

# Anesthesia: What to expect when you go under

Dr. Ian McConachie

Associate Professor, Department of Anesthesia and Perioperative Medicine  
Western University, London, ON, Canada

## Surgery - what?

Most of us are anxious at the thought of it. But we have less to fear — fortunately anesthesia and surgery are safer now than at any other time in history. We fear the unknown, so let's know more about anesthesia and surgery. I'll go over information you need to know before you have surgery — we'll walk down your path together. Hopefully, the information will reassure you and calm your fears about anesthesia. We'll also go over ways to improve your outcome after surgery and decrease your chances of problems and side effects.

If you need more information, don't be shy to talk to your surgeon, nurse or other caregiver.  
*Let's begin our journey.*

## What is anesthesia?

Modern anesthesia began in the 1840s with the use of chloroform, ether and nitrous oxide to reduce pain and awareness during surgery. Although these were imperfect, their benefits cannot be overestimated. It's hard to imagine what surgery must have been like before them.

The introduction of anesthesia and the development of antiseptic techniques later in the 19<sup>th</sup> century arguably were the catalysts for the development of surgery as we know it. Of the three original agents used only nitrous oxide is still used in the western world.

Anesthesia is defined as “lack of sensation.” Most people think of it “being asleep” but this refers to “general anesthesia.” Other types of anesthesia you may have heard of include:

- sedation (sometimes called neurolept).
- local anesthesia (freezing or numbing the area of surgery).
- regional anesthesia (often referred to as a nerve “block” because sensation to part of the body is blocked).
- central nerve blocks (for example, a spinal or epidural anesthesia).

Sedation and local anesthesia techniques are often used for “minor” surgeries or procedures. A procedure that seems “minor” to the doctors is often a very big deal to you and may make you very anxious.

- Whichever type of anesthesia is used, you will be closely watched and your vital signs (such as blood pressure and pulse rate) will be monitored and recorded. Your anesthesiologist will be there during your surgery.

## Is general anesthesia the same as sleep?

Sleep and the anesthetic state are only very superficially the same. The most important differences are that you cannot be woken while under general anesthesia by sound or touch as would be the case if you were just asleep. Another difference is that under general anesthesia the sensations of touch and pain are not processed in the normal way by the brain and cannot be recalled after the surgery.

A better description of general anesthesia is that drugs are used to induce a reversible unconscious state, while the anesthesiologist maintains and supports the normal functions of the body (blood pressure, breathing and heart rate among others).

### Frequently asked questions

#### 1. Will I wake up during the operation?

Anesthesiologists refer to this as “awareness under anesthesia.” This is extremely rare with modern general anesthetics (and much less common than was implied by the Hollywood film “Awake”). If sedation is being given for surgery, you are less deeply “asleep” though comfortable and relaxed and may remember some part of the operation.

#### 2. Will I wake up after the operation?

Waking up after surgery is automatic and often fast once the procedure is finished. With longer operations the body “soaks up” more drugs and waking up can be slightly slower. This also is true for older patients and patients with kidney or liver disease (in whom the elimination of the drugs by the body is slower).

#### 3. How does the anesthesiologist know how much to give and that I am properly “asleep”?

The anesthetic level is assessed against clinical information and data from the monitors showing how your vital signs react to the drugs. In addition, drug concentrations are directly measured in your lungs and brain. Technology is being developed to monitor brain waves during anesthesia as a measure of the depth of anesthesia.

#### 4. Will I die during the operation?

This almost never happens with modern anesthesia. Of course, there are risks associated with anesthesia. These are discussed later.

#### 5. Will I tell staff any secrets or embarrassing details?

A major myth around anesthesia is that you will talk and give away secrets either while going to sleep or waking up. In my 20 years of practice, I have never seen this happen.

#### 6. Will I dream during the anesthetic?

Possibly. We don't fully understand this yet. Some of the “dreams” that you may remember probably happen at the end of the anesthetic as you are waking up.

## What are the goals of anesthesia?

- To permit safe surgery
- To eliminate patient distress
- To minimize any discomfort

Sometimes all that is needed is local numbing or freezing of the operation area, with or without a small amount of sedation or neurolept. If you are having urological surgery, you may need a spinal or epidural “block.” This effectively and thoroughly numbs the lower half of the body.

## Spinal anesthesia

Spinal anesthesia, around since 1896 (when they used cocaine!), has an impressive track record for safety. The injection of a small amount of local anesthetic into the fluid surrounding the spinal cord numbs or freezes the nerves of the lower half of the body. This provides excellent analgesia for surgery and will usually last 2-3 hours.

During this time, the nerves supplying the muscles of the legs are also frozen and you will not be able to move your legs by yourself until the spinal wears off.

Often morphine or a similar painkiller is injected at the same time. This acts on the spinal cord and helps with pain relief for up to 24 hours but without affecting the muscles.

### How does spinal anesthesia compare to general anesthesia?

The decision to use either a spinal or general anesthesia depends on:

- Your health
- The type of surgery proposed
- The preferences of the individual anesthesiologist

Most patients expect to “go to sleep” and fear having a needle inserted in their back. Often this is fear of the unknown. The risks of spinal anesthesia are low. Usually you can get relaxing medication as well as a spinal which, in addition to sedating you, can limit any memories of the procedure!

Depending on your general health, your anesthesia provider may recommend a spinal anesthetic (for example, if you have poor lung function). You will not be forced against your will to have a spinal as opposed to a general anesthetic. However, it’s wise to take into account the advice of the doctors.

There used to be advantages of spinal over general anesthetic. But with advances in drugs and patient monitoring techniques, the advantages are equivalent with both types. Take a look at Table 1 for the advantages and disadvantages of spinal anesthesia.

## Epidural analgesia

This is similar to a spinal anesthetic but with certain technical differences. The local anesthetic drug is injected slightly less deeply than for a spinal anesthetic such that the spinal fluid compartment is not entered. Usually a very thin plastic tube is inserted into this space and can be left in place for several days. This can have local anesthetic and other painkillers slowly and continuously dripped down it and can be used to relieve the pain of major surgery. Epidurals are usually placed before you are given a general anesthetic and then used for pain relief after the surgery.

### Table 1. Advantages and disadvantages of spinal anesthesia

#### Advantages

*From the patient's view:*

- Reduces nausea and vomiting after surgery
- Patients can eat and drink sooner (depending on type of surgery)
- Residual postoperative analgesia - often for many hours
- Faster initial wakeup and recovery

*From the anesthesiologist's view:*

- Decreased blood loss for certain major surgeries
- Decreased rate of leg blood clots after certain major surgeries
- Allows verbal communication with patient
- No atmospheric pollution with anesthetic gases
- Less expensive
- Avoids risk of very rare complications of general anesthesia
- May be better for patients with lung diseases

#### Disadvantages

*From the patient's view:*

- Patients often prefer to be asleep
- Fear of the unknown
- Anxiety about environment in the operating room (noises of instruments)
- Potential for discomfort for long cases from lying on the operating room table
- Legs may be weak or numb for several hours after the surgery
- Fear of insertion of needle into back

*From the anesthesiologist's view:*

- Occasionally causes fall in blood pressure
- Difficulty passing urine occasionally in immediate postoperative period
- Occasionally difficult to perform in elderly or arthritic patients
- Rare potential for nerve damage

## What to look for in your anesthesia provider

Different countries have different models of anesthesia care. In North America your general anesthesia or spinal/epidural anesthesia provider will be a highly qualified doctor. These doctors are usually known as anesthesiologists (though, confusingly many anesthesiologists in Canada are still known as anesthetists).

- Specialist anesthesiologists first qualify from medical school and then undergo five or six years of specialist anesthesia training.
- Local medical governing bodies and medical societies also are involved in granting licenses to practice medicine and maintaining hospital standards within their own jurisdictions.
- In many hospitals in the United States, certified registered nurse anesthetists (CRNAs) may administer your anesthetic with the support and supervision of medical anesthesiologists.
- In smaller communities and hospitals in Canada, your anesthesiologist may be a family doctor who has undergone additional training in anesthesia enabling them to offer safe anesthesia for your surgery – albeit perhaps in a more limited range of surgical operations than those carried out in larger hospitals.
- Often anesthesiologists work within and lead what is being called an Anesthesia Care Team. In this model, the anesthesiologist will lead and direct your anesthesia care; your caregiver (either a specially trained nurse or respiratory therapist) will be there too. This model is more common for the other types of anesthesia than for general anesthesia.
- In university hospitals, medical students (known as residents) may be involved in your care. At all times these residents are being supervised and directed by a fully qualified anesthesiologist.
- If your surgery is considered “minor,” your surgeon may administer the local anesthetic or “freezing” themselves with or without some sedation. If sedation is given, your vital signs will be closely watched.

## How safe is it?

Rest assured that your anesthesiologist (and your whole care team) has your safety as the highest priority.

Anesthesia and surgery are not to be taken lightly and there are always potential risks. Better training of anesthesiologists, advances in monitoring techniques, organ support and newer anesthetic drugs have made surgery safer for an increasingly elderly and sick population.

In addition, anesthesiologists undergo a process of lifelong learning and strives to maintain their skills. Anesthesiologists increasingly have to demonstrate to their licensing bodies that they are undergoing continuing professional development. The development and implementation of practice guidelines, both locally and nationally, and other systematic approaches to reduce error all contribute to developing a culture of safety in hospitals.

Improvements in general medical care and improvements in surgical techniques should share some of the credit for the advances. For example, the trend towards minimally invasive surgery with smaller surgical incisions has been a major advance in surgical patient safety.

## What are the risks?

Risk can be defined as the potential for harm. Few of us completely understand risk. When pressed, we will usually acknowledge that nothing in life is completely risk-free. So, obviously there are risks attached to surgery and anesthesia, though anesthesia is often perceived as being especially risky.

Fortunately these risks are now so low that it is almost certainly the case for most people that the riskiest part of the operation is the journey to the hospital! Somehow we don't consider car journeys as a risk because it is something we face every day. So we "ignore" these sorts of everyday risks and attach more importance to the risk of something outside our usual experience, such as an operation.

We weigh the potential benefits against the potential risks. To make this decision, you need to understand the risks involved. Your surgeon and your anesthesia care provider will discuss these risks with you in language you can understand as part of the "consent" process.

One way of picturing how real these risks are to think of them as happening to one person in a community. For example, 1 in 30,000 could be considered as one person in a small town experiencing the complication if everyone in the small town underwent the procedure!

Bound up in the question of risk versus benefit is whether you are "fit" for the anesthetic. There are ways to determine this. Your doctor will consider the following questions in your case:

- What are the risks of anesthesia and surgery for you?
- Are you in optimal condition?
- If not, can your risks be reduced (for example by losing weight, stopping smoking, treating high blood pressure, treating a chest infection)?
- If so (and the operation is not an emergency operation which needs to be done immediately), your risks may be reduced by delaying surgery until the problems have been addressed. This will improve the risk versus benefit calculation. You should also consider the risks of not having the surgery.

The risks of anesthesia and surgery relate to:

- The anesthetic itself.
- Your medical condition.
- Your age. The risks are higher in the very old and very young.
- The surgery proposed. In particular, the magnitude and duration of surgery will influence risk. Operations with long surgical incisions result in more pain afterwards and more breathing complications, especially if those incisions are on the abdomen or chest. "Keyhole" surgery is usually better tolerated than "open" surgery.

## Risks of “going to sleep” (general anesthesia)

Common side effects and complications, such as nausea and sore throat are discussed later. Here are seven risks of general anesthesia:

### 1. Damage to teeth, lips and tongue

Teeth (mostly the two upper incisors) may occasionally be damaged when the airway tube is inserted. They are more likely to be damaged if they have crowns, bridges or veneers on them. Most injuries to teeth happen in people with teeth in poor condition or with failing dental work. Injury to teeth is also more likely if the airway tube is placed in an emergency situation or if insertion of this tube is difficult. Minor trauma to the lips or tongue is quite common and will almost always resolve over a couple of days without treatment.

### 2. Injury to eyes

Serious eye problems are uncommon and can be caused by awkward positions (facing down for surgery). Minor scratches to the cornea are slightly more common, although your anesthesiologist will take steps to protect your eyes and make sure they are closed during surgery. These scratches can be uncomfortable (treatments are available), but the discomfort is short-lived.

### 3. Inadequate anesthesia or “awareness”

Dreaming around the time of an operation is not awareness. Awareness refers to conscious recall of some events during the operation – with or without the experience of pain. Modern anesthesia is associated with an overall risk of awareness of 1 in 15,000. Many of these will just recall snippets of conversation. Recalling pain is much less common – about 1 in 45,000 anesthetics. Of course, some patients will be at higher risk (like the very sick patient especially undergoing emergency surgery).

### 4. Serious allergic reaction to the anesthetic

It's hard to know the exact number – our best estimate is that a life-threatening allergic reaction to an anesthetic (or other drug given during anesthesia such as antibiotics) occurs in 1 of every 20,000 anesthetics. A small percentage (5%) of these reactions may lead to death.

### 5. Equipment failure

There are strict guidelines covering the servicing and regular checking of all equipment used in the delivery of anesthesia and the monitoring of the anesthetized patient. It is the responsibility of the anesthesiologist to be satisfied that all the checks have been carried out satisfactorily and that any back-up equipment is available and also checked. Equipment failure during anesthesia is rare.

### 6. Death under anesthesia

Deaths because of anesthesia have fallen from 1 in 10,000 anesthetics to 1 in 300,000 anesthetics over the last 30 years. It has been estimated that non-emergency surgery carried out on a previously healthy patient should carry a risk of dying as a result of the anesthetic and surgery combined of no more than 1 in 100,000. More than 90% of deaths that occur after surgery are not directly caused by the anesthetic.

## 7. Brain damage

Brain damage after anesthesia and surgery is rare. The exact chances are not known. Strokes after surgery are usually unrelated to the anesthetic and occur 2–10 days after surgery. However, the risk of developing a stroke may be increased in the elderly, in those who have had a previous stroke or in those having surgery to the brain, head and neck, carotid artery surgery or heart surgery.

## Risks and side effects of spinal anesthesia

Some local tenderness and bruising is common around the injection site in the back. Persistent backache is rare.

The most common side effect of spinal anesthesia is headache (from internal leakage of spinal fluid into the area surrounding the spinal space). This occurs in 1–2% of patients with modern spinal needles and the chances of headache are less as we get older.

You may be worrying about nerve damage and more serious problems after spinal anesthesia. When we look at the chances, the best estimates for these are:

- Direct nerve damage: 1 in 10,000–30,000. Most recover within a few weeks to few months.
- Permanent paralysis: 1 in 50,000–100,000
- Spinal hematoma: 1 in 150,000–220,000 (blood clot)
- Spinal infection: 1 in 100,000–150,000

These complications are very rare.

## Common illnesses and anesthesia

Patients with severe medical conditions who would have been thought unfit for surgery in the past will usually tolerate anesthesia. Sometimes such patients need further assessment and investigations to define their disease state and the reserves of the body organs involved.

In general, if you have a well-controlled medical disease you will do better with anesthesia and surgery than those whose illnesses are poorly controlled. Further medical treatments may be recommended to reduce your risks; sometimes surgery may be delayed to make sure your other disease is controlled.

### 1. Heart disease

Well-controlled hypertension (high blood pressure) or angina is usually not a barrier to surgery and anesthesia. It is important in most cases that you don't miss your usual doses of your blood pressure medication. Occasionally there are exceptions to this rule and you will be advised by your surgeon or during the pre-admission process.

Many patients with severe heart disease safely undergo general anesthesia for major surgery every day. With severe angina, heart failure or recent myocardial infarction (heart attack), the risks of anesthesia or of getting another heart attack may be increased compared to people having the same operation without similar heart disease. Nevertheless, your doctors will assess the situation.

## 2. Diabetes

You will be advised as to whether to take your usual blood sugar medication on the day of surgery. In most cases you should not take these medications as you will not be eating as normal on the day of surgery. If your diabetes is not well-controlled, there will be an increased risk of complications after surgery (like infections). Discuss this with your surgeon or family doctor.

## 3. Asthma

Unless you are very sick at the time of the surgery (for example, have an infection), most patients with asthma have few problems with anesthesia. This is partly because most anesthetic drugs actually relax the airways!

## 4. Other chronic lung conditions

If your lung condition is severe, it may be difficult for you to breath during and after the surgery. Occasionally, your anesthesiologist may advise a spinal anesthetic or simple sedation to reduce the irritation to the airway and lungs that can be caused by the artificial airways used during general anesthesia.

## 5. Sleep apnea

Sleep apnea is becoming more common and its exact implications for anesthesia and surgery are still unclear. Again, you may be advised to have a spinal anesthetic or sedation to avoid general anesthesia. Many hospitals admit patients with sleep apnea overnight, especially if severe, if having a general anesthetic. This enables your healthcare team to keep a close watch on your breathing on that first night. If you use an aid to breathing, such as a CPAP machine, you should bring it with you to the hospital or clinic unless advised not to do so.

## Anesthesia for children

More and more children undergoing surgery are cared for in specialist children's units or hospitals. The environment and facilities are tailored towards making the whole process more "child friendly" and less intimidating and frightening. Often a parent may stay with the child and accompany her to the operating room. Many hospitals will allow the parent to stay with the child during induction of anesthesia to try and distract and comfort the child. The anesthetic is similar to that for adults, though obviously a lot of the equipment is scaled down in size!

Children tend to like needles even less than adults and many anesthesiologists still use "gas" to get the child initially off to "sleep." This is called an inhalational induction and is not as bad as it sounds – modern "gas" is much quicker and less pungent than gas used in the past. The whole process is much easier than it used to be.

## Anesthesia for the elderly patient

As the average age of the general population ages, so the proportion of elderly patients requiring anesthesia and surgery increases. Modern anesthesia is very safe — even in the elderly despite the increasing presence of other coexisting illnesses in this age group. Some elderly patients are a little confused and disorientated after anesthesia and surgery for a short while. This can be distressing for both the patient and the family. Avoiding hospitalization (meaning, going home on the day of surgery) reduces the chance of developing this problem. Some known and treatable causes of confusion after the surgery are infections, poor pain control and dehydration.

Recently, we have found subtle impairment of intellect, memory and concentration in some elderly patients after surgery and anesthesia. The causes of this are still being investigated; it seems more common in the very old, those with previous ill health, poor mobility, poor memory or previous high alcohol intake. For most patients, this will improve with time.

## Your path to surgery

We'll go over the usual steps in your journey so that you'll know what to expect from the anesthetic and surgery. This is a general path and may not be applied to everyone — your path may change slightly depending on your individual needs. In general, this path applies to planned surgery (or elective surgery). If you are admitted to the hospital as an emergency, you may bypass many of these stages.

*Let's start:*

### 1. The clinic visit

This starts with the decision by you and your surgeon that surgery is necessary. At this time, your surgeon will often complete the consent form for you to sign. This form gives the surgeon permission to operate and include consent for the anesthetic (it's rare to have a separate form for the surgery and the anesthetic). If you need specialized anesthetic techniques or monitoring, then you may need to sign a separate form.

### 2. Investigations and blood tests

If you are in good health, you may not need any special pre-surgical investigations, such as electrocardiographs or blood tests. Other patients may have such investigations performed at the clinic visit, or more commonly, at a later pre-admission visit. This is especially likely if you are having major surgery or have other medical illnesses. These investigations are often considered routine for certain types of surgery and should not be a cause for alarm.

### 3. Pre-admission screening

You will usually undergo pre-admission screening. This may take the form of questions during a telephone call from a pre-admission nurse. These questions will explore your general health, medications you take and any problems with previous anesthetics. You should tell the nurse if there are any family problems with anesthetics (especially rare problems such as malignant hyperthermia). Particular attention will be given to any allergies, especially allergies to medications.

You may also be asked to attend the pre-admission clinic for more assessment. The reason for this is to identify problems, predict your risk for the proposed surgery and suggest ways and treatments that may reduce this risk. This is also a useful opportunity to ask questions and for the staff to give you information about the process and events on the day of surgery.

#### 4. Medicine and anesthesia consults

You may need to see an anesthesiologist or an internal medicine doctor for further assessment and necessary interventions to decrease your risk of complications. If you have severe cardiac disease, you may need to see a cardiologist. Alternatively, these consults may be proposed as a result of your responses to the screening questionnaire. In many hospitals, the anesthesiologist in the pre-admit clinic will be different than the one on the day of your surgery.

#### 5. Taking medications before surgery — which to take or not take

If you normally take medications, you will be instructed which, if any, to take on the day of surgery. Your doctor is considering the following things when making this decision:

- Most drugs do not directly interfere with the anesthetic, but some may have other implications (bleeding during surgery).
- It's best to minimize the drugs taken on the day of surgery, where possible.
- It's best not to miss doses of drugs taken for cardiac conditions, high blood pressure or epilepsy.
- Drugs for diabetes and diuretics (water pills) are probably best avoided on the day of surgery.
- Taking certain medications (such as blood thinners) will depend on the reasons for taking them (underlying illness and on the nature of the proposed surgery).
- You will be told to fast before the surgery; generally, you'll be allowed to take your medications with a sip of water to help you swallow (unless specifically told otherwise).
- For major surgery, you may be asked to take special laxatives to “clean out” and prepare the bowels before anesthesia.

#### 6. Fasting

Different hospitals have different policies regarding how long you should fast before anesthesia or sedation. Often you will be allowed to drink clear fluids (fluids with no milk or other solids) until close to the operation time. This also applies to chewing candy or gum – the act of chewing itself causes the stomach to fill with acid.

These instructions are important — the stomach must be as empty as possible at the time when anesthesia or sedation is being administered. Otherwise there is a risk that you may vomit and inhale some of the stomach contents into your lungs.

## 7. Admission

Unlike in the past, it's rare for you to be admitted to the hospital the day before surgery. On the day of surgery, you will be asked to attend the hospital or clinic prior to your booked time of surgery – often several hours before the time of surgery.

Different settings have different models of care. At my own institution, patients present themselves at the admission area where the admission paperwork is prepared and health coverage details noted in the chart. Patients are then instructed to go to the Surgical Day Care Unit (SDCU) where more paperwork is completed, including all the papers necessary for the charting of the operation, anesthesia and associated nursing care. Several checks will be carried out to confirm that the right patient is having the right operation. The same questions will often be asked on several occasions. This may seem a little irritating, but the system is focused on patient safety and regular checks to avoid mishap.

A nurse will explain the processes and procedures and answer any questions. At some point you will be asked to undress and your clothing and other personal items secured. A hospital gown will be provided and a plastic identity band placed on your wrist. Relevant allergies will be highlighted with a second wrist band.

The surgeon or his/her delegate will often make a mark with ink on the correct operative site especially for left or right areas of the body – less common in urology!

An intravenous infusion will usually be sited in one of your arm veins. This is required for anesthetic and other sedative drugs to be given intravenously (through your veins) for the procedure and also for antibiotics and other drugs that may be needed.

At some point in this admission process, you will meet your anesthesia care provider who may check your general health and specific issues relevant to your anesthetic. The surgeon or delegate will answer any last minute questions regarding the proposed procedure.

At the appropriate time, you will be taken to the operating room or clinic room for the surgery.

## 8. The operating room

You will likely have your surgery in an operating room at a hospital. However, more and more people are having surgery at freestanding clinics and other facilities that offer surgery. Minor procedures may be performed in your surgeon's office – often only with some local anesthetic freezing. The operating room will have the operating table, an anesthetic machine, monitors and various trolleys, trays of operating instruments and other devices.

## 9. Administering the anesthetic

Usually, you will be asked to lie on the operating table before being given the anesthetic. Final patient checks are carried out (this includes a Surgical Safety Checklist). Promoted by the World Health Organization, this checklist formalizes much of what was already standard in North America. It includes formal acknowledgment by members of the team of the patient identity, consent for surgery, whether the antibiotics have been given, whether the instruments and monitors are all available.

Various monitoring devices are then attached. The anesthesia care provider, once satisfied with the information given to him/her by the monitors, will usually administer oxygen from the anesthesia machine to you via anesthesia tubing and a face mask. The mask may smell of rubber but this is not the anesthetic. The anesthetic drugs are given into the intravenous tubing which then goes into your veins. This is called the induction of anesthesia. Apart from a brief period of feeling lightheaded or dizzy, the induction is usually very quick and not too unpleasant. Occasionally, there may be a little stinging in the hand or arm where the intravenous tube is inserted during the passage of these drugs. Although this can be unpleasant it does not have any serious implications. Once you are asleep, an artificial airway or breathing tube will often be used to permit ongoing administration of the anesthetic. Other monitors or a second intravenous line may be inserted. Many different intravenous drugs and anesthetic gases are given for an individual anesthetic. Some of these drugs may be painkillers or anti-sickness drugs for afterwards.

Once you are fully anesthetized, your skin will be cleaned, sterile drapes will be applied and the operation may proceed. Fortunately, you will be unaware of all of this!

Induction through the intravenous line is the most common way that anesthesia is induced; sometimes anesthesia gas is given from the anesthetic circuit to induce anesthesia. This is more common in children.

In some countries the anesthetic is administered in an induction or anesthetic room immediately adjacent to the operating room. Once anesthetized, the patient is wheeled into the operating room for surgery.

If the chosen anesthetic is a spinal anesthetic, this will either be performed in the operating room or occasionally in a different area of the operating suite where similar procedures are performed. The injection in the back can be done while you are sitting upright or, less commonly, while you are lying on your side.

In either case the anesthesiologist will take precautions to reduce the chance of infection (by using sterile gloves, facemask, sterile instruments and drapes).

Your skin will be cleaned and some local anesthetic will be injected to numb the area before the spinal needle is inserted. This numbing injection itself stings prior to going numb! A very fine spinal needle is inserted into the spinal space and the local anesthetic injected. The onset of the spinal block is very rapid and complete over a large part of the lower body. Sedation and often oxygen via a clear mask can then be given if you desire. Even if no sedation is used, it is unlikely that you will see anything of the operation because of the screens and drapes.

## 10. Monitors

The most important “monitor” is the vigilance of the anesthesia care provider who is constantly there during your operation. In addition, devices to monitor your condition are routinely used during anesthesia and sedation – it is not that we expect problems but it’s part of our culture of safety.

These monitors are usually combined in one box built into the anesthetic machine. In addition there are important monitors and safeguards built into the function of the machine itself (for example monitoring pressures within the airway and lungs). See Table 2 on next page for a list of monitors and what’s being monitored.

**Table 2. Vital signs and monitors**

<b>Vital sign monitored</b>	<b>Monitoring device employed</b>
Heart rate and rhythm	ECG machine
Blood pressure	Automatic blood pressure machine and cuff
Oxygen levels in tissue	Pulse oximeter
Carbon dioxide in expired air (adequacy of breathing and confirming airway position)	Capnograph (carbon dioxide monitor)
Patient temperature	Electronic thermometer

For major surgery or for patients with cardiac and other health problems, blood pressure may be monitored by means of a small tube inserted directly into one of your arteries. Local anesthetic will be given before the tube is inserted. Similarly, a small tube may be inserted into one of the main veins in the neck (known as a central line) for major surgery. This gives information on the need for intravenous fluids and on the function of the heart.

## 11. Awakening

When the surgery is finished and dressings applied, the anesthetic is stopped and you will wake up. This is often quite fast – especially after short operations. Any airway or breathing tube is removed at this time. During this awakening, you will be closely monitored. Once the anesthesia provider is satisfied that you are sufficiently awake, you will be taken to the recovery unit or the Post-Anesthesia Care Unit (PACU).

## 12. Post-Anesthesia Care Unit

Usually, you spend at least 30 minutes in the Post-Anesthesia Care Unit. You will be checked to make sure you have sufficiently recovered from the anesthetic before you move on to the next stage in your journey. Any surgical wounds and sutures will also be checked at this time. Oxygen by clear plastic mask is often given and intravenous fluids, analgesics and other drugs given as required. Blood pressure, heart rate and other vital signs are monitored during this time. Once a certain degree of recovery is achieved as indicated by scoring of vital signs and degree of wakefulness, you will be either discharged to the Surgical Day Care Unit if you are going home that same day or admitted to a hospital bed if you are staying in the hospital.

## 13. Admit or discharge?

About 70% of patients in North America go home the same day as their surgery – what we call ambulatory surgery (literally walking surgery).

The benefits to the hospital and health care system are largely economic (it's cheaper to send you home rather than keeping you in the hospital). Most patients also prefer to sleep in their own beds and be with their family. Also, avoiding hospitals may reduce the chance of developing an infection after surgery!

Patients admitted to hospital after surgery tend to have other medical conditions or are having major surgery requiring special after-surgery (or postoperative) care.

## Going home

If you are going home after your surgery and not staying at the hospital, recovery from anesthesia and surgery are checked in the Surgical Day Care Unit for the final time. Any medications will be prescribed (painkillers) and any postoperative instructions will be discussed. You may get something to drink and possibly something light to eat.

Often, you will be given a paper with instructions. Examples of instructions for going home the same day after anesthesia and surgery include:

- no driving for 24 hours
- no operating machinery for 24 hours
- no alcohol for 24 hours

Although you have recovered from the anesthetic and may feel well, some of the anesthetic is still in your body for up to 24 hours. This is enough to have a subtle effect on reflexes and coordination – hence the “no driving” rule.

When the hospital paperwork is completed, you may dress and leave – escorted and driven by a responsible adult if a general anesthetic or sedation has been given.

When you get home, you should rest for the remainder of the day. Fatigue is common for days after surgery – longer after major surgery. There is a tendency to blame the anesthetic for this but, in truth, much of this is due to changes to the chemistry and hormones of the body resulting from the surgery itself.

## Common problems after surgery

1. **Nausea and vomiting:** These side effects are less common than in the past. This is because of better anesthetic drugs and also because anti-sickness drugs are commonly given during the procedure by the anesthesiologist. You may also be given anti-sickness drugs to take home with you after major surgery.
  - The risk of nausea and vomiting is about 20-30% in all patients (10% in low-risk patients and up to 80% in patients with specific risk factors).
2. **Sore throat:** The artificial airways used during anesthesia can cause sore throat and hoarseness after surgery. This usually responds to simple painkillers and oral fluids.
3. **Shivering:** A brief period of shivering is quite common after anesthesia and surgery. This is not always due to you being cold (anesthesiologists use warming blankets to keep patients warm during longer operations).
4. **Headache:** This is common after surgery and usually responds to simple painkillers.
5. **Drowsiness and fatigue:** This is common during the first 24 hours.

## Pain after surgery

The anesthetic includes painkillers and some of these are intended to last into the postoperative period. Minor operations and procedures are often associated with minimal discomfort afterwards. After operations performed on an ambulatory basis, you will be prescribed oral painkillers to take at home.

If you are staying at the hospital, you will be given a mixture of painkillers both orally and by injection. These painkillers will act on a number of different aspects of pain and will often include combinations of morphine type drugs, aspirin type drugs and other novel types of painkillers.

Pain following surgery is taken very seriously by all health professionals. At various times after surgery, you will probably be asked to rate your pain on a score of 0 to 10 with 0 being no pain and 10 being the worst pain you can imagine. Your answers are useful to help guide your ongoing pain management.

Many hospitals have set up “acute pain teams” to improve the management of pain after major surgery and to improve patient comfort. A mainstay of such teams is the use of patient controlled analgesia (PCA) pumps. These pumps infuse small amounts of painkillers (usually morphine or a similar drug) directly into the intravenous fluids and directly into your vein. The drug then works fast. You control the release of this drug by pressing a button on a handset attached to the pump. This is important as every patient is different and only YOU know how much pain YOU have and this way you can have pain medication when YOU need it, not when I or anyone else thinks you need it. Some patients worry that they will take too much, but the pumps have built-in controls. You cannot overdose on the drug even if pressing the button without knowing it while half asleep. Another fear is that you will become addicted to the drug, but this rarely happens in the context of an acute operation.

## Reducing the risk of complications

If you are due to undergo anesthesia and surgery in the near future, take steps to reduce your risk of complications and/or improve their overall experience.

If you are in poor health, your chance of complications and problems related to your anesthetic and surgical operation are increased. However, almost everyone can do something to reduce these risks – though if there is only a short waiting period prior to surgery this may be limited. Some high-risk patients may have their surgery delayed until they take these steps (losing weight).

### Before surgery

This is mostly common sense, but here are some general things to keep in mind:

- Lose weight if you are overweight and stop smoking.
- Consult with your family doctor and other specialists to ensure that your medical illnesses (such as high blood pressure) are adequately controlled.
- Make sure you eat well. Good nutrition is important before surgery so that your body is prepared for the changes and the healing process.

- Try to exercise (time permitting) to improve your general strength and aerobic fitness. Evidence is accumulating that those who are physically fit do better after major surgery.
- Take vitamin D and antioxidants to reduce the oxidative “stress” associated with surgery (this is controversial). Follow the manufacturers’ dosing guidelines as some vitamins can be toxic in very large doses.
- Get enough sleep!
- Be informed. Being an informed patient makes you less anxious. Anxious patients have been found to suffer more pain from surgery than non-anxious patients.

## After surgery

To make sure your recovery is as smooth as possible and to help you get back to normal, please:

- Follow your doctors’ and nurses’ postoperative instructions. They are given for a reason. If these are unclear, please ask for clarification.
- Eat a good quality, high protein, palatable diet (including nutritional supplements if necessary or advised) as soon as possible. After major surgery, follow advice as to when and how diet should be resumed. After major surgery, you may be only able to take fluids by mouth at first.
- Follow a graded mobilization exercise program as advised.
- Especially after major surgery, perform deep breathing exercises and chest physiotherapy as advised to reduce the chance of postoperative chest infection and other complications.
- Take painkillers as recommended. There are no medals for bravery and being in pain can slow your recovery.
- Finish all courses of antibiotics that are given to you even if you feel well.

### For more information:

You can get brochures and more information from these societies:

Canadian Anesthesia Society: <http://www.cas.ca/English/Patient-Information>

American Society of Anesthesiologists: <http://www.asahq.org/For-the-Public-and-Media.aspx>

The Royal College of Anesthesiologists (in the United Kingdom):  
<http://www.rcoa.ac.uk/patients-and-relatives>