

Information for parents of children requiring cardiac surgery:

ANAESTHESIA

Your child is due to be admitted to hospital for a heart operation. Although most children make an uneventful recovery after their operation there are some risks involved. The most serious include death and brain damage. These risks apply to all aspects of your child's care including anaesthesia, surgery and intensive care. Although in general the risks relating to anaesthesia are low they will vary depending on how well your child is, what type of operation is required and whether or not he/she has other medical problems.

We hope this leaflet will answer some of the questions you may have about the care your child will receive from the consultant anaesthetists working in the cardiac unit and also inform you about some of the risks involved.

Pre-operative visit

The consultant anaesthetist who will be looking after your child while he/she has her operation will want to see you, either the day before your child's operation or in the pre-admission clinic. He/she will check to see if our child is allergic to anything, particularly any medicine or drug, or any sticky tape, please tell the anaesthetist as well as the nurses. Please ask any questions you have about your child's care.

Eating and drinking before the operation

When there is food in the stomach there is a chance of sickness occurring during anaesthesia that could cause your child to choke. It is therefore very important that no solid food is eaten for 6 hours before the planned start of the operation. All babies and children may have a small amount of clear fluid up to 2 hours before the operation.

Pre-medication (premed')

This medicine, which is given by mouth, helps older children overcome any anxiety they may have before an operation. Many younger children do not need a premed because they come to the operating theatre with one of their parents, which is usually enough to give them the reassurance they need. A premed may make children so sleepy that they remember very little about what happens to them when going to the operating theatre, but this does not always happen as everyone reacts to drugs a little differently. We do not usually prescribe a premed for children under six months of age. We usually prescribe an anaesthetic cream that the nurse will put onto two areas of skin over some obvious veins. This cream will numb the skin so that if we give an injection later it will not hurt.

Taking your child to the operating theatre

One of you may come with your child and ward nurse to the special (anaesthetic) room just outside the operating room. Sometimes we take young babies straight into the operating room and in this event you will be asked to stay behind in the ward when the nurse takes your baby to the operating department.

In the anaesthetic room

Children may be given an injection in the hand or foot to send them off to sleep. Instead of having an injection some children are anaesthetised by encouraging them to breathe a mixture of gases from a mask placed on the face. Once your child is settled the ward nurse will take you back to K2. You may be told roughly how long the operation is expected to take. The ward nurses will keep in touch with the theatre staff and will keep you informed if there is any major delay.

What happens to your child before surgery

Your child is kept deeply asleep and pain free throughout the operation. This is achieved by allowing your child both to breath anaesthetic gases and by giving anaesthetic drugs through a plastic tube into a vein. This plastic tube, called a cannula, is put into a vein by the anaesthetist. Once your child is asleep, a tube is put down his/her throat and attached to a ventilator (artificial breathing machine). When you first see your child in the intensive care unit this breathing tube will still be in place. It is only removed when your child is ready to breathe on his/her own.

A plastic cannula is put into an artery normally in the groin or arm. This is connected to a monitor that shows us your child's blood pressure at all times. One or two other long cannulae are also passed into large veins in the groin or neck. We use these to give drugs and to help us measure heart function and fluid requirements before, during and after surgery. A thin flexible tube is put into the bladder so that we can accurately measure the amount of urine passed and made sure that the kidneys are working properly.

A thin flexible tube is put through the nose and down into the stomach so that we can remove any fluid that may collect there. Special flexible thermometers are placed into the throat and into the back of the nose so that we can monitor your child's temperature throughout surgery. Special sticky tape is placed over each eyelid to make sure that the eyes remain shut. We also tape a special light probe onto a finger. This is connected to a monitor, which gives us a constant reading of how much oxygen is reaching the body. We also have other machines that monitor the amount of anaesthetic gases and oxygen we give your child. Once everything is ready we move your child into the operating theatre.

What happens during surgery

The anaesthetist monitors constantly your child's vital organ functions during surgery. He/she adjusts the ventilator as necessary, regulates the amount of anaesthetic drugs that are needed and gives any drugs or fluids needed to support heart, lung and kidney function. Many babies and children that need heart surgery have to be put onto a heart-lung (bypass) machine. This machine takes over the work of the heart and lungs during the operation. Not all children needing heart surgery require the use of the bypass machine, but certainly all operations on the heart itself will require its use. Use of the bypass machine allows the surgeon to work inside the heart

If your child has had heart surgery before, then the time taken from starting the operation to getting your child onto the bypass machine may be quite long. This is because there is scar tissue under the breastbone and this requires careful dissection.

Risks and complications relating to anaesthesia

Occasionally complications occur that are related to the drugs we give or the placement of monitoring cannula and tubes. These include;

Bruises. Your child will develop a bruise where a cannula has been inserted, though this will fade after a few days. Rarely there is a blockage of the blood vessel, but we can treat this if it is necessary. Bleeding around the cannula may also occur but we can treat this.

Nosebleed. Passing the temperature probe or the stomach tube through the nose may cause a nosebleed but this is not usually a problem and can be treated if necessary.

Reaction to drugs. These are uncommon and usually only result in a rash. Rarely there may be a more serious reaction that may require treatment.

Infections. These include lung, urine and blood infections. Antibiotics are given to prevent these. These are uncommon unless your child is very ill for a long time after their operation.

Reaction to the breathing tube. This is rare but a little more common in children with Down's syndrome. It may cause swelling of the walls of the main airway and require the breathing tube to be left in for a long time.

Urinary catheter. Rarely, trying to pass a tube into the bladder can cause bleeding or bruising to the passage into the bladder. If this happens we will remove the tube. If urine does not then drain normally we may need to put a tube directly from the abdominal wall into the bladder.

Low blood pressure. This may happen as a reaction to the anaesthetic drugs we give, or as a result of the handling of the heart and vessels around the heart by the surgeon. Changes in the heart rhythm may also cause low blood pressure. Whatever the cause, we will be doing our best to correct the situation as soon as possible and, in most instance, we are successful. When, as is usual, the problem is short-lived it causes no further problems. However, if your child has a low blood pressure for a long time, and does not respond to treatment very well, then vital organ function (including that of brain, kidney and liver) may be affected. Damage to these organs is usually temporary, but may require further treatment and prolong the time your child is in the ICU. Rarely, damage may be permanent. If this is likely, we will tell you. Serious

problems are more likely to happen when heart function is poor, and can occur before during or after surgery.

Risks and complications relating to use of the heart-lung bypass machine

There are some extra risks when the bypass machine is used. These include:

Air bubbles getting into the blood. These can cause little or no problem but, rarely, they may be serious and cause brain damage. If brain damage is suspected we will tell you. In these rare cases, however, it may be difficult to predict what the outcome will be, as young children can often make a remarkable recovery.

Bleeding after the operation. We have to use a drug to stop the blood from clotting in the bypass machine. We give another drug at the end of the operation to reverse the effects of the first drug but giving the correct amount is not always easy as it depends on many different things. The bypass machine also damages some parts of the blood that help form clots. It is therefore common for children who have had heart surgery, especially when they have needed heart-lung bypass to bleed for a few hours after the operation is over. We usually replace any blood lost with a mixture of blood and special fluids containing important parts of the blood needed for normal clotting. Sometimes, when bleeding is rather heavy, the surgeon may have to re-operate and stop the bleeding. This is usually done in the ICU.

Blood transfusions. Despite careful screening, a blood transfusion can sometimes result in a reaction though this is usually very mild. Very rarely a serious infection can be transferred in blood. We do our best to restrict the amount of blood we give your child and give only what he/she needs.

After the operation

After the operation your child will be nursed in the intensive care unit (ICU) for a time, before returning to the ward. (If you have not already seen the ICU the nurses on the ward will arrange a visit before your child has his/her operation.) When you visit your child for the first time in the ICU all of the monitors and tubes that were needed for looking after your child during surgery will still be in place. They will be removed gradually as your child recovers from their operation. Drugs may be given to help support heart and kidney function. Antibiotics will be given regularly to help prevent infection. Specially trained doctors called consultant Intensivist will be in charge of the care of your child while he/she is in the ICU.

There will be a nurse with your child at all times during his/her stay in the ICU. There will also be a doctor close by. Please ask the nurse or doctor any questions about the care your child is receiving at any time. The nurses and doctors will let you know when they think that your child is ready to return to K2.

These notes are not comprehensive and you should feel free to ask any questions you may have.

**INFORMATION LEAFLET FOR PARENTS WHOSE CHILD MAY
REQUIRE THE USE OF HEART-LUNG BYPASS TO UNDERGO CARDIAC
SURGERY**

- heart lung bypass is used to allow the surgeon to operate either inside or outside the heart.
- The whole process allows the surgeon to operate on a 'bloodless' heart.

HOW IT WORKS

There are two main vessels, inferior vena cava (I.V.C) and superior vena cava (S.V.C.) on the right side of the heart, which carry non-oxygenated blood to the heart. This would normally be pumped to the lungs to pick up oxygen. This oxygen rich blood would then return to the left side of the heart and then pumped around the body via a large artery known as the Aorta.

When using a Heart-lung machine, two plastic cannulas (tubing) are placed into the I.V.C. and S.V.C. The blood flowing through these two vessels is taken to the Heart-lung machine before it reaches the heart. The blood then travels through the heart-lung machine via a pump and is cooled or rewarmed, then it picks up oxygen as it passes through an artificial lung (oxygenator).

The oxygen rich blood then flows through a filter and is pumped into another cannula sited in the Aorta. (The vessel which carries oxygenated blood from the heart of the rest of the body).

This procedure allows the blood to bypass the heart and lungs enabling the surgeon to perform the operation in a bloodless field.

Prior to bypass, the Heart lung machine and the patient are heparinised with a drug called Heparin. This drug thins the blood and prevents the normal clotting mechanisms from occurring. This is important, as any clots formed during the bypass could be dangerous. At the end of the procedure, a further drug is given to reverse the effects of the Heparin.

If the surgeon is required to work inside the heart, it may be necessary to actually stop the heart from beating.

If we need to do this, a cold blood solution containing high levels of potassium will be infused into the heart. The high potassium will stop the heart from beating and the low temperature will help protect the heart muscle.

When the surgery is complete the heart often requires a small electrical jolt to start it beating again. On occasion, the heart may require temporary pacing wires to help with beating as it recovers.

There are several risks associated with the use of the Heart-lung machine.

These include:

- ❑ Introduction of air bubbles into the bloodstream.
- ❑ Formation of clots
- ❑ Low blood pressure
- ❑ An increased risk of bleeding

These risks can lead to complications, the main concern being multi-organ failure. However, the incidence of fatalities associated with the use of Heart-lung bypass is less than 1%.

INFORMATION FOR PARENTS OF CHILDREN UNDERGOING CARDIAC SURGERY

All surgery, however minor, carries risks of death or other complications. These risks are related to the anaesthetic and the surgery. Whilst in some patients the risks may be low, it is never possible to guarantee a risk free operation.

Cardiac surgery in infants and children is no exception. The complications may occur either during surgery itself or in the early post-operative period. The risks vary from child to child and depend on many factors including:

- Age of the child
- Nature of heart defect
- Condition of the child
- Previous heart surgery
- Additional medical conditions
- Type and extent of surgery

Usually the risk of death for simple defects is 1-2% (1 to 2 per 100), but for more complicated defects may be from 5 – 30% and for very complicated defects in excess of 50%.

Cardiac Surgery is only undertaken when the risk of operating is less than that of not operating substantially outweigh these risks. In some patients, to provide maximum benefit, surgery is performed when the patient is still relatively well as undue delay can increase the risks or make later surgery impossible. In some instances; the actual type of operation can only be determined once the surgeon has exposed the heart and vessels. Thus a simpler or more complicated operation may become necessary.

Complications: Some of the complications may be specific to the type of surgery, eg. When operating from the side of the chest or when using a heart lung bypass machine. Complications include but are not restricted to the following:

- Bleeding around the area of surgery may require transfusion or even re-operation .
- Infections – chest infections/pneumonia and generalised (blood stream) infections.
- Fluid collection in the chest requiring drains to be inserted –sometimes for prolonged periods.
- Heart failing to maintain blood pressure after surgery may be due to the condition itself, surgery or both.
- Kidney failure – this is infrequent, but more common in newborns and virtually always recovers though a period or dialysis may be necessary.

- **Brain damage** – this is infrequent and children tend to recover faster and better than adults. Rarely there may be residual damage. Convulsions do not necessarily indicate brain damage – they can occur in perfectly normal healthy children.
- **Intestinal damage** – particularly in newborn infants – intravenous feeding may be necessary for some days to weeks.

- **Damage to heart structures** close to the area of the surgery:
Valve damage is uncommon.
The electrical system which controls the heartbeat may be damaged. This may require a temporary and rarely a permanent pacemaker later.

- **Damage to nerves** leading to the
diaphragm – this may cause prolonged dependency on a ventilator or even an operation on the diaphragm itself.

Vocal Cords – rarely a permanent hoarseness can occur.

These complications whilst infrequent may occur singly or one may follow another even when the surgery has been successful. When severe they can result in a prolonged stay on the intensive care unit.

These notes are not meant to be comprehensive and parents should feel free to ask any questions they may have specifically about surgery in their child.