

Further information about having an anaesthetic

This information is for adults expecting to have an operation that requires 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 our short booklet, [Having an anaesthetic](#). This longer leaflet is for people who want to know more about the whole process or about a specific subject such as side effects.

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

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What is an anaesthetic?

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

Local anaesthetic

A local anaesthetic is given by injection to numb a part of your body. You stay awake but don't feel pain.

Regional anaesthetic

This is 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.

General anaesthetic

A general anaesthetic produces 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 safety and wellbeing throughout your surgery, and they will plan your pain control with you.

Before you come into hospital

To prepare yourself for your operation you should:

- Stop smoking. 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. Losing weight will reduce many of the risks of having an anaesthetic.
- Increase your physical activity, as improving your fitness will improve recovery after your operation.
- See a dentist if you have loose or 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, a thyroid disorder, epilepsy or high blood pressure.
- **Bring all your medications to hospital with you, including prescription medicines, medications you have bought over the counter, and alternative medicines such as herbal remedies.**
- Follow the fasting ('nil by mouth') instructions 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 the 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. Tell staff if you feel cold.

Health check before your anaesthetic and surgery

You will have a health check before your operation. This may be at a preoperative 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.

A nurse will usually see you at the pre-assessment clinic, and you will only be referred to see an anaesthetist if more extensive planning before your surgery is needed. If you are not asked to attend a pre-assessment clinic, your assessment will be done by a doctor or nurse when you are admitted to hospital.

Your health check is necessary to make sure that you are fit and well enough to have your operation. You will be asked questions about your health and if any tests are required, such as blood tests, an electrocardiograph (ECG) or a 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 before your operation, you will not normally 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
- any problems you have had with previous anaesthetics
- any family members who have had problems with anaesthetics that you know of
- any chest pain or shortness of breath you may have
- whether you have heartburn
- 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 and/or use recreational drugs
- any prescription, over-the-counter and/or alternative medicines you take.

All women of childbearing age will be asked if there is any chance that they may be pregnant. The anaesthetic and surgery pose a risk to an unborn baby, therefore if there is any chance you could be pregnant you will need to have a pregnancy test before a decision is made about whether to operate. Usually elective (non-emergency) surgery will be postponed if you are pregnant. If the operation cannot be postponed, your anaesthetist and surgeon will need to be informed of your pregnancy.

Fasting or 'nil by mouth' instructions

If you are having a general or regional anaesthetic, you will be required to fast on the day of your operation. This usually 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 should be given clear instructions if you need to fast. It is important to follow the instructions given below, as 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. 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). If you are in any doubt, please ask.

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 toast or cereal with tea or coffee before 7am.
- 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 stick to the fasting times above.

For certain procedures, there are different fasting instructions which involve taking carbohydrate-loading drinks. If this applies to your procedure, you will be told 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 your surgery – with a sip of water before 6am for morning surgery and before 11am for afternoon surgery – unless your anaesthetist or surgeon has asked you not to.

If you take medication to thin your blood (such as antiplatelet medicines, for example aspirin or clopidogrel, or anticoagulant medicines, for example warfarin or rivaroxaban), medicines for diabetes, or herbal remedies you will need to be given specific instructions. Be sure that you receive these instructions and take careful note of them.

Meeting the anaesthetist before your operation

You will meet the anaesthetist before your operation, on the ward or in theatre. The anaesthetist will make every effort to meet you on the ward, but if this is not possible you will be assessed by another member of the team. They 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.

Other issues the anaesthetist may discuss with you:

Premedication (premed)

This is the name for medicines given before an anaesthetic which 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, you may need to leave at a later time. 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.

Postponement of your operation

Occasionally the anaesthetist might find something about your general health that could increase the risks of you having an 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 high dependency unit (HDU), overnight intensive recovery (OIR) or the intensive care unit (ICU). If this is planned (for example after cardiac surgery) it will be discussed with you beforehand and you will be informed of what to expect.

Consent – asking for your consent

We want to involve you in 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 do decide to go ahead, you will be asked to sign a consent form. This states that you agree to have the treatment and you understand what it involves.

The consent form is signed after you are seen by your surgeon and you fully understand what the operation is likely to involve, including the benefits, 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 so, you will be asked by one of the doctors or nurses to confirm that you have signed the form and still want to proceed with surgery. If you did not sign the form in Outpatients then the surgeon will ask for your written consent 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.

Going to the theatre suite for your operation

You will go to the anaesthetic room with a nurse if you were admitted to the ward prior to your surgery. Otherwise, theatre staff will collect you from the Admissions Lounge. If accompanied by a nurse, they 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 with your name, date of birth and hospital number, and will ask you for details about your health from your medical records, as a final check to ensure that you are having the correct operation. They will also check the consent form that you have signed.

If you still have any unanswered questions or concerns in the anaesthetic room, then say so.

Types of 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 is 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 are 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 are free from pain. Epidurals may be used during and/or after surgery for pain relief.
- A general anaesthetic produces a state of controlled unconsciousness during which you feel nothing. It is essential for many operations and you will be 'asleep' for the entire procedure.

If you are having a local or regional anaesthetic, you can 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 sleep-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 anaesthetic (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.

General anaesthetics

The start of 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.

- Anaesthetic drugs are injected through a thin plastic tube (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. This is the usual method used for adults.
- Anaesthetic gases and oxygen are breathed in through a mask. This method 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 lightheaded 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 onto 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 drugs and giving you the 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) which 'breathes' 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 that 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 that 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. A 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 or discharged home.

How long you have to wait before you can eat and drink again will depend on the operation you have had. 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 or drink within an hour of regaining consciousness. Ask the staff on the ward if you are unsure as to whether or not you are allowed food and drink.

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 in getting you into the correct position, tell if the needle causes you pain, and let the anaesthetist know when the anaesthetic is taking effect. The type and site 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 at Guy's and St Thomas' 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 usually take only a few minutes to work and last about two hours. They cannot be topped up to make them work for longer. A needle is inserted between the bones of your back, through ligaments and then through the dura (the membrane that encloses the nerves and spinal cord). Spinal injections are usually performed below the lower end of the spinal cord. 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 then removed. The catheter stays in place and 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 or epidural regional anaesthetic

The regional anaesthetic block is usually given 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 or 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 can feel any tingling or pain that feels like electric 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 members of staff will be in the theatre to care for you during your surgery. If you are not already on the operating table, you will be moved across from the trolley onto the 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 area of the body that is being operated on, so you will not see the operation unless you want to and this is practical. The anaesthetist is always near to you and you can speak to him/her at any time.

Once the nerve block has been given, 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 – the time it takes ranges from one to 24 hours depending on the type of anaesthetic injection.

Benefits of having a spinal or epidural injection

These 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 anaesthetics

Possible side effects and complications 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, where a high dose becomes toxic
- a feeling of numbness and heaviness of the limb after the operation
- rarely, a possibility of nerve damage.

Other side effects and complications are discussed on page 13.

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 supply 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. 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 monitors which measure your heart rate, blood pressure and oxygen levels. You will also have a cannula (a short, thin plastic tube) placed in a vein on the back of your hand or arm. This is so that sedation may be given, or a general anaesthetic if you are having one as well as the brachial plexus block, and to allow other drugs to be given if required. The block can be given 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. In most circumstances, an ultrasound machine is used to 'look' directly at the nerve through the skin. A small probe is placed on the skin with cold gel, resulting in an image appearing on the screen. Once the nerve is seen, the needle is used to inject local anaesthetic around it. Occasionally, a nerve stimulator may also be used to locate the nerve. This uses a small electrical current which runs through a needle. This causes the muscle supplied by the nerve to twitch, but this should not be painful. Occasionally your anaesthetist may suggest placing a catheter (a long, very thin tube) through the needle at the same time. The catheter can then remain in place after the needle has been removed and this 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 (on average 10–12 hours). Your arm will be in a sling until the strength has returned. You must ensure that the strength and feeling have 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 concerned.

Benefits of having a brachial plexus block

These 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 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

Possible side effects and complications include:

- Risks due to the local anaesthetic include allergy, which is very rare, as are serious problems such as fits, or heart or breathing problems. Anaesthetists are trained to deal with these emergencies.

Risks to nearby structures:

- If the injection is placed in the side of your neck, side effects can 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 (1 in 1000 patients). This can usually be managed to keep you safe and serious, permanent harm is very rare.
- With all injections, 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. Permanent damage is rare. The risk is the same for all injection sites. An exact measure of the risk is not available, but studies have estimated that nerve damage affects between 1 in 15,000 and 1 in 30,000 people having a brachial plexus block.
- You may notice areas of tingling and/or numbness in your arm, shoulder or hand. This occurs in around 1 in 10 people and can last up to six weeks, or occasionally up to three months.

48 hours after your operation

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 coordination skills can be affected. Please rest at home for a minimum of 24 hours after your surgery. Do not go to work or school the day after your surgery. As it is a minimum of 24 hours that is recommended, we have specified a total number of 48 hours as you may have had your operation in the late afternoon.

For 48 hours after your surgery 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.

You do not need to follow these instructions if you have had a local anaesthetic without sedation.

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 concerned about your condition, please call us. Before you go home you will be given information about who to contact.

Pain control after your operation

The level of pain you experience will depend on the type of surgery you have had. 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 prescribed by 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 for 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 to clear your lungs and prevent chest infections. You will also be able to move around sooner 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).

Types of pain relief

There are various ways of taking painkillers to help keep you comfortable. These include:

Tablets, capsules or liquids

These are used for all types of pain. They take at least 20 minutes to take effect. 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.

Injections

These are often needed immediately after surgery, particularly in recovery, and may be given through your cannula into a vein, or into your leg or buttock muscle using a needle.

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 into a vein in your arm or hand, and a longer tube is attached to this cannula which connects to the PCA pump. You are then 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 and relatives must not press the PCA button.

People 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 PCA to help ensure that your pain is being controlled without you suffering side effects.

Possible side effects of PCA include nausea (feeling sick) and itchiness, which can be treated. Drowsiness may also occur but do not worry about this as the nurses will continue to monitor you while you are asleep.

Local anaesthetic catheters

These are thin tubes the surgeon or anaesthetist can place under the skin, near to your surgical wound or to the nerves that supply the area. Not all operations are suitable for having local anaesthetic catheters.

Each catheter is attached to a pump that contains local anaesthetic. The local anaesthetic blocks pain signals from nearby nerves and should reduce your pain. The pump can be kept running for several days.

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 pump. The medicine bathes the pain nerves in the back. This should block pain sensation from the area of the body that was operated on. 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.

Side effects and complications of epidurals

Possible side effects and complications include:

- Difficulty passing urine. A catheter will be inserted into your bladder, usually while you are in the operating theatre. This will drain your bladder.
- Low blood pressure. Occasionally your blood pressure will fall. You will have an intravenous drip connected to your arm, so you can receive fluids to raise your blood pressure if this happens. 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 it 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 specific 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 epidural is reduced or stopped, this side effect will disappear.
- 'Breakthrough' pain. Sometimes the epidural does not work perfectly. Between 10 in 100 and 30 in 100 (10-30%) people receiving epidurals may still feel some pain. The likelihood of this happening depends on the type of surgery you are having. Often this problem can be corrected by giving extra doses of medication 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 the epidural is inserted you may feel a brief 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, 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 to be 1 in 55,000, and the incidence of permanent harm 1 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

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

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 type of anaesthetic used. If there are risk factors specifically associated with your procedure and anaesthetic 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, such as:

- whether you have any other illnesses
- personal and lifestyle factors, such as smoking or being overweight
- having 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:

1 in 10
Very common

1 in 100
Common

1 in 1,000
Uncommon

1 in 10,000
Rare

1 in 100,000
Very rare

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. These side effects or complications 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 anaesthetic.

Section 1: Very common to common side effects or complications

Nausea and vomiting (GA & RA)

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 - the act of forcefully emptying the stomach or ‘throwing up’.

Feeling sick after an operation or anaesthetic is a common problem. About 1 in 6 people will experience a feeling of sickness after having an operation. A number of different factors may contribute to sickness after surgery, for example:

- the operation you are having
- the drugs that are used
- your gender
- other factors, as mentioned below.

Some operations cause more sickness than others, such as:

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

Some drugs are known to cause sickness, these include:

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

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

If you have been sick after a previous operation, it does not necessarily mean that you will always be sick after every operation. The operation you are having may be different and less likely to cause sickness, and the anaesthetic may be adjusted to decrease sickness.

Other possible causes of sickness include going without food and drink before or after the operation, anxiety, and travelling soon after having the 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.

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

Tips to avoid sickness after your operation:

- Avoid sitting up or getting out of bed too quickly.
- Avoid drinking or 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 could 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 (windpipe) 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 windpipe 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, and is used 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 in the following ways:

- 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 the 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 2 in 5. After a general anaesthetic with a laryngeal mask airway, the risk is thought to be 1 in 5.

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, you are coughing up blood or your voice is hoarse, you should contact your doctor for further advice.

Minor damage to lips or tongue (GA)

Lacerations (cuts or tears) or bruising to the lips and tongue are very common, probably occurring in about 1 in 20 general anaesthetics. These injuries heal very quickly and can be treated with simple ointments such as Vaseline®.

Shivering (GA & RA)

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 it 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 or 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 contribute to this fall in temperature, as they reduce your body's natural ability to control its 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 the intravenous fluids or blood that you receive.

Shivering occurs in about 1 in 4 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 taken. 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. Your shivering should 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 they have side effects.

Itching (GA & RA)

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, antiseptics, stitches or dressings).

Bruising and soreness (GA & RA)

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 (GA & RA)

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 (GA & RA)

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. A 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 (GA & RA)

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

Pain (GA & RA)

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

Confusion or memory loss (GA)

Some people who have 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 often 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 become confused. These events will be treated as part of your normal care, and the mental changes are likely to improve as you recover.

There are two types of confusion that can happen after surgery and an anaesthetic:

- Delirium (postoperative delirium) happens very soon after an operation. It has a number of causes that are usually treatable.
- Cognitive dysfunction (postoperative cognitive dysfunction or POCD) can develop later. The cause of this is not well understood and there is evidence that in a few people its effects may be permanent.

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, or side effects of pain relief medicines
- dehydration
- low oxygen levels, which can be an after-effect of the anaesthetic, or can be due to the effects of medicines on breathing, a 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 diseases such as Parkinson's disease
- previous poor mobility
- previous high alcohol intake
- disorientation 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, nurses, physiotherapists, and occupational therapists (who give you practical help to help you get your independence back in hospital and at home). Family and friends also play a key role as they are familiar to you and they will provide you with reassurance that you are safe.

Occasionally, people do not recover fully and this is because postoperative cognitive dysfunction (POCD) has occurred. POCD is detected in clinical trials (research) 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 which accurately detect changes in someone's ability to carry out the many complex tasks of daily life. Some people score well in the tests but still find they cannot do the things they were able to before. It is therefore difficult to say how often POCD actually 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.

Postoperative chest infection (GA)

After an anaesthetic and operation there is a risk that you may develop a chest infection (this is called 'postoperative' 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 breathing difficulties already and whether you smoke.
- Your body shape, as this can cause increased risks. Being overweight can cause a person to have collapsed parts of their lungs.
- The type of operation you are having (chest and abdominal operations are more likely to cause chest infections).
- 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.
- Your age, as older people are more likely to get a chest infection, but the risk is not much higher if you are older but still fairly healthy.

If you are developing a chest infection you may feel feverish and find breathing more difficult than usual. You are also likely to have a cough and bring up green/yellow phlegm. The cough may be painful 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 normally only lasts a day or two.

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 face mask.
- 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 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 with a different condition.

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

There are various ways to help prevent a chest infection.

- Good pain relief after surgery is important, so you can breathe and cough easily.
- The anaesthetist may suggest using an epidural instead of a general anaesthetic for chest, abdominal and lower limb operations.
- If you are a smoker the most helpful 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 possible 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 in the months and weeks leading up to your operation will help.

Bladder problems (GA & RA)

After certain types of operation and regional anaesthetic, 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 become damaged. This happens in about 1 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.

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. Putting these devices in place can sometimes cause damage to the teeth or soft tissues of the mouth or nose.

Teeth or dental work such as crowns, bridges and 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 1 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.

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 windpipe. 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 may 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 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 there is any reason why there may be difficulty in inserting tubes into your airway. However difficulties may also arise unexpectedly.

Certain factors that put you at higher risk of experiencing difficulties include:

- reduced (small) mouth opening
- reduced neck movement
- prominent upper teeth or small lower jaw
- certain medical conditions such as rheumatoid arthritis and ankylosing spondylitis
- being pregnant and requiring an emergency general anaesthetic
- being very overweight
- teeth being in poor condition (large amounts of decay or failing dental work) - nearly two thirds of injuries happen to people with teeth in poor condition
- having an operation or examination of the mouth, neck, jaw or oesophagus (gullet)
- having to have a tracheal tube inserted after the operation has started.

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 problem that puts you at risk of 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 there were some difficulties during your procedure, your anaesthetist will provide you with a letter specifying what went wrong. It is very important to keep this letter and show it to 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 the 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 (GA & RA)

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 (GA & RA)

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.

Section 3: Rare to very rare side effects or complications

Awareness (GA)

When you have a general anaesthetic, you become unconscious. Accidental awareness is becoming conscious when the anaesthetist intended you to be unconscious. 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 (6 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 his/her 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 while 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 the risk of dangerous side effects. Muscle relaxants also prevent movement, while the anaesthetist uses information from monitors (assessing heart rate, blood pressure and anaesthetic gas levels etc) to judge whether you are unconscious or not.

Awareness can happen if the equipment that delivers the anaesthetic to your body is malfunctioning. Sometimes, awareness can be caused by a combination of factors.

In 2014 the Royal College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland published a very large study on accidental awareness during general anaesthesia called National Audit Project 5 (NAP5). This study identified that accidental awareness occurs in around 1 in 20,000 patients after a general anaesthetic. Awareness is more likely if you are having open heart surgery, obstetric surgery or surgery after a major accident, it also seems to be more common in female and obese patients.

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.

Not surprisingly, patients who report accidental awareness may be anxious or fearful of general anaesthesia should another anaesthetic be needed. Long-term effects of awareness include anxiety, sleep disturbance, flashbacks and nightmares. In a minority of patients, post-traumatic stress disorder develops.

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. If you are already at home, you or your GP can contact the anaesthetic department at the hospital. If you would like to speak to someone independently, you can also contact the Patient Advice and Liaison Service (PALS) at your hospital, or you can contact your GP.

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 the clear outer layer of the eye. A corneal 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 or it may leave a dark spot in the field of view.

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 overweight.

About 1 in 5 (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 6 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 a scar on the cornea. The effect of the scar on vision will depend on how big the scar is and where it is on the cornea. Many corneal abrasions heal and leave no effect on vision, although an eye specialist would be able to see the scar using a special light to examine the eye closely. Contact lens wearers 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 where 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 to 1 in 600 people having a general anaesthetic, but this rises to 1 in 140 in those who are turned face down for their operation. Your anaesthetist will therefore take care to protect your eyes during your anaesthetic.

Other types of damage to the eye are rare or very rare. The possibilities of other injuries described below are from medical literature but are so rare that overall figures to show how often they happen are not available.

Possibilities of other 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 due to pressure on the optic nerve (the main nerve to the eye) or due to blockage of the main artery to the eye.

Serious allergy to drugs (GA & RA)

When you have an anaesthetic you will be given a number of drugs. These may include injections into a vein or 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.

Allergic reactions can happen in response to many things. Pollen, dust, bee stings, nuts and antibiotics are common causes – these triggers are called allergens. Anaphylaxis is an extreme form of allergy. 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 potential allergens in everyday life and they usually do us no harm. Sometimes the body makes substances called antibodies which are particular to each allergen and will recognise the allergen if they meet it again in the future. This is known as sensitisation. If the antibodies meet the same allergen at a later date, the antibodies may react against it and cause the release of histamine and other chemicals. These inflammatory chemicals cause the symptoms of allergy. If only small amounts of these substances 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.

How anaphylaxis is treated:

- Any medicine thought to have caused it is stopped immediately.
- If the pulse is weak, the person is 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 you will continue to be observed. 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. A life-threatening allergic reaction during an anaesthetic is thought to occur in about 1 in 10,000 to 1 in 20,000 people, with the chance of death being 1 in 200,000 to 1 in 400,000.

The most common causes of anaphylaxis during an anaesthetic are:

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

Routine skin testing for anaphylaxis before the operation is not recommended, as a negative result does not guarantee that you will not have a reaction; also you may become sensitised to a common chemical similar to the 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 a 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 any information on to the health professional looking after you. If your allergy is serious you may be advised to wear a MedicAlert bracelet. You may be referred to the Allergy Clinic for further investigations prior to surgery.

There are other types of reaction which appear similar to allergies but which are not allergic reactions. It can be more difficult to identify the cause of these reactions.

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

The nervous system consists of:

- The central nervous system, which is made up of the brain and the spinal cord. The brain acts a 'central processor' which controls the system. The spinal cord carries electrical signals away from the brain to nerves supplying muscles and organs. The spinal cord 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.

- The 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 (transmitting both sensory and motor information).

Some of the symptoms caused by peripheral nerve damage are described below.

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

The area of the body affected varies according to which nerves are damaged, this can range 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 often affects a large area and pain is common. Control of the bowels and bladder can also be affected.

Peripheral nerve effects vary. 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 (in less than 1 in 10,000 people) nerve damage occurs that is permanent.

Spinal cord effects unfortunately are usually permanent. This is very rare, occurring in less than 1 in 50,000 anaesthetics.

The most common nerve injuries are to 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. Compression of this nerve causes numbness in the fourth and fifth fingers and/or weakness in the hand muscles.

The common peroneal nerve 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, inadequate blood supply, insertion of a cannula or an unknown cause.

Compression and stretching can occur during an operation as you will be placed in a certain position to allow the operation to be performed. 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 (a device to constrict blood flow) is used to reduce surgical bleeding, there can be nerve damage due to the 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 the needle used to introduce a cannula or a drip into a vein or artery can damage nerves.

Unfortunately, how the injury occurred 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 and with 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
- being aware of the risk
- encouraging you to avoid 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 in 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 an 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 regrow.

Compared to peripheral nerve damage, spinal cord injury is 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 occur due to low blood pressure, a clot blocking the blood vessels, or compression or stretching of blood vessels making them narrower, as this may cause oxygen starvation of the spinal cord.

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 three months is estimated to be less than 1 in 2,000 patients having a general anaesthetic. Permanent damage lasting more than one year is estimated to be less than 1 in 5,000.
- Spinal cord damage occurs in less than 1 in 50,000 patients having a general anaesthetic.
- More minor symptoms may occur much more frequently, perhaps affecting as many 1 in 100 people having a GA 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 result in permanent paralysis of one or both legs (paraplegia) and/or loss of control of the bowel or bladder.

The majority of people with nerve damage make a full recovery over 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 reasons listed below.

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 the 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 a spinal/epidural injection is 1 in 50,000, with the incidence of permanent harm thought to be 1 in 100,000.

Haematoma. This is a collection of blood near the nerve, which collects due to damage to a blood vessel caused by a needle or a 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 to be 1 in 55,000, with an incidence of permanent harm of 1 in 66,000.

If your blood does not clot normally or you take a blood thinning medicine (anticoagulant) you are more likely to get a haematoma. You will need to stop your anticoagulant before the surgery and spinal or epidural injection. Detailed information and instructions on how and when to stop your medicines will be provided to you by the pre-assessment or surgical team. 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 infections 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 abscess after an epidural/spinal is approximately 1 in 24,000, with an incidence of permanent harm of about 1 in 52,000 (nearly 1 in 2 abscesses cause permanent damage).

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 fluids to prevent and treat this.

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 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 as to whether it is safer to do the epidural while you are awake or after the general anaesthetic has been given.

- **Haematoma prevention.** If you take an anticoagulant (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 anticoagulant cannot be safely stopped then you will not be able to have an epidural or spinal injection.
- **Stopping aspirin.** 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 during the operation. Your back should be kept clean and regularly checked in the days following the operation.

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 that 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 the damage is and how it occurred. This may involve: nerve conduction studies (where very small electrical currents are applied to the skin or muscle and recordings are made of the nerve impulses), magnetic resonance imaging (MRI) or computed tomography (CT) scanning. Treatment may involve physiotherapy, exercise, medication or, occasionally, an operation to repair a nerve or relieve pressure on a stretched nerve.

Death or brain damage (GA & RA)

Deaths caused by anaesthetics are very rare. It can be difficult to separate the risks of surgery from the risks of having an anaesthetic. 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 bowels, emergency surgery 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 misjudgement, perhaps by giving too much of a drug or by giving the wrong drug. Modern anaesthetic techniques, training, monitoring and equipment mean that deaths caused by anaesthetic errors are very rare, occurring in about 1 in 185,000 general anaesthetics in the United Kingdom.

Deaths caused by anaesthetics are very rare, and are usually caused by a combination of four or five complications occurring together. There is approximately 1 death in every 100,000 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 otherwise healthy and 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 a general anaesthetic increases for those who are elderly, have had a previous stroke or those who are having surgery to the brain, head or 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 ten 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.

The majority of information contained in this publication 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'.

Useful sources of information

Contact us

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

For more information leaflets on conditions, procedures, treatments and services offered at our hospitals, please visit www.guysandstthomas.nhs.uk/leaflets

The Royal College of Anaesthetists

For further information regarding your anaesthetic.

w: www.rcoa.ac.uk/patients-and-relatives

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

Your comments and concerns

For advice, support or to raise a concern, contact our Patient Advice and Liaison Service (PALS). To make a complaint, contact the complaints department.

t: 020 7188 8801 (PALS) **e:** pals@gstt.nhs.uk

t: 020 7188 3514 (complaints) **e:** complaints2@gstt.nhs.uk

Language and accessible support services

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

t: 020 7188 8815 **e:** languagesupport@gstt.nhs.uk

NHS 111

Offers medical help and advice from fully trained advisers supported by experienced nurses and paramedics. Available over the phone 24 hours a day.

t: 111

NHS website

Online information and guidance on all aspects of health and healthcare, to help you take control of your health and wellbeing.

w: www.nhs.uk

Get involved and have your say: become a member of the Trust

Members of Guy's and St Thomas' NHS Foundation Trust contribute to the organisation on a voluntary basis. We count on them for feedback, local knowledge and support. Membership is free and it is up to you how much you get involved. To find out more, please get in touch.

t: 0800 731 0319 **e:** members@gstt.nhs.uk **w:** www.guysandstthomas.nhs.uk/membership

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We want to make sure the information you receive is helpful to you. If you have any comments about this leaflet, we would be happy to hear from you, fill in our simple online form,

w: www.guysandstthomas.nhs.uk/leaflets, or **e:** patientinformationteam@gstt.nhs.uk

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