which carries the risk of damage to the oesophagus, although this is rare.

Common side effects

It is very common to have some more minor side effects after an anaesthetic. Feeling hungry or thirsty, having a headache or nausea (feeling sick, sometimes with vomiting), and a sore throat are the most common. These are generally mild and can usually be treated effectively. Minor grazes to the lips are also common.

Other side effects include tiredness, dizziness, and confusion on waking. Younger children particularly can be very upset or even angry immediately after an anaesthetic.

These side effects generally just need time to wear off and are not usually seen after cardiac surgery as most children remain sedated on the



intensive care unit after surgery. They may however be experienced if children are woken up early after their operation.

Awareness during an operation

People often worry about the risk of awareness (being awake) during an operation. This can happen in children but it is uncommon. When it does happen, it is usually an awareness of sounds or of touch that is not painful. It is rare for children to be upset by an episode of awareness, or to have subsequent ongoing distress. A large national study has shown that it is very rare for a child to report a painful, distressing experience under anaesthesia.

As children are usually taken to the CICU after their heart operation with the breathing tube still in place they will often be aware of this and other aspects of care that are being carried out by the ICU nurses while they are still sedated.

Anxiety and behaviour change

It is very common for children to be apprehensive or anxious about having an anaesthetic. Explanation and reassurance can help with this.

Some children's behaviour may change for a period after coming to hospital for a procedure – they may have separation anxiety, temper tantrums, eating disturbances, or sleep disturbances (this could include bed wetting or nightmares). These will generally settle in a few weeks, although for some children this can take longer.

Children who have multiple procedures and experience significant anxiety are more likely to experience disturbances in emotions and behaviour for longer.

If you want to discuss this or anything else in more detail, please ask us at your appointment with the

Anaesthetic Pre-Operative Assessment clinic (APOA). We can also discuss any other worries or concerns you may have.

Additional information

There is ongoing research into possible long-term effects of anaesthesia in babies and very young children. At present there is no strong evidence that anaesthetics are harmful to development.

Anaesthetists are highly trained to avoid, anticipate and treat any problems that may arise. Risks cannot be removed completely but modern equipment, training and medicines continue to make anaesthesia safer. An anaesthetist will be with your child throughout their anaesthetic to monitor their progress and to help them to wake up as comfortable as possible.

Risks should always be balanced against the overall importance of having a procedure or surgery.



Understanding risk

Risks are a normal part of life. Decisions we make every day involve balancing risk and benefit. For example: Should I cross the road here (quicker but more risky)? Or should I walk to the zebra crossing (safer but slower)?

Your decision will depend on many things. How busy is the road? Are you alone, or do you have your children with you? Are you in a hurry? As well as how you feel about taking risks generally.

Having a procedure or operation under general anaesthetic is no different. It will involve hoped-for benefits but will also involve some side effects and risks. You have to balance the potential benefits against the risks in order to come to your own decision. This leaflet is designed to help you with this by giving you information about anaesthesia.

Describing risks

People vary in how they interpret words and numbers. In this information sheet, we have linked numbers to words. For example, when it says that feeling thirsty after an anaesthetic is very common – you know that it means that the chance of feeling thirsty is more than 1 in 10. The definitions we have used are below, along with examples from everyday life:

Very Common - more likely than a 1 in 10 chance of happening

*For example, when flipping a coin, it is **very common** for it to land on 'Heads' (1 in 2)*

Common - less likely than 1 in 10, but more likely than 1 in 100

*For example, it is **common** for a pregnancy to be twins (1 in 65)*

Uncommon - less likely than 1 in 100, but more likely than 1 in 1,000

*For example, it would be **uncommon** for your child to have the same birthday as their anaesthetist (1 in 365)*

Rare - less likely than 1 in 1,000, but more likely than 1 in 10,000

*For example, it is **rare** for a pregnancy to be triplets (1 in 5,000)*

Very rare - less likely than 1 in 10,000, but more likely than 1 in 100,000

*For example, it would be **very rare** to be killed in a road traffic accident in a 12-month period (1 in 32,000 in the UK)*

Extremely rare - less likely than 1 in 100,000

*For example, it would be **extremely rare** to be killed by lightning in the UK (1 in 200,000 lifetime risk)*

More exact numbers are used in some places, to give you the best information available.

This information sheet includes text taken from the Royal College of Anaesthetists (RCoA) publication, 'Your child's general anaesthetic (2020)' but the RCoA has not reviewed this information sheet as a whole.

