

# Further information about having an anaesthetic

This information is for adults expecting to have an operation that needs an anaesthetic. It explains what an anaesthetic is, how to prepare for one and what to expect when you come into hospital. You should already have been given a short booklet on "Having an anaesthetic". This longer leaflet is for people who want to know more about the whole process or a specific subject such as side effects.

We hope the information will help you to understand more about what will happen to you from when you are informed that you need an operation until it is over. We also hope that it will answer any questions or concerns you may have and reduce feelings of anxiety. If you have any concerns or do not understand something please ask your doctor, nurse or anaesthetist for more information.

## Contents

What is an anaesthetic	1
Before you come into hospital	2
Fasting and nil by mouth instructions on the day of your operation	3
The anaesthetic	6
Pain control after your operation	10
Side effects and risks of having an anaesthetic	12
Further information	31

## What is an anaesthetic?

Anaesthesia stops you feeling pain during an operation. There are different types of anaesthetic.

- A **local anaesthetic** uses an injection to numb a part of your body. You stay awake but don't feel pain.
- A **regional anaesthetic** uses an injection of anaesthetic to numb a larger part of your body (such as an arm or a leg). You stay awake but don't feel pain.
- A **general anaesthetic** gives a state of controlled unconsciousness during which you feel nothing. This is essential for many operations and you will be asleep for the entire procedure.

Anaesthetics are given by specially trained doctors called anaesthetists. The anaesthetist is responsible for your wellbeing and safety throughout your surgery and will plan your type of anaesthetic and pain control with you.

## Before you come into hospital

To prepare yourself for your operation you should:

- Stop smoking as giving up for several weeks before the operation will reduce the risk of breathing problems. The longer you can give up beforehand, the better. If you cannot stop smoking completely, cutting down will help.
- Lose weight if you are overweight as reducing weight will reduce many of the risks of having an anaesthetic.
- See a dentist if you have loose/broken teeth or crowns that are not secure. Dental treatment may reduce the risk of damage to your teeth.
- Have a check up with your GP if you have a long-standing medical problem such as diabetes, asthma, thyroid problems, epilepsy or high blood pressure.
- **Bring all of your medications, including prescription medications, medications you have bought and alternative medicines, such as herbal remedies.**
- Follow the fasting instructions ('nil by mouth') given on pages 3-4.
- If you are or may be pregnant contact the hospital before you come in for your operation.
- Keep warm before your anaesthetic as this will decrease risk of complications after your operation. The hospital may be colder than your home so you should bring a dressing gown or extra clothing and slippers with you to hospital. Tell staff if you feel cold.

**Remember for 48 hours after your anaesthetic (you do not need to follow these instructions if you have had local anaesthetic without sedation):**

For the 48 hours after your anaesthetic and surgery it is important to follow the advice below for your safety as although you might feel fine, your reasoning, reflexes, judgement and co-ordination skills can be affected for 48 hours after your surgery. Please rest at home for a minimum of 24 hours after your surgery. Do not go to work or school on the day after surgery. As it is a minimum of 24 hours that is recommended we have used a total number of 48 as you may have your operation in the late afternoon and therefore it is advised that:

### For 48 hours after do not:

- drive any vehicle, including a bicycle
- operate any machinery
- attempt to cook, use sharp utensils or pour hot liquids
- drink alcohol
- smoke
- take sleeping tablets
- make any important decisions or sign any contracts.

Follow the advice and instructions that the doctors and nurses have given you before you leave hospital.

If you have a problem at home and you are worried about your condition please call us. Before you go home you will be given information about who to contact.

## Health check before your anaesthetic and surgery

You will have a health check before your operation. This may be at a pre-operative assessment clinic or on the ward.

There are pre-assessment clinics at both Guy's and St Thomas' hospitals and your appointment letter will tell you which one to go to. There is also a separate pre-assessment clinic at Guy's Hospital for orthopaedic surgery. A nurse will usually see you at the pre-assessment clinic. If you are not asked to attend a pre-assessment clinic your assessment will be done by a doctor/nurse when you are admitted to hospital.

The health check is to make sure that you are well enough for your operation. You will be asked questions about your health and if any tests are required such as blood tests, electrocardiograph (ECG) or chest X-ray, these will be arranged. Some tests can be done in the clinic, for others you may need to come back another day. This is a good opportunity to discuss any concerns or worries you may have. Although you will be seen by an anaesthetist prior to your operation you will not see one at the pre-assessment clinic.

### During your pre-assessment you will be asked about:

- your general health and fitness
- any serious illnesses you have had
- if you have had any problems with previous anaesthetics
- whether you know of any family members who have had problems with anaesthetics
- whether you have any chest pain or shortness of breath
- whether you have heart burn
- pains you have which would make lying in one position uncomfortable
- any allergies you have
- any loose teeth, caps, crowns or bridges
- whether you smoke, drink alcohol or use recreational drugs.

All women of child-bearing age will be asked if there is any chance that they may be pregnant. A pregnancy test should be done with the woman's consent if she may be pregnant. The need to test for pregnancy is because of the possible risk of the anaesthetic and surgery to the unborn baby. If there is any chance you could be pregnant you should have a pregnancy test before a decision is made to proceed to operate. Usually elective (non-emergency) surgery will be postponed. If you need to have an operation your anaesthetist and surgeon will need to be informed if you are pregnant.

## Fasting or 'nil by mouth' instructions on the day of your operation

Fasting means that you cannot eat or drink anything (except water) for six hours before surgery. You are allowed to drink water up to two hours before surgery. You will be given clear instructions if you need to fast. It is important to follow these instructions given below. If there is food or liquid in your stomach during the anaesthetic it could come up to the back of your throat and damage your lungs.

The instructions you need to follow will depend on when your surgery is scheduled for:

### For morning surgery, coming to hospital at 7am

Do not eat after 2am.

You may drink water (not fizzy) till 6am.

## For afternoon surgery coming to hospital at 11am

Have a light breakfast of tea/coffee with toast/cereal before 7am.

And then do not eat after 7am.

You may drink water (not fizzy) till 11am.

If you are given a different time to come into hospital for morning or afternoon surgery than mentioned above, you must still follow the fasting times above.

Even if you are expecting to have your procedure under a local anaesthetic, follow these fasting guidelines if you are likely to require sedation (to help relax you).

**Please note, for certain procedures there is a specialised fasting protocol which involves carbohydrate loading drinks. If this applies to your procedure, you will be informed how and when to take these drinks before you come in for surgery.**

## Medicines

If you are taking medicines, you should continue to take them as usual on the day of surgery, with a sip of water before 6am for morning surgery and before 11am before afternoon surgery unless your anaesthetist or surgeon has asked you not to. If you take drugs to thin your blood (such as warfarin, aspirin or clopidogrel), drugs for diabetes or herbal remedies, you will be given specific instructions.

## Meeting the anaesthetist before your operation

You will meet an anaesthetist before your operation. The anaesthetist will make every effort to meet you on the ward before surgery, but this is not always possible. The anaesthetist will look at the results of your health check and may ask you further questions. It may be necessary to listen to your chest with a stethoscope, examine your neck and jaw movements and look in your mouth.

The type of anaesthetic given will depend on:

- the type of operation you are having
- your physical condition
- your preferences
- the anaesthetist's recommendations for you.

We want to involve you in all the decisions about your care and treatment. Your planned treatment will not go ahead until you understand and agree with what has been planned for you.

You may decide you do not want the treatment suggested or that you want more information or more time to decide. If you decide to go ahead you will be asked to sign a consent form. This confirms that you agree to have the procedure and understand what it involves. For more information please ask for a copy of our leaflet on consent.

Other issues the anaesthetist may discuss with you are:

- premedication ('premed')
- blood transfusion
- postponement of an operation
- admission to the High Dependency Unit (HDU), Overnight Intensive Recovery (OIR) or the Intensive Care Unit (ITU).

## Premedication

This is the name for drugs given before an anaesthetic may help you to relax. They may cause drowsiness so you mustn't get out of bed after you have been given a premed. Call the nurses if you need anything. They may also make you drowsier after the operation so if you want to go home on the same day, this may be delayed. If you think a premed would help you, ask the anaesthetist. Sometimes it may not be possible for you to have a premed.

## Blood transfusion

During most operations you will lose some blood. The anaesthetist will make up for this blood loss by giving you other types of fluid into a vein through a drip. If you lose a lot of blood you may need a blood transfusion. If the anaesthetist expects you to need a blood transfusion it will be discussed with you beforehand. Occasionally you might need blood unexpectedly. You have the right to refuse a blood transfusion but you must make this clear to the anaesthetist and surgeon before the operation. For more information please ask for a copy of our leaflet on blood transfusion.

## Postponement of your operation

Occasionally the anaesthetist might find something about your general health that could increase the risks of your anaesthetic or operation. It might then be better to delay your operation until the problem has been reviewed or treated.

## Admission to HDU, OIR or ICU

After some major operations you may be taken to the HDU, OIR or ITU. If this is planned (for example after cardiac surgery) it will be discussed with you beforehand and you will be informed what to expect.

## Going to the theatre suite for your operation

You will go to the anaesthetic room with a nurse. Once there the nurse will hand over your notes and pass on any important information to the theatre staff. The nurse may stay with you until you are asleep. You can wear your glasses, hearing aids and dentures until you are in the anaesthetic room. If you are having a general anaesthetic, you will usually need to remove them in the anaesthetic room to make sure they are not damaged or dislodged while you are anaesthetised. If you are having a local or regional anaesthetic, you may keep them on.

Theatre staff will check your identification bracelet which has your name, date of birth and hospital number and will ask you about other details in your medical records as a final check that you are having the correct operation. They will also check the consent form that you have signed.

The consent form will have been signed after you have been seen by your surgeon and you fully understand what the operation is likely to involve, the benefits and risks and any available alternative treatments. Sometimes the consent form will have been signed by you when you see your surgeon in the Outpatients Department. If this is so you will be asked by one of the doctors/nurses to confirm that you have signed the consent and still want to proceed with surgery. If you have not signed one in the out-patients then the surgeon will gain your written consent with you when you arrive for surgery. It is important that you understand the information you have been given. Do ask questions if you don't understand or if you want more information. If you still have any questions or concerns in the anaesthetic room, say so.

## The anaesthetic

An anaesthetic is given so that you do not feel any pain during surgery. There are different types of anaesthetic and the anaesthetist will discuss and advise which one is best for you. Anaesthetics can be given in various ways and do not always make you unconscious:

- A **local anaesthetic** uses a drug that numbs a part of your body. It is usually injected and will sting for a few seconds at first. You stay conscious but free from pain.
- A **regional anaesthetic** uses an injection of local anaesthetic to numb a larger part of your body, for example an arm or a leg. The most common regional anaesthetics (also known as regional 'blocks') are spinal and epidural anaesthetics. They involve injections in the back to remove feeling from the waist down. You stay conscious but free from pain. Epidurals may be used during and/or after surgery for pain relief.
- A **general anaesthetic** gives a state of controlled unconsciousness during which you feel nothing. This is essential for many operations and you will be asleep for the entire procedure.

If you are having a local or regional anaesthetic, you may decide whether you would prefer to be fully alert or have sedation. Sedation is the use of small amounts of anaesthetic or similar drugs to produce a 'sleepy-like' state. If you are to have sedation you must follow the fasting instructions above. A local or regional anaesthetic may be combined with a general anaesthetic. There is always a chance that your local or regional anaesthesia under sedation or awake may have to be converted to a general anaesthetic if for example you are experiencing pain during the procedure.

Once all the preoperative checks have been completed the anaesthetist or anaesthetic assistant will attach monitors to you which measure your heart rate, blood pressure and oxygen levels.

More monitoring may be needed for major operations.

## Starting your general anaesthetic

Induction usually takes place in the anaesthetic room although sometimes you may go directly to the operating theatre.

There are two ways of starting a general anaesthetic:

- Usually for adults anaesthetic drugs are injected through a thin plastic tube (a 'cannula') into a vein in the back of your hand or arm. A needle will be used to put this cannula into the vein. This is secured with a dressing to stop it from falling out. Sometimes it can take more than one attempt to insert the cannula.
- Breathing anaesthetic gases and oxygen through a mask. This is more commonly chosen for children.

Induction happens very quickly and you will become unconscious within a minute or so. People usually describe it as a light-headed feeling. The anaesthetist will tell you when the general anaesthetic drug is about to be given. As you are being anaesthetised you will usually be given oxygen to breathe through a clear, plastic face mask held very lightly on your face.



Once you are unconscious, the anaesthetist will continue to give drugs into your vein or anaesthetic gases to breathe (or both) to keep you anaesthetised. The anaesthetist will choose a way of making sure that you can breathe easily. This may be done by tilting your head back and lifting your chin. You may have a tube placed in your airway to assist your breathing. Keeping your airway open is very important for your safety. When the anaesthetist is satisfied that your condition is stable you will be taken into the operating theatre. The anaesthetist will be with you throughout your operation, checking the monitors, adjusting the anaesthetic and giving you the drugs and intravenous fluids that you need.

Some of the drugs you may need during your anaesthetic include:

- Anaesthetic drugs or gases to keep you anaesthetised.
- Pain-relieving drugs to keep you pain free during and after your operation.
- Muscle relaxants to relax or temporarily paralyse the muscles of your body. These drugs will stop you breathing and the anaesthetist will use a machine (a ventilator) to 'breathe' for you.
- Antibiotics to prevent infection.
- Anti-sickness drugs to stop you feeling sick.

Throughout the anaesthetic and operation a team of theatre staff will look after you. The team includes nurses, surgeons, anaesthetists and operating department practitioners.

When the operation is finished the anaesthetist will stop giving anaesthetic drugs. If muscle relaxants have been used a drug that reverses their effect will be given if required. When the anaesthetist is satisfied you are recovering normally, you will be transferred to the recovery room.

Most people regain consciousness in the recovery room. Nurses will monitor your pulse rate, blood pressure and oxygen levels. If you are in pain when you wake up, tell them so they can give you extra pain relief medication. Oxygen will be given to you through a lightweight, clear plastic mask which covers your nose and mouth. Breathing oxygen keeps up its levels in your blood while the anaesthetic wears off. The nurse will remove the mask as soon as you no longer need it. If you feel sick tell the nurses as this can be treated with anti-sickness medication. Depending on the operation you have had you may have a urinary catheter which is a soft thin tube put temporarily into the bladder to drain it. The recovery staff must be satisfied that you have safely recovered from your anaesthetic and your condition is stable before you are taken back to the ward. The operation will affect how long before you can drink or eat. After minor surgery, this may be as soon as you feel ready. Even after quite major surgery you may feel like sitting up and having something to eat/drink within an hour of regaining consciousness. Ask the staff on the ward if you are unsure of whether or not you are allowed drink/eat.

## Local and regional anaesthetics

These anaesthetics are usually given to you while you are awake in the anaesthetic room. This is so that you can assist the anaesthetist to get you into the correct position, tell if the needle causes you pain and tell the anaesthetist when the anaesthetic is taking effect. The type and place of a local or regional anaesthetic injection will depend on the operation you are having and the pain relief you will need afterwards.

### Local anaesthetics

Local anaesthetics are injected close to the area of your operation. They can also be used to numb the skin before anything sharp is inserted, such as a cannula for a drip.

## Regional anaesthetics

The commonest regional anaesthetics performed here are spinal, epidural and brachial plexus blocks.

## Spinal and epidural anaesthetics

Spinals or epidurals are used for operations on the lower half of your body.

### Spinal injections

Spinals are single injections which take only a few minutes to work and last about two hours. They cannot be topped up to make them work longer. A needle is inserted between the bones of your back, through ligaments and then through the dura which is the membrane that encloses the nerves and spinal cord. Spinal injections are usually performed below the lower end of the spinal cord. Nerves in this area are bathed in cerebro-spinal fluid (CSF). A single injection of local anaesthetic is given and the needle is then removed.

### Epidural injections

An epidural is performed by using a needle to introduce a fine catheter (tube) into your back. The needle is passed between the bones, through ligaments and into a space outside the dura. The catheter is passed through the needle into this space and the needle is removed. The catheter is taped securely to your skin. Local anaesthetic can be given through this catheter for a period of time. An epidural is used for operations which are longer than two hours or when pain relief is needed for several days. Epidurals can take up to half an hour to work.

## Starting a spinal/epidural regional anaesthetic

The regional anaesthetic block is usually performed in the anaesthetic room adjacent to the operating theatre. You will be attached to routine monitors to measure your heart rate, blood pressure and oxygen levels and you will have a plastic intravenous cannula inserted into your hand/arm.

Some local anaesthetic may be given into the skin around the area where the needle for injection of the block is inserted to make this more comfortable for you. It can take more than one attempt to get the needle in the right place so that the area is properly numbed. The anaesthetist will ask you to keep still while the injections are given and when the needle is inserted you will be asked if you feel any tingling or shocks. You may notice a warm tingling feeling as the anaesthetic begins to take effect. It is common to feel as though the part of your body which is anaesthetised does not belong to you. Your operation will only go ahead when you and the anaesthetist are sure that the area is numb. When the insertion of the block is complete your monitoring equipment will be temporarily disconnected and you will be wheeled into the operating theatre.

## In the operating theatre: local or regional anaesthetics

This is a busy place and several staff will be in the theatre to care for you during your surgery. If you are not already in the operating table you may be moved across from the trolley onto the operating table. Monitoring equipment will be reconnected and you will feel the blood pressure cuff inflating on your arm as it takes your blood pressure regularly.

A cloth screen is used to shield the operating site, so you will not see the operation unless you want to. The anaesthetist is always near to you and you can speak to him/her at any time.



Once the nerve block has been done, the area that will be operated on will feel numb and heavy immediately or up to 30–40 minutes later. The anaesthetist will reassure you if you have any questions. The surgeon thoroughly checks you are numb in the area before starting the operation. It will take some hours for feeling to return to the area of your body that was numb. This ranges from one to 24 hours depending on the type of anaesthetic injection.

The **benefits** of having a spinal/epidural injection include:

- excellent pain relief after your operation for up to 24 hours
- avoidance of the risks of general anaesthetic
- early intake of food and drink after your operation.

**Side effects and complications** of regional anaesthesia include:

- failure of the regional anaesthetic to work which may result in you having a general anaesthetic instead
- allergy to the local anaesthetic drugs used
- local anaesthetic toxicity
- a feeling of numbness and heaviness of the limb after the operation
- rarely, a chance of nerve damage.

Other side effects and complications are discussed on page 12.

## Brachial plexus block

A brachial plexus block may be done for hand, arm and shoulder surgery. The brachial plexus is the name for the bundle of nerves that supplies the shoulder, arm and hand with feeling and power. These nerves start in the neck and travel via the armpit to the hand and can be blocked by an injection of local anaesthetic near to the nerves of the brachial plexus. The injection may be placed in the side of the neck, above or below the collar bone or in the armpit depending on where you are having your operation. Before you have the brachial plexus block you will be asked to fast as for a general anaesthetic. This is very important if you are having a general anaesthetic as well as the block or if a general anaesthetic is unexpectedly needed.

When you arrive in the anaesthetic room you will be attached to routine monitoring which measures your heart rate, blood pressure and oxygen levels. You will also have a cannula (a thin plastic tube) placed in a vein on the back of the hand/arm. This is so sedation may be given or a general anaesthetic if you are having one as well as the brachial plexus block and to allow drugs to be given if required. The block can be performed with you awake, sedated or under general anaesthetic.

Firstly the site of the injection is cleaned and if you are awake an injection of local anaesthetic is given to numb the skin. Then a needle is used to inject local anaesthetic around the nerves. Initially your arm will feel warm and tingly and within about 40 minutes it will become numb and heavy. A nerve stimulator may be used to locate the nerve. This uses a small electrical current which runs through the needle to help find the nerves. This causes the muscle supplied by the nerve to twitch, but this should not be painful. Sometimes an ultrasound machine is used to 'look' directly at the nerve through the skin. This is achieved with a small probe placed on the skin with some cold gel so that an image appears on the screen. Once the nerve is seen, the needle is used to inject local anaesthetic around the nerve. Occasionally your anaesthetist may suggest placing a catheter (a very thin tube) through the needle at the same time. This can then remain in place after the needle has been removed and allows more local anaesthetic to be given for pain relief up to a few days after your operation.

The effects of the local anaesthetic will last between four and 24 hours (average 10–12 hours). Your arm will be in a sling until the strength has returned. You must ensure that the strength and feeling has fully returned to your arm before trying to use it normally. You may ask any of the nurses or doctors about this if you are worried.

### Benefits of brachial plexus block include

- Avoids risks of a general anaesthetic. It may be possible to have your operation performed with a brachial plexus block alone. This may be advisable if you have heart or breathing problems. You will be awake and pain free although you may still be able to feel pressure and movement in the area.
- Pain relief after your operation. The brachial plexus block is often given in conjunction with a general anaesthetic as it provides pain relief for after the operation. This reduces the need for strong pain relief which can make you feel sick and drowsy. It can also help the physiotherapists to start moving the arm which aids recovery.
- Increases blood flow to the area as in certain situations this may improve healing and speed up your recovery.

### Risks of having a brachial plexus block

- Risks due to the local anaesthetic include allergy which is very rare as are serious problems such as fits, heart or breathing problems. Anaesthetists are trained to deal with these emergencies.
- Risk to nearby structures:
  - If the injection is placed in the side of your neck, side effects include a hoarse voice, droopy upper eyelid and feeling faint especially on sitting up. Rarely, you may find breathing a bit more difficult. All these are temporary and should get better when the block wears off.
  - If the injection is placed near the collar bone there is a small risk of damage to the lung (one in 1000 patients). This can usually be managed to keep you safe and serious, permanent harm is very rare.
  - For all injection sites there is a small risk of bleeding due to damage to a blood vessel. This can be treated by direct compression and/or extra fluids given into a vein.
- Risk of nerve damage. Nerve damage can occur because of direct injection into the nerve or because of bleeding or infection. The risk of permanent damage is rare. It is the same for all injection sites. An exact measure of the risk is not available but studies have estimated it as between one in 15,000 and one in 30,000 of patients having a brachial plexus block.
- Patients commonly notice areas of tingling and/or numbness in the arm, shoulder or hand. This occurs in around one in 20 patients and usually resolves within three weeks or occasionally up to three months.

### Pain control after surgery

The level of pain experienced will vary from patient to patient and depends on the type of surgery. Good pain relief is important as it prevents suffering and it helps you recover more quickly. Before your surgery, the anaesthetist will talk to you about pain control and will answer any questions or concerns you may have.

Following surgery, you may be referred to the acute pain team. This is a team of specialist staff that helps patients to control and manage pain. For your safety, please tell the ward nurse and doctor if you are taking any pain relief at home (whether from your doctor or bought over the counter) and if you are allergic to any medicines.

Everyone feels pain differently. Nurses and other medical staff will assess your pain, using the following scale: **0** = no pain, **1** = mild pain, **2** = moderate pain, **3** = severe pain.

The aim is to allow you to be comfortable when resting, able to take deep breaths and cough effectively and to move with only mild pain. You should tell the nursing staff when you are in pain, as your pain relief may need to be adjusted.

If pain is controlled, you will be able to do deep breathing exercises which help clear your lungs and prevent chest infections. You will also be able to move around more quickly after your operation and follow physiotherapy advice. This will help you to recover more quickly. It also reduces the risk of blood clots (deep venous thrombosis or DVT).

## Methods of giving pain relief

There are various methods available to control pain that can help the medical and nursing teams to keep you comfortable. These include:

### Tablets, capsules or liquids

These are used for all types of pain. They take at least 20 minutes to work and you need to be able to eat, drink and not feel sick for these drugs to work.

### Suppositories

These are placed in your back passage (rectum). The pellet dissolves and the drug passes into your body. They are useful if you cannot swallow or if you are likely to vomit. They are often used along with other methods of pain relief.

### Patient controlled analgesia (PCA)

The word 'analgesia' means pain relief. PCA is used to control pain after certain operations. The anaesthetist will place a small cannula (plastic tube) into a vein in your arm/ hand and a longer tube is attached to this cannula which connects to the PCA pump. After the operation you will be given a button to press whenever you need more pain relief. Pressing the button releases a set amount of painkiller (usually morphine) into your bloodstream. Only you or the medical staff should press the PCA button. Friends/relatives **MUST NOT** press the PCA button.

Patients often worry that they may overdose but PCA pumps are programmed to allow a set amount of morphine to be delivered, at most, every five minutes (no matter how many times you press the button) so as to prevent overdose. The nurses will closely monitor you while you are using a PCA to help ensure that your pain is being controlled without suffering side effects. Possible side effects of PCA include nausea (feeling sick) and itchiness which can be treated with medicine to relieve it. Drowsiness may also occur but do not worry about this as the nurses will continue to monitor you while you are asleep. Possible side-effects of PCA include:

### Epidural infusion

An epidural is a form of pain control used after major operations. If the anaesthetist thinks that you will benefit from this type of pain control, it will be discussed with you before your operation. It involves placing a fine plastic tube in your back via a needle. Painkilling medicines are given through the tube from a locked pump system. The medicine bathes the pain nerves in the back. This should block pain sensation from the operation site. The epidural infusion usually continues for two to five days, depending on the surgery you have had. You will be given painkillers you can take by mouth before the epidural is stopped.

## Possible side effects and complications of an epidural:

- Difficulty passing urine. A catheter (long, thin tube) will be inserted into your bladder while you are in the operating theatre. This will drain your bladder.
- Low blood pressure. Occasionally your blood pressure may fall. You will have an intravenous drip connected to your arm, so you can receive fluid. Sometimes drugs are also given to increase your blood pressure.
- Itching. You may feel itchy while your epidural is working. If so, tell the nurses and they can give you medicine to help to relieve this.
- Headache. Rarely the bag of fluid that surrounds the nerves and spinal cord is punctured when the epidural is being inserted. This is called a 'dural puncture' and may cause a severe headache that could last for days or weeks if it is not treated. Dural puncture is uncommon, occurring less than one in every 100 times an epidural is put in. If you do develop a headache, tell the nurses. Pain relief tablets will be prescribed and the nurses will monitor you to see if any further treatment is required.
- Weak legs. Depending on where the epidural tube is placed, your legs may feel numb or weak while your epidural is working. This is nothing to worry about. The ward nurse will check on this. Once the infusion is reduced or stopped, this effect will disappear.
- 'Breakthrough' pain. Sometimes the epidural does not work perfectly (10- 30% of epidurals depending on the type of surgery you are having). Often this can be corrected by giving extra doses through the epidural. If this does not help, the epidural may either be put in again or replaced with another form of pain relief.
- Nerve damage. When an epidural is inserted you may feel a transient pain, 'twinge' or tingling, either in your back or down one leg. This is quite common and will soon ease off. It is important to tell the anaesthetist if you feel this so the epidural can be repositioned.
- Sometimes a numb patch on a leg or foot, or some weakness in a leg may last for a few weeks or months, before it wears off completely. It is very rare to get long-lasting nerve damage after an epidural, causing problems such as muscle weakness, pain or a feeling of tingling or numbness down one leg.
- Infection. Very rarely an infection may develop around the epidural, called an epidural abscess.
- Epidural haematoma. Very rarely a blood clot may develop around the epidural. This is called an epidural haematoma. If it occurs it may require an operation to treat it and there is a possibility of paralysis resulting. The incidence of haematoma is estimated as one in 55,000 with an incidence of permanent harm of one in 66,000.

Ward nurses and doctors will monitor you closely while you have epidural pain relief. This ensures that complications are rare. The acute pain team nurse will also see you regularly.

## Side effects and risks of having an anaesthetic

Modern anaesthesia is very safe and serious problems are uncommon. Anaesthetists use specialist equipment to monitor you throughout your operation. However, risk cannot be removed completely and some people may have side effects or complications.

**Side effects** are secondary effects of drugs or treatment. They are often expected but are sometimes unavoidable. Examples would be having a sore throat or feeling sick after an operation. Side effects usually last only a short time and can be treated with medicines if needed.

**Complications** are unexpected and unwanted events due to a treatment. Examples would be damage to teeth or an unexpected allergy to a drug. The exact likelihood of complications occurring depends on your medical condition, the type of surgery planned and the anaesthetic used. If there are risk factors specifically associated with your procedure and anaesthesia these will be discussed with you.

To understand a risk, you must know:

- how likely it is to happen
- how serious it could be
- how it can be treated.

The risk to you as an individual will depend on a number of factors:

- whether you have any other illness
- personal factors, such as smoking or being overweight
- surgery which is complicated, long or carried out as an emergency.

The scale below will help you work out the possibility of side effects and complications.

<b>1 in 10</b>	<b>1 in 100</b>	<b>1 in 1,000</b>	<b>1 in 10,000</b>	<b>1 in 100,000</b>
<b>Very common</b>	<b>Common</b>	<b>Uncommon</b>	<b>Rare</b>	<b>Very rare</b>

Details of some important potential side effects or complications of anaesthesia and their treatments are given below. The scale above is used to help you understand how often these side effects or complications are likely to occur. The details are divided into three sections relating to their chance of occurring.

**Section 1** **Very Common to common**

**Section 2** **Uncommon**

**Section 3** **Rare or very rare**

Each side effect or complication is marked with GA, RA or GA & RA.

- GA only means that this may occur with a general anaesthetic.
- RA only means that this may occur with a regional anaesthetic.
- GA & RA means that it may occur with both these types of anaesthesia.

## Section 1: **Very common** to **common** side effects or complications

### **Nausea and vomiting (RA & GA)**

Nausea is an unpleasant sensation and is described as 'feeling sick'. It is often associated with the urge to vomit. Vomiting is actually being sick. It is the act of forcefully emptying the stomach or 'throwing up'.

Feeling sick after an operation or anaesthetic is a common problem. About one third of people (one in three) will experience a feeling of sickness after having an operation. A number of different reasons may contribute to sickness after an operation, for example:

- the operation you are having
- drugs that are used
- who you are
- other reasons as mentioned below.

Some operations cause more sickness than others such as:

- operations on the abdomen or genital area
- ear, nose or throat operations (e.g. removal of tonsils)
- surgery to correct a squint of the eye
- long operations.

Some drugs are known to cause sickness and include:

- anaesthetic drugs, including anaesthetic gases
- pain relief drugs (especially morphine-like medicines).

Some people such as women, non-smokers, those who suffer travel sickness or who have been sick after previous operations are more likely to be sick.

Just because you have been sick after a previous operation does not mean that you will always be sick after every operation. This is because the operation you are having may be different and less likely to cause sickness and the anaesthetic may be adjusted to decrease sickness.

Other reasons include being without food/drink before and after the operation, anxiety and travelling soon after having an anaesthetic.

The sensation of sickness is usually short-lived. Uncommonly it may last for more than one day. If you are worried about sickness or have experienced it following a previous anaesthetic tell the anaesthetist.

### **Treatment of sickness**

If you feel sick tell the nurse/doctor looking after you. It can be treated by giving anti-sickness drugs, oxygen and intravenous fluids.

To avoid sickness after your operation:

- Avoid sitting up or getting out of bed too quickly
- Avoid drinking/eating too quickly after your operation. Start with small sips of water and build up slowly to bigger drinks and light meals.
- Good pain relief will help
- Taking slow deep breaths can help reduce any feeling of sickness.



## Sore throat (GA)

After a general anaesthetic you may develop a sore throat which can range from a minor discomfort to a more severe continuous pain. You may also have a dry throat or feel pain on speaking or swallowing. These symptoms may disappear after a few hours but may take two days or more to settle down.

During a general anaesthetic the anaesthetist has to make sure you can breathe freely and that secretions/stomach contents do not get into your trachea or your lungs. There are several ways to do this depending on your medical condition and on what operation you are having. The following may be used:

- **A tracheal tube.** This is positioned in your trachea and has a soft cuff which is inflated to prevent leakage of gases or movement of secretions.
- **A laryngeal mask airway.** This is a different shaped tube, which sits in the back of the throat above the opening of the trachea. It too has a soft inflatable cuff.
- **Face mask.** This is held firmly onto your face with or without a plastic airway that is placed inside your mouth.

During your anaesthetic it may be necessary to use additional tubes placed in your nose or mouth to empty your stomach or remove secretions.

All of these tubes or masks are used after you are anaesthetised and you are not usually aware of their use. However any of them may cause a sore throat as follows:

- During insertion each may cause irritation or damage to your throat. The anaesthetist will make every effort to prevent damage but some damage can still occur especially if the tube is difficult to insert.
- The tracheal tube and the laryngeal mask airway both have a cuff which is inflated during you anaesthetic. This cuff may press on parts of your throat or airway causing swelling and discomfort.
- Anaesthetic gases and some drugs can dry your throat and this may contribute to a sore throat.

After a general anaesthetic with a tracheal tube the risk of developing a sore throat is estimated to be between one in five and one in seven. After a general anaesthetic with a laryngeal mask airway the risk may be one in 25.

If any additional tubes are needed in your nose or mouth there is an increased chance of getting a sore throat. Young women are more likely to get a sore throat. In most cases symptoms disappear without any specific treatment. Severe cases can be treated with pain relief medicines and gargling may help to reduce inflammation and pain. If your symptoms do not disappear after two days or if you are having problems with breathing, coughing up blood or hoarseness in your voice you should contact your GP or anaesthetist for further advice.

## Shivering (RA & GA)

After your operation is finished you will be transferred to the recovery room. Recovery staff will continue to monitor your blood pressure, oxygen levels and pulse rate. Some people shiver during this period. This can be distressing but is not usually dangerous and it should stop within 20–30 minutes. It is an involuntary process and may affect various different parts of your body.

It can occur after a general anaesthetic and during/ after a regional anaesthetic. Most shivering after an operation is due to a fall in your body temperature. Most of the drugs used to keep you asleep during your anaesthetic may add to this fall in temperature as they reduce your body's natural ability to control your own temperature. Parts of your body may be exposed to a cool environment during your operation. Shivering may also occur without a fall in temperature and can be due to anaesthetic drugs and gases.

To prevent shivering care is taken to keep you as warm as possible by heating and moisturising the anaesthetic gases, using heated blankets and warming intravenous fluids/ blood that you receive.

Shivering may occur in about one in four patients following a general anaesthetic. The risk of shivering following a regional anaesthetic may be slightly higher and last longer than following a general anaesthetic. Young adults are more prone to this.

On arrival in the recovery room your temperature will be measured. The nurse will use a warming blanket to bring your temperature up to normal. If you are in pain you will be given pain relief. Shivering will stop. You may be given oxygen during the period you are shivering as shivering increases your body's need for oxygen. There are drugs that may be used but they are not 100% effective and have side effects.

### **Itching (RA & GA)**

This is a side effect of opiate medicines (such as morphine) and can be treated with other medicines. It can also be caused by an allergy (for example to drugs, sterilising fluids, stitches or dressings).

### **Bruising and soreness (RA & GA)**

This can happen around injection and drip sites. It may be caused by a thin vein bursting, movement of a nearby joint or infection. It normally settles down without treatment but if the area should become uncomfortable the position of the drip can be changed.

### **Dizziness and feeling faint (RA & GA)**

The anaesthetic may lower your blood pressure and make you feel faint. This may also be caused by dehydration. Fluids or drugs or both will be given to you to treat this.

### **Headache (RA & GA)**

There are many causes of headache, including the anaesthetic, the operation, dehydration and feeling anxious. Most get better within a few hours and can be treated with pain relief medicines. Severe headache may occur after a spinal or epidural anaesthetic. If this happens tell the nurse and they will ask the anaesthetist to see you. You may need special treatment to cure this type of headache.

### **Aches, pains and backache (RA & GA)**

During the operation you may lie in the same position on a firm operating table for a long time. Great care is taken to position you but some people still feel uncomfortable afterwards.

### **Pain (RA & GA)**

Some drugs may cause some pain or discomfort when they are injected.

## Confusion or memory loss (GA)

Some people having an operation and anaesthetic become confused afterwards. Their memory may fail and their behaviour is unlike their normal selves. If this happens it can be very upsetting for you and your family, friends or carers. However as you recover from the effects of the operation the confusion will get better.

Mental confusion is common after major operations in elderly and infirm people but it can happen to anyone of any age. Very commonly these mental changes are associated with being generally unwell. You may have an infection or have slightly lower oxygen levels than normal. You may be in pain or receiving strong pain relief medicines and there are other common events which may follow an operation or anaesthetic which can cause you to be confused. These events will be treated as part of normal care and the mental changes are likely to improve as you recover.

### Symptoms of confusion

Some people become agitated and confused in their thinking and behaviour whereas others become quiet and withdrawn. Some typical symptoms are:

- not knowing your name or where you are
- not knowing what has happened to you or why you are in hospital
- difficulty concentrating
- loss of memory
- reversal of day and night sleep patterns
- being illogical or incoherent, shouting and swearing
- emotional changes such as tearfulness, anxiety, anger or aggression
- trying to climb out of bed and pulling out drips and tubes
- appearing indifferent to whatever is going on
- becoming paranoid and thinking people are trying to harm you
- occasionally people experience visual or auditory hallucinations.

Doctors and nurses are very familiar with this kind of confusion because it is very common. Confusion happens because in the first few days and weeks after your operation your body is repairing itself and the physical challenges associated with this process can cause you to become confused. Some things which can lead you to becoming confused are:

- infections such as chest, wound or urine infections
- poor pain control, side effects of pain relief medicines
- dehydration
- low oxygen levels due to after effects of the anaesthetic, effects of medicines on breathing, chest infection or other lung problems
- inadequate nutrition
- prolonged constipation
- sleep disturbance
- not taking drugs that you were taking before the operation
- loss of vision and hearing simply due to lack of glasses or hearing aids.
- advanced age
- previous ill health
- previous poor memory, dementia, stroke or other brain disease such as Parkinson's disease
- previous poor mobility
- previous high alcohol intake
- being disoriented due to the unfamiliar environment.

You can reduce your risk of becoming confused by having a regional anaesthetic and staying awake during your operation. This does not remove the risk completely as it can still occur during the recovery period.

The majority of people who become confused make a full recovery within a few days. Occasionally it may take up to three months. There is a team of people available who will be able to help you if confusion occurs. The team includes doctors, nurse, physiotherapists and occupational therapists (who give you practical help to help you get back your independence in hospital and at home). Family and friends play a key role as they are familiar to you and will provide reassurance to you that you are safe.

Occasionally you may not recover fully and this is because post-operative cognitive dysfunction (POCD) has occurred. POCD is detected in clinical trials by memory tests, mood assessments and tests of ability to manage the activities of daily living such as shopping or doing a crossword.

There are difficulties in designing tests so as to detect accurately the changes in people's ability to carry out the many tasks of daily life. Some people score well in tests but still find they cannot return to do things they were able to before (such as a crossword). It is therefore difficult to say how often it occurs and its cause is not understood. If you think you may have POCD you should visit your GP as there may be things that can be done to help you.

### Post-operative chest infection (GA)

After an anaesthetic and operation there is a risk that you may develop a chest infection. This is called 'post-operative' because it happens after the operation. Anaesthesia and surgery interfere with the normal ways in which the lungs keep clear of secretions and infection. Pain from the surgical wound (especially after chest or abdominal operations) can make breathing and coughing more difficult. This makes a chest infection more likely. How likely you are to get a chest infection depends on:

- Your health before the operation, in particular whether you have chest trouble already or smoke.
- The type of operation you are having (chest and abdominal operations are more likely to cause chest infection).
- How long you are likely to be lying in bed unable to sit in a chair or walk about. This is why you will be encouraged to get up.
- How urgent your operation is as there is more time to get you in the best possible condition if the operation is known about some time in advance.
- The type of anaesthetic you are having.
- Your age as older people are more likely to get a chest infection but the risk is not much higher if you are still fairly healthy.

If you are developing a chest infection you may feel feverish and find breathing more difficult than usual. You also are likely to have a cough and bring up green/yellow phlegm. The cough may be painful in itself and not powerful enough to clear the phlegm.

Some people get a dry but persistent cough after an anaesthetic and this does not mean you are getting a chest infection. It only lasts a day or two normally.

Chest infections are usually treated with antibiotics. Physiotherapy is also an important part of treatment. Oxygen will often need to be given. Oxygen is given:

- Usually through a light, plastic facemask.
- Through small tubes placed under the nose which some people find more comfortable. (This method cannot always be used as it depends on how much oxygen you need.).
- Occasionally you will be asked to use oxygen under pressure by breathing through a mask which covers the mouth and/or nose. This helps expand the lungs better.

You will also be encouraged to get out of bed as soon as it is safe for you to do so. It may take a couple of months for your chest to feel back to normal again but most people have no long term effects.

Occasionally the chest infection is very serious and breathing becomes very difficult. This is more likely if you have had previous lung disease, are a heavy smoker or were already ill from other causes.

Sometimes it will be necessary to put a breathing tube into the trachea and use a ventilator (breathing machine). You would be taken to the Intensive Care Unit (ICU) and given a general anaesthetic before this treatment starts. This is a life-threatening situation and people may die from this kind of serious chest infection.

Prevention of a chest infection includes:

- Good pain relief after surgery so you can breathe and cough easily.
- The anaesthetist may suggest using an epidural for chest, abdominal and lower limb operations.
- If you are a smoker the most useful thing you can do is stop smoking. You need to stop at least six weeks before your operation if you are to get the full benefit of stopping.
- If you already have chest disease your doctor and chest specialist can help you to get in the best condition before your operation.
- Whatever your situation you are more likely to avoid a chest infection and recover better from your operation if you are as fit as possible. Taking as much exercise as you are able to take in the months and weeks leading up to your operation will help.

### **Bladder problems (RA & GA)**

After certain types of operation and regional anaesthesia men may find it difficult to pass urine and women tend to leak urine. To prevent problems a urinary catheter may be inserted at a suitable time.

### **Muscle pains (GA)**

These sometimes happen if you have been given a drug called suxamethonium. This is a drug given mainly for emergency surgery when your stomach may not be empty.

## Section 2: **Uncommon** side effects or complications

### Damage to teeth, lips or tongue (GA)

During a general anaesthetic it is possible for your teeth to be damaged. This happens in about one in 4,500 general anaesthetics. Serious damage to the tongue is rare. Minor damage to the lips or tongue is very common.

General anaesthesia is a state of controlled unconsciousness. When you are anaesthetised, you will become less able to breathe freely through your nose or mouth. The anaesthetist will choose a way of making sure that you can breathe properly. This is essential for your safety and usually requires an artificial airway or breathing tube to be placed in your mouth or throat. Insertion of these devices can cause damage to the teeth or soft tissues of the mouth or nose. Lacerations or bruising to the lips and tongue are very common, probably occurring in about one in 20 general anaesthetics. These injuries heal very quickly and can be treated with simple ointments such as Vaseline.

Teeth or dental work such as crowns, bridges or veneers may be broken, chipped, loosened or completely removed by accident. The most frequently damaged teeth are the upper maxillary incisors (top front teeth). Damage to a tooth requiring subsequent removal or repair occurs in about one in 4,500 general anaesthetics. Rarely pressure from an airway device causes damage to nerves which control movement and sensation in the tongue. This causes numbness and loss of normal movement of the tongue for a period of time. These changes are almost always temporary, with recovery taking a few weeks or months.

The use of artificial airway devices to keep you breathing safely after you are anaesthetised is not always straightforward. Anaesthetists are trained in the use of airway devices but even in skilled hands there may be some difficulty and a certain amount of force is used. This can sometimes lead to damage to teeth, lips or tongue.

For major operations on the chest, abdomen, head, neck or spine you will need a tracheal tube to be placed through your mouth or nose into your trachea. This is usually done after you are anaesthetised. The instruments used to place this tube may cause damage, especially if placement is difficult. Other types of tube may be used for other operations and these carry less risk of damage to teeth. The surgeon can also damage your teeth, lips or tongue during operations in the mouth or throat including examinations under anaesthetic of the throat, the lungs or the oesophagus (gullet).

You will usually be asked to remove false teeth before a general anaesthetic. This is because they be displaced or damaged as your anaesthetist places the artificial airway device.

Occasionally you may be asked to leave your false teeth in place. This is most likely to be if you have teeth of your own in amongst the false teeth and your anaesthetist thinks that the false teeth will help protect your own teeth. In this case there is a risk that the false teeth may be damaged.

Anyone undergoing an anaesthetic is at risk of damage to teeth. The anaesthetist will assess your airway before the anaesthetic starts and may need to look in your mouth, ask you to move your neck and ask about your teeth and if you have any caps, crowns or loose teeth.

The anaesthetist will be able to tell you if you have any features that predict difficulty in inserting tubes into the airway. However difficulties may also arise unexpectedly.



Certain factors associated with difficulty include:

- reduced mouth opening
- reduced neck movement
- prominent upper teeth or small lower jaw
- certain medical conditions such as rheumatoid arthritis and ankylosing spondylitis
- pregnant women requiring an emergency general anaesthetic
- people who are very overweight.

The following people have a higher risk of damage to teeth:

- Anyone with one of the above factors mentioned.
- Anyone with teeth in poor condition (large amounts of decay or failing dental work).  
Nearly two thirds of injuries happen to people with teeth in poor condition.
- Anyone having an operation or examination of the mouth, neck, jaw or oesophagus.
- Anyone who has to have a tracheal tube inserted after the operation has started. This is sometimes necessary if the existing airway becomes unsatisfactory during the operation and insertion of the tracheal may be more difficult.

All anaesthetists are trained to be aware of the potential for damage to teeth. They will take care during the insertion of airway devices and excessive force will be avoided as much as possible. If you have any feature that predicts difficulty with airway devices your anaesthetist will choose a suitable technique which will allow safe insertion. This should be discussed with you beforehand.

Teeth may be protected with mouth guards but there is no evidence to support their routine use. However, if you are of a high risk of damage to teeth the anaesthetist or surgeon may choose to use a mouth guard.

If your teeth or gums are in a poor condition or any teeth are loose it is important to visit your dentist before a planned operation for a check-up and dental assessment. Alert the anaesthetist to any loose teeth or dental work before your operation.

If you know there have been difficulties with placing a tube in your airway or you have had damage to your teeth during a previous anaesthetic it is important to tell your anaesthetist. You should tell someone involved in your care as early as possible as it may be necessary to find out exactly what happened.

If the anaesthetist tells you there were difficulties it is helpful to know what they were. If you are not sure ask the anaesthetist to write them down so that you can show any future anaesthetists.

If your teeth are damaged during an operation, your operation will usually proceed as planned. If a tooth has become completely dislodged it must be secure or removed before you wake up.

If there is chipping or cracking of a tooth the anaesthetist will record the damage and you will be informed when you have recovered. Immediate treatment will involve pain relief if required and an explanation of what has happened. The tooth may require repair, re-implantation or extraction depending on the nature of the injury and pre-existing health of the tooth. Damage to veneers, crowns or bridges may require repair.

Guy's and St Thomas' NHS Foundation Trust has a dental department so arrangements can be made for you to be seen by a dentist.

## Breathing difficulties (RA & GA)

Some pain relieving drugs can cause slow breathing or drowsiness after the surgery. If muscle relaxants are still having an effect the breathing muscles may be weak. These effects can be treated with other drugs.

## An existing medical condition getting worse (RA & GA)

The anaesthetist will always make sure that you are as fit as possible before your surgery. However, if you have had a heart attack or stroke, it is possible that it may happen again, as it might even without surgery. Other conditions such as diabetes or high blood pressure will also need to be closely monitored and treated.

## Awareness (GA)

When you have a general anaesthetic, you become unconscious. The anaesthetist decides how much anaesthetic you need to keep you unconscious during your operation. Awareness is when you become conscious during your operation and can remember things that happened. This is an uncommon event, but it can be distressing.

The majority of patients who are aware do not feel any pain, but may have memories of events in the operating theatre. Dreaming around the time of operation is very common (six in 100) but this is not awareness. Some patients recall events from the recovery period and mistakenly believe them to be memories from during the surgery.

Awareness happens when you are not receiving enough anaesthetic to keep you unconscious. Anaesthetics have side effects that increase as more anaesthetic is given. These include falling blood pressure and reduced breathing. The anaesthetist is present throughout the whole operation and uses clinical judgement and experience to ensure that you are receiving enough anaesthetic to keep you unconscious but not so much that you suffer serious side effects.

Anaesthetists sometimes use muscle relaxing drugs as part of the anaesthetic. These drugs stop your breathing and a ventilator (breathing machine) will be used to do the breathing for you. For some operations these drugs are essential as they allow the surgeon access to parts of your body that could not otherwise be reached. These drugs also allow lighter levels of anaesthetic to be used and this reduces dangerous side effects. Muscle relaxants also prevent movement and the anaesthetist uses information from monitors (heart rate, blood pressure and anaesthetic gas levels etc) to judge whether you are unconscious or not.

Awareness occurs if the amount of anaesthetic needed to keep you unconscious is not enough. It can also happen if the equipment that delivers the anaesthetic to your body is malfunctioning or there may be a combination of these.

A recent survey of over 80,000 patients published in 2007 found that one in 14,000 people having a general anaesthetic experienced awareness. Most of the cases of awareness were in people who had certain risk factors. If no risk factor is present the risk was one in 42,000 anaesthetics. Awareness is more likely if you are having open heart surgery, obstetric surgery or surgery after a major accident.

Over half of aware patients can recollect sounds and conversations within the operating theatre. You may be unable to move and have feelings of anxiety and panic. Approximately a quarter of aware patients are aware of the insertion or presence of the tracheal tube in their throats. Pain is experienced by about one third of aware patients.

People who have been aware during a general anaesthetic may subsequently suffer anxiety and fear of anaesthetics

If you think you have been aware the anaesthetist will want to know about it as you will benefit from talking about it and understanding how it might have happened.

## **Section 3: Rare or very rare side effects or complications**

### **Damage to the eyes (GA)**

During a general anaesthetic it is possible for eyes to be damaged.

The most common type of damage to the eye that can occur during or after a general anaesthetic is a corneal abrasion. The cornea is a superficial clear layer of the eye. An abrasion is a tear or graze of this layer. Corneal abrasions often heal without long-term effects on vision but a scar usually remains on the cornea. This may not be noticed during normal vision or it may leave a dark spot in the field of view. Other types of damage to the eye are rare or very rare. There may be accidental trauma to the eye or unintended pressure on the eyeball during the operation. Pressure is more likely if you need to be turned face down for your operation. Anaesthetists are trained to take great care to position your head and neck but it can be difficult to achieve a good position when you are face down especially in people who are over weight.

About one in five (20%) of corneal abrasions happen due to direct trauma or to chemicals getting in the eye. Trauma can be due to your eyes rubbing on bed linen or sterile surgical drapes and anaesthetic or surgical equipment may touch the exposed area. Most abrasions happen because your eye does not close fully during the anaesthetic and the cornea becomes dry.

Approximately six out of 10 people having a general anaesthetic do not close their eyes naturally. In addition a general anaesthetic reduces the rate of tear production. The dry cornea may stick to the inside of the eyelid and the abrasion occurs when the eye is opened again.

Corneal abrasions are usually very painful. Healing takes a few days after which the pain will stop completely. The treatment is aimed at keeping the eye as still as possible. It may involve eye-drops, ointments and an eye patch as well as pain relieving medicines. No surgical treatment is necessary.

When it is healed there will be scar on the cornea. The effect of the scar on vision will depend on how big it is and where it is on the cornea. Many corneal abrasions heal and leave no effect on vision although an eye specialist will be able to see the scar using a slit lamp to examine the eye closely. Contact lens users should take advice before using contact lenses again. Occasionally the abrasion will be right in the centre of the cornea and there may be some long term blurring of vision.

Corneal abrasions can usually be prevented by careful protection of the eye. Tape should be used to close the eye fully in all people having a general anaesthetic and this needs to be removed with care as bruising of the eyelid can occur especially if you bruise easily.

Another method of protection is to put aqueous gel or paraffin-based ointment into the eyes. This may be necessary for some operations when the surgeon needs to look in the eyes during surgery. However there are some reports of the ointments and gels causing irritation for a few hours after the anaesthetic. Redness of the eye, blurred vision and a feeling there is something in the eye may occur for up to eight hours.

If eye protection is not used corneal abrasions are very common. If protection is used corneal abrasions have been shown to happen in one in 600 patients having a general anaesthetic but this rises to one in 140 in patients who are turned face down for the operation. Your anaesthetist will therefore take care to protect your eyes during your anaesthetic.

The possibilities of other injuries described below are from medical literature but are so rare that overall figures about how often they happen are not available.

Possibilities of damage include:

- Pressure on nerves in the eyebrow area causing a droopy eyelid
- Pressure on the eyeball itself. This can cause dislocation of the lens of the eye or even blindness. Blindness can be due to detachment of the retina (the light detecting layer inside the eye) or pressure on the optic nerve (the main nerve to the eye) or blockage of the main artery to the eye.

### Serious allergy to drugs (RA & GA)

When you have an anaesthetic you will receive a number of drugs. These may include: injections into a vein or a muscle, anaesthetic gases, capsules, tablets or liquids to swallow and suppositories. You may also be given fluids into a vein to prevent dehydration and you will be in contact with cleaning fluids and equipment in the operating room. All these things can cause allergic reactions of varying severity.

Anaphylaxis is an extreme form of allergy. Allergic reactions can happen in response to many things. Pollen, dust, bee-stings, nuts and antibiotics are common causes. These things are called antigens. Rarely anaphylaxis happens during an anaesthetic, either caused by one of the anaesthetic drugs or by other substances used during the operation.

We encounter thousands of antigens in everyday life and they usually do us no harm. Sometimes the body makes substances called antibodies which are special to each antigen and recognise the antigen if they meet it again in the future. This is known as sensitisation. If the antibodies meet the same antigen at a later date the antibodies may react against the antigen and cause the release of histamine and other chemicals. These substances cause the symptoms of allergy. If only small amounts of mediators are released the symptoms are minor, for example hay fever or skin rashes. If very large amounts are released rapidly there may be severe wheezing, low blood pressure or swelling inside the throat and this is called anaphylaxis.

In extreme cases anaphylaxis can be life threatening. There are other types of reaction which appear similar to those due to the antibodies and there are a number of mechanisms for them.

These are called non-allergic reactions. It can be more difficult to identify the cause of these reactions. Anaphylaxis is treated by:

- any medicine thought to have caused it is stopped immediately
- if the pulse is weak the person should be laid flat on their back with their legs raised
- adrenaline is the most effective drug treatment
- oxygen and an intravenous fluid drip
- antihistamines, steroids and asthma treatment might be needed.

Usually the symptoms will settle down quickly but continued observation will be required. Treatment in the intensive care unit (ICU) may be needed. All anaesthetists are trained in how to treat anaphylaxis. Adrenaline is immediately available in every operating theatre.

It is important that any episode of anaphylaxis is investigated to confirm which substance has caused it so it can be avoided in future. Investigation includes blood tests and skin testing. An estimate of the frequency of a life-threatening allergic reaction during anaesthesia is one in 10,000 to one in 20,000 with the chance of death being one in 200,000 to one in 400,000.

The most common causes of anaphylaxis during anaesthesia are:

- muscle relaxant drugs used to prevent movement during surgery
- latex used in surgical gloves and other equipment in the operating theatres
- antibiotics which are often needed during surgery.

Routine preoperative skin testing for anaphylaxis is not recommended as a negative result does not guarantee that you will not have a reaction and also you may become sensitised to a common chemical similar to anaesthetic drugs after you have had the test.

The exception to this is latex allergy. If you have symptoms of latex allergy, for example itching or rash after exposure to balloons, rubber gloves or condoms then you should be tested before your operation.

You may already know that you are allergic to a substance before you come into hospital. You will be asked several times whether you have any allergies and you must pass this information to the health professional looking after you. If your allergy is serious you may be advised to wear a Medic-Alert bracelet.

## **Nerve damage associated with an operation under general anaesthetic (GA)**

The nervous system consists of the:

- Central nervous system which comprises the brain and the spinal cord. The brain acts a 'central processor' of the system. The spinal cord carries electrical signals away from the brain to nerves supplying muscles and organs it and also carries signals from nerves which supply the sense organs towards the brain. These signals allow you to feel touch, pain, position and hot/cold.
- Peripheral nervous system. The peripheral nerves include motor nerves (controlling muscles) and sensory nerves (bringing information about touch, pain and other sensations). Some nerves are mixed.

Symptoms caused by peripheral nerve damage include:

- If sensory nerves are damaged you may feel numbness, tingling or pain. The pain can be a continuous aching pain or a sharp shooting pain. You may also get inappropriate warm or cold sensation
- If motor nerves are damaged, there may be weakness or paralysis (loss of movement) of muscle in that area.
- If mixed nerves are damaged there will be a mixture of the above symptoms.

The area affected varies according to the nerves damaged from a small patch of numbness to most of a limb being affected.

Damage to the spinal cord usually affects both muscle power and sensation depending on where the damage has happened. Unfortunately spinal cord damage is often extensive, with pain being a frequent feature. Control of the bowels and bladder can also be affected.

Peripheral nerve effects are variable. If the changes you notice are slight they may resolve in a few days but often it will take several weeks. Most symptoms resolve within three months. Full recovery can sometimes take up to a year or even longer. Rarely (less than one in 10,000) nerve damage occurs that is permanent.

Spinal cord effects unfortunately are usually permanent. This is very rare occurring in less than one in 50,000 anaesthetics.

The most common nerve injuries are the ulnar nerve at the elbow and the common peroneal nerve at the knee.

The ulnar nerve of the arm can be compressed at the elbow where it is close to the skin. It causes numbness in the fourth and fifth fingers and/or weakness in the hand muscles.

The common peroneal can be damaged on the outside of the leg, just below the knee. This can cause foot drop (an inability to raise the foot off the ground) and/or numbness on the front of the foot.

If there is nerve damage the anaesthetist or surgeon may arrange for you to see a neurologist.

Treatment may include physiotherapy and exercise. If you have pain this will be treated with drugs. Drug treatment is not always successful in relieving this pain. Occasionally an operation can be done to repair a nerve or to relieve pressure on a stretched nerve.

Peripheral nerves can be damaged by compression, stretching, surgical damage, inadequate blood supply, insertion of a cannula or an unknown cause.

Compression and stretching can be caused during an operation as you will be placed in a certain position to allow the operation to be done. You may need to lie on your front to allow surgery on your back. If you were awake you would feel this and move to relieve any discomfort but during an anaesthetic you cannot do this.

If a tourniquet is used to reduce surgical bleeding there can be nerve damage due to compression.

Surgical damage may be caused by the surgeon cutting a nerve or injuring it with the diathermy instrument used to stop bleeding. Surgical instruments can also compress and/or stretch a nerve. During some operations this will be difficult to avoid.

Every nerve is supplied by blood vessels which keep it healthy. If these blood vessels are damaged during the operation or if the blood supply is reduced the nerve can be starved of oxygen. This damage is slightly more likely if you have narrowing of your blood vessels generally (you may know you have coronary artery disease or narrowed blood vessels elsewhere).

Insertion of a cannula or a 'drip' can damage nerves by way of the needle used to introduce the cannula into a vein or artery.

Unfortunately the mechanism of injury is unclear in the majority of cases of nerve injury associated with surgery and general anaesthesia.

Nerve damage can be associated with a peripheral nerve block with local anaesthetic and regional anaesthetic injections such as spinal and epidural injections.



**Prevention of peripheral nerve damage:**

The anaesthetist, surgeon and theatre staff take care to try and prevent nerve damage. They share the responsibility of minimising the risks by:

- careful padding of vulnerable areas
- positioning you in a way which avoids stretching nerves
- surgical awareness of the risk
- avoiding prolonged bed rest.

Increased risk of nerve damage occurs:

- With certain positions such as lying on your front for back surgery, lying on your side for chest or kidney surgery, lying on your back with your legs raised for surgery in the genital area or the position your arm is placed for some shoulder operations.
- Certain operations including operations on the spine or brain, cardiac or vascular surgery, operations on the neck or parotid (a gland in the face), some kinds of breast surgery and operations where a tourniquet is used to reduce bleeding (knee, foot, hand operations mainly).
- Previous disease such as diabetes, rheumatoid arthritis or atherosclerosis.
- Increasing age.
- Being overweight or very thin.
- Being male (men have increased risk of ulnar nerve damage).

Spinal cord damage is very rare. Unfortunately compared to peripheral nerve damage it is more likely to result in permanent serious disability. This is because the spinal cord cannot grow back and heal unlike peripheral nerves which can re-grow.

Compared to peripheral nerve damage spinal cord injury is rarer, more likely to be disabling, more likely to be permanent and more often associated with pre-existing disease. The main cause of spinal nerve damage with a general anaesthetic is an inadequate blood supply to the spinal cord. Other causes of spinal cord damage during an operation are not related to the anaesthetic and happen during surgery on or near the spine itself. Inadequate blood supply to the spinal cord can happen due to low blood pressure, a clot blocking the blood vessels, compression or stretching of blood vessels making them narrower as this may cause oxygen starvation of the spinal cord leading to damage.

The exact incidence of nerve damage is not known. The following figures are the best information available:

- The risk of a significant peripheral nerve injury lasting more than 3 months is estimated to be less than one in 2,000 patients having a general anaesthetic. Permanent damage lasting more than one year is estimated to be less than one in 5,000.
- Spinal cord damage occurs in less than one in 50,000 patients having a general anaesthetic.
- More minor symptoms may occur much more frequently, perhaps as high as one in 100 people having a general anaesthetic but most recover completely.

If you think you may have nerve damage after you have left the hospital go to your GP for advice.

## Nerve damage associated with a spinal or epidural injection (RA)

Nerve damage is a rare complication of spinal or epidural anaesthesia. It is usually temporary. Permanent nerve damage resulting in paralysis (loss of the use of one or more limbs) is very rare.

A single nerve or a group of nerves may be damaged. Therefore the area affected may be small or large. In its mildest form you can get a small numb area or an area of 'pins and needles' on your skin. There may be areas of your body that feel strange and painful. Weakness may occur in one or more muscles. The most severe (and very rare) cases give permanent paralysis of one or both legs (paraplegia) and/or loss of control of the bowel or bladder.

The majority of people make a full recovery over a period of time between a few days to a few weeks. Permanent damage is very rare.

Nerve damage can be caused by a spinal or epidural injection for the following reasons: direct injury caused by a needle/catheter, haematoma (a blood clot), infection, inadequate blood supply or other causes

- **Direct injury.** This can occur if the epidural /spinal needle or the epidural catheter damages a single nerve or group of nerves or the spinal cord. Contact with a nerve may cause 'pins and needles' or a brief shooting pain. This does not mean that the nerve is damaged but if the needle is not repositioned damage can occur. If this happens try to remain still and tell your anaesthetist about it. The anaesthetist will change position of the needle and the sensations will usually improve immediately. Most cases of direct damage are to a single nerve and temporary. Injecting drugs right into the nerve rather than into the area surrounding it can also cause direct damage.

The estimated incidence of direct nerve damage from spinal/epidural injection is one in 50,000 with an incidence of permanent harm of one in 101,000.

- **Haematoma.** This is a collection of blood near the nerve, which collects due to damage to a blood vessel by the needle or the catheter. Small amounts of bleeding or bruising are common and do not cause damage to the nerve. A large haematoma may press on a nerve or on the spinal cord and cause damage. Occasionally an urgent operation is required to remove the haematoma and relieve the pressure. The incidence of haematoma is estimated as one in 55,000 with an incidence of permanent harm of one in 66,000.

If your blood does not clot normally or you take a blood-thinning medicine (anti-coagulant) such as warfarin or heparin, you are more likely to get a haematoma. You will need to stop these medicines before you can have an epidural or spinal injection. However you must discuss this with your surgeon and anaesthetist as sometimes it may not be advisable to stop them. It is important that you tell the anaesthetist about any problems with blood clotting that you have had in the past as you may not be able to have an epidural or spinal injection.

- **Infection.** Most infection related to a spinal or an epidural are local skin infections and do not cause nerve damage. Very rarely an infection can develop close to the spinal cord and major nerves. There may be an abscess (collection of pus) or meningitis. These infections are very serious and require urgent treatment with antibiotics and/or surgery to prevent permanent nerve damage.

The incidence of epidural abscess after a peri-operative epidural/spinal is one in 24,000 with an incidence of permanent harm of one in 52,000.

If you have a significant infection elsewhere or if you have a weak immune system, you have a higher risk of serious infections and may be unable to have a spinal/epidural injection.

- **Inadequate blood supply.** Low blood pressure is common when you have an epidural or spinal injection. If the drop in blood pressure is large and/or prolonged, this can reduce the blood flow to nerves and rarely can cause nerve damage. Anaesthetists use both drugs and intravenous fluid to prevent/treat this.
- **Other causes.** There have been cases of the wrong drug being given in an epidural or spinal injection. This is an exceptionally rare event.

If you have nerve damage you should not assume that it is caused by the epidural/spinal injection. There are other causes of nerve damage related to having an operation (see below).

### **Prevention of nerve damage**

Anaesthetists are trained to be aware of nerve damage and steps are taken to prevent each kind of damage mentioned. These include:

- **Prevention of direct injury.** All anaesthetists performing epidural and spinal injections are trained in these techniques. Spinal injections are placed below the expected lower end of the spinal cord. This should prevent damage to the spinal cord itself. Spinal injections are usually performed while you are awake or lightly sedated. If there is pain or tingling due to contact with a nerve you will be able to warn the anaesthetist. The anaesthetist may do the epidural while you are awake. Direct nerve injury after an epidural nerve injection is rare and there is no clear evidence about whether it is safer to do the epidural while you are awake or after general anaesthesia has been given.
- **Haematoma prevention.** If you take an anti-coagulant (a drug which thins the blood, such as warfarin), you will be asked to stop it several days before surgery IF your doctors think it is safe to do so. The anaesthetist and surgeon will decide if and when the drug should be stopped. A blood test will allow the anaesthetist to decide if it is safe to have a spinal or epidural injection. If your anti-coagulation cannot be safely stopped then you will not be able to have an epidural or spinal injection.

If you take aspirin you can have an epidural or spinal injection. However your surgeon may ask you to stop taking the aspirin to help prevent bleeding during the operation.

- **Infection prevention.** All epidural and spinal injections are performed under sterile conditions similar to those used during the operation. Your back should be kept clean and regularly checked over the next few days.

If you have an epidural or spinal injection the nurses will make regular checks until everything returns to normal. This should help identify possible nerve damage very early and if treatment is needed it can be started immediately.

If it is thought you have nerve damage the anaesthetist or surgeon may arrange for you to see a neurologist. Tests may be done to try and find out exactly where and how the damage has occurred. This may involve; nerve conduction studies (when very small electrical currents are applied to the skin or muscle and recordings are made of the nerve which show whether or not it is working), magnetic resonance imaging (MRI) or computed tomography (CT) scanning. Treatment may involve physiotherapy, exercise, drugs and occasionally an operation to repair a nerve or relieve pressure on a stretched nerve.

### Equipment failure (RA & GA)

Pipes bring anaesthetic gas (nitrous oxide), piped air and oxygen into the operating theatre and connect these to the anaesthetic machine. If you are having a general anaesthetic the machine mixes these with a volatile anaesthetic agent (a vapour).

A breathing system made of light plastic tubing delivers these gases from the anaesthetic machine to the patient. A plastic bacterial filter is placed at the end of the breathing system and this is connected to a face mask or a tube placed in your throat.

During some anaesthetics you will be breathing for yourself. However in some general anaesthetics a machine (ventilator) is used to take over your breathing.

Monitors are used to measure your heart rate, blood pressure, your blood oxygen level and the amount of anaesthetic gases, oxygen and carbon dioxide in your breath.

An anaesthetist and a trained assistant are present throughout your anaesthetic and pay constant attention to you and the equipment being used. There are also audible and visual alarms on the monitoring used.

Equipment is designed to prevent misuse or mistakes. For example anaesthetic gases cannot be administered without oxygen as they have a device that prevents low oxygen levels in the gas mixture you breathe.

Anaesthetic machines are regularly serviced. It is the responsibility of the anaesthetist to check anaesthetic equipment at the beginning of each operating session.

If equipment fails there is:

- In the event of oxygen supply failure there is a back-up oxygen cylinder on each anaesthetic machine.
- If the anaesthetic gases fail drugs may be given into a vein to maintain anaesthesia.
- If the ventilator fails there is a self-inflating bag system that can supply air to the patient. Replacement equipment is also available in the theatre area.
- In the event of power failure a generator should take over without any loss of power supply. This generator is tested regularly.

It is very rare for equipment failure to have serious consequences for the patient.

## Death or brain damage (RA & GA)

Deaths caused by anaesthesia are very rare. It can be difficult to separate the risks of surgery and the risks of anaesthesia when considering what happens during an operation. Your surgeon will be able to tell you more about the specific risks of your operation. There are four main reasons why deaths occur during anaesthesia:

- There may be issues about your health or the type of operation that increase the risk of dying during a general anaesthetic. These include increasing age, major surgery on your heart, lungs, brain, major blood vessels or your bowels, emergency surgery (including surgery for major trauma) and being very unwell before your operation
- There may be an allergic reaction to the drugs given
- The surgeon may make a mistake or the surgery may be very difficult to achieve without damage.
- The anaesthetist may make a mistake or a misjudgement perhaps by giving too much of a drug or giving the wrong drug. Modern anaesthetic techniques, training, monitoring and equipment mean that deaths caused by anaesthetic errors are very rare, occurring in about one in 185,000 general anaesthetics in the United Kingdom.

Deaths caused by anaesthesia are very rare, and are usually caused by a combination of four or five complications together. There are probably about five deaths for every million anaesthetics in the UK.

More than 90% of the deaths that do occur around the time of surgery are not directly caused by the anaesthetic.

If you are a healthy patient having non-emergency surgery severe brain damage is very rare. Exact figures for this risk do not exist. However the risk of having a stroke that causes brain damage during general anaesthesia increases for those who are elderly, have had a previous stroke and those having surgery to the brain, head and neck, carotid artery surgery or heart surgery.

Most strokes occurring around the time of surgery are not directly related to the general anaesthetic. Most strokes occur two to 10 days after surgery and are due to the combined after-effects of the surgery and the anaesthetic together with the condition of the patient before the operation.

## Further information

The majority of information contained in this booklet has been obtained from '*You and your anaesthetic*' and '*Anaesthesia Explained*' by The Royal College of Anaesthetists and The Association of Anaesthetists of Great Britain and Ireland, '*Risks associated with your anaesthetic*' by The Royal College of Anaesthetists and '*Brachial plexus block for arm, hand or shoulder surgery*' by Dr K MacLennan and Dr S Roberts from The Royal College of Anaesthetists, Directory of Quality Assured Patient Information Materials.

NICE Guidance June 2003- Routine tests carried out before a planned surgical operation

Further information regarding your anaesthetic may be found at: [www.youranaesthetic.info](http://www.youranaesthetic.info) and [www.rcoa.ac.uk](http://www.rcoa.ac.uk)

## Your feedback

We are always happy to receive feedback about the care we provide. Good or bad, your comments are important to us and help to improve our service. Comments boxes and forms are available in most departments. The PALS service is also available (see below). From time to time, we will also ask you directly to comment on the care you have received from a particular member of staff. All doctors are legally obliged to be the subject of patient feedback every few years as part of maintaining their licence to practise. This is part of what we call 360 degree feedback. If you are asked to provide this feedback, please be as honest and fair as you can be. Rest assured that your feedback will remain confidential. You will not be identified by your doctor or anyone else unless you choose to include extra details which allow you to be identified. It will not change the treatment you receive as an individual, but it could help improve care for everyone in the future.

### Contact us

If you have any questions or concerns about having an anaesthetic, please ask your doctor, nurse or anaesthetist for more information.

### Pharmacy Medicines Helpline

If you have any questions or concerns about your medicines, please speak to the staff caring for you or call our helpline. **t:** 020 7188 8748 9am to 5pm, Monday to Friday

### Patient Advice and Liaison Service (PALS)

To make comments or raise concerns about the Trust's services, please contact PALS. Ask a member of staff to direct you to the PALS office or:

**e:** 020 7188 8801 at St Thomas' **t:** 020 7188 8803 at Guy's **e:** [pals@gstt.nhs.uk](mailto:pals@gstt.nhs.uk)

### Knowledge & Information Centre (KIC)

For more information about health conditions, support groups and local services, or to search the internet and send emails, please visit the KIC on the Ground Floor, North Wing, St Thomas' Hospital. **t:** 020 7188 3416

### Language support services

If you need an interpreter or information about your care in a different language or format, please get in touch using the following contact details.

**t:** 020 7188 8815 **fax:** 020 7188 5953

### NHS Choices

Provides online information and guidance on all aspects of health and healthcare, to help you make choices about your health. **w:** [www.nhs.uk](http://www.nhs.uk)

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