

Risks associated with your anaesthetic

Section 15: Death or brain damage

Summary

This leaflet gives information about why patients might die or get significant brain damage during an anaesthetic and what can be done to prevent it. Most of the deaths that occur around the time of surgery are not directly caused by the anaesthetic but due to other illnesses or the surgery itself.

For healthy patients undergoing minor planned surgery, dying or getting brain damage from a general anaesthetic is very rare. Your surgeon and anaesthetist will be able to tell you more about your individual risk.

Why do deaths occur during general anaesthesia?

Most of the deaths that occur around the time of surgery are not directly caused by the anaesthetic^{1,2,3} but by other reasons connected with the health of an individual or the operation they are having:

There may be things about your health or the type of operation you are having that increase the risk of dying during a general anaesthetic. For example, death is more likely if:

- you are older
- you need major surgery on your heart or lungs, your brain, your major blood vessels, or your bowels
- you need emergency surgery, including surgery for major trauma
- you are very unwell before your operation.

There may be an unexpected allergic reaction to the anaesthetic drugs that are given. Life-threatening allergic reactions are rare. They occur in less than 1 in 10,000 general anaesthetics, and many are followed by a full recovery. More information can be found about serious allergies during an anaesthetic in Section 9 in this series.





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Specific risks of your operation should be explained to you before you sign your consent form. After the risks have been explained to you, you can decide whether you want to go ahead with the operation.

An error or misjudgement by the anaesthetist or surgeon could cause a problem that may very rarely result in death. However, 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 given in the United Kingdom.⁴

What is the risk of dying during a general anaesthetic?

Exact figures are not available. Some facts and figures are given below.

- if you are a healthy patient having non-emergency surgery, the short answer is that death is very rare. An exact figure is not known, but it is around 1 death per 100,000 general anaesthetics⁵
- as already stated, the risk increases:
 - if you are older
 - if you are having major or emergency surgery
 - if you have previous problems with your health, especially severe liver disease, heart disease, lung disease, diabetes requiring insulin, or cancer which has spread beyond the primary tumor
 - if you were ill or injured before the operation.

However, the risk of dying is still low.¹ An exact figure is difficult to quote, but your anaesthetist will be able to talk to you about it

- for every 100,000 caesarean sections, one death happens which is said to be due to the anaesthetic alone. The rate is higher for emergency caesarean section with a general anaesthetic compared to planned caesarean section with a spinal or epidural anaesthetic. The overall death rate from all causes associated with caesarean section in England and Wales is approximately 17 in 100,000 caesarean sections⁶
- the risk of a child dying from a general anaesthetic is around 1 in 40,000.⁷ However, if the child is healthy and having non-emergency surgery, the risk is much less, probably less than 1 in 100,000,⁸ and the risks may be even lower in children over the age of one year.

What is the risk of getting brain damage due to a general anaesthetic?

Dizziness, drowsiness, headache and confusion are relatively common shortly after general anaesthesia and, in a small number of patients, may persist for days, weeks or even months. However, this does not mean that brain damage has occurred. More information about these symptoms can be found in Section 7 of this series.



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If you are a healthy patient having non-emergency surgery, severe brain damage is very rare. But on the very rare occasions when it does occur, the brain damage may be permanent and cause inability to think, feel or move normally. Exact figures for this risk do not exist.

Such permanent brain damage may be caused by a stroke that occurs during an anaesthetic. The risk of having a stroke that causes brain damage during general anaesthesia increases:

- for the elderly
- for anyone who has had a previous stroke
- for people having surgery to the brain or head and neck, surgery on the carotid artery (a major blood vessel which supplies the brain), or heart surgery.⁵

Strokes occurring around the time of surgery are not often directly related to the general anaesthetic. Most strokes occur between two and 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.

Very rarely, brain damage can happen because a complication or error has resulted in inadequate oxygen delivery to the brain for some time during the operation.

What precautions are used to prevent death and brain damage from occurring?

Drugs used by anaesthetists have effects on the brain (causing unconsciousness) but also on other body organs. They affect the heart, the blood pressure, breathing and lung function and other organs such as the kidney. It is usually these other effects that increase the risk of death or brain damage during the anaesthetic.

Anaesthetists are trained to use anaesthetic drugs with care, taking into account all relevant factors. Your anaesthetist will assess your condition before the operation to make sure that the drugs and techniques used are as safe as possible for you. He/she stays beside you throughout the whole anaesthetic and can adjust the anaesthetic and other treatments to keep you safe and healthy.

To help the anaesthetist, a number of monitors are used to measure heart and lung function, and the amount of anaesthetic given. Your physical state is monitored before the anaesthetic starts, during the anaesthetic, and afterwards into the recovery period. The anaesthetist chooses the appropriate doses of drugs according to the information obtained from the monitors and his/her clinical judgement.

There is continuing research aimed at making the drugs and techniques used by anaesthetists ever more safe for patients.

Is there anything I can do to prevent the risk of death or brain damage?

If you require emergency surgery, the short answer is: not much.



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However, if you are having non-emergency surgery, then anything that you can do to improve your physical condition will reduce the risks associated with anaesthesia. This includes losing weight (if you are overweight), giving up smoking, eating well to improve your nutritional state, taking regular exercise and getting any long-term medical condition, such as asthma or diabetes, well controlled before the operation. Further information can be found in the booklet *Anaesthesia explained* on the RCoA website (rcoa.ac.uk/documents/anaesthesia-explained).

References

- 1 Sury MR et al. The State of UK anaesthesia: a survey of National Health Service activity in 2013. *Br J Anaesth* 2014 (bit.ly/2gVd7zn).
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- 3 NHS performance indicators. *DH*, London 2002.
- 4 Buck N, Devlin HB, Lunn JN (Eds). The Report of the Confidential Enquiry into Perioperative Deaths 1987. *The Nuffield Provincial Hospitals Trust/King's Fund*, London 1987.
- 5 Jenkins K, Baker AB. Consent and anaesthetic risk. *Anaesth* 2003;**58**:962–984.
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- 7 Tired L et al. Complications relating to Anaesthesia in infants and children: a prospective survey of 40,240 anaesthetics. *Br J Anaesth* 1988;**61(3)**:263–269.
- 8 van der Griend BF et al. Postoperative mortality in children after 101,885 anaesthetics at a tertiary paediatric hospital. *Anaesth Analg* 2011;**112(6)**:1440–1447.

Further information

Anaesthetists are doctors with specialist training who:

- discuss the type or types of anaesthetic that are suitable for your operation. If there are choices available, your anaesthetist will help you choose what is best for you
- discuss the risks of anaesthesia with you
- agree a plan with you for your anaesthetic and pain control
- are responsible for giving your anaesthetic and for your wellbeing and safety throughout your surgery
- manage any blood transfusions you may need
- plan your care, if needed, in the intensive care unit
- make your experience as calm and pain free as possible.

Common terms

General anaesthesia – This is a state of controlled unconsciousness during which you feel nothing and may be described as 'anaesthetised'.

Regional anaesthesia – This involves an injection of local anaesthetic which makes part of your body numb. You stay conscious or maybe sedated, but free from pain in that part of your body.



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You can find out more about general and regional anaesthesia in the patient information booklet *Anaesthesia explained*, which is available from the RCoA website via:

rcoa.ac.uk/documents/anaesthesia-explained

Risks and probability

In modern anaesthesia, serious problems are uncommon. Risk cannot be removed completely, but modern drugs, equipment and training have made anaesthesia a much safer procedure in recent years.

The way you feel about a risk is very personal to you, and depends on your personality, your own experiences and often your family and cultural background. You may be a 'risk taker', a 'risk avoider', or somewhere in between. You may know someone who has had a risk happen to them, even though that is very unusual. Or you may have read in the newspapers about a risk and be especially worried about it.

People vary in how they interpret words and numbers. This scale is provided to help.



Your anaesthetist will give you more information about any of the risks specific to you and the precautions taken to avoid them. There are some rare risks in anaesthesia that your anaesthetist may not normally discuss routinely unless they believe you are at higher risk. These have not been listed in this leaflet.

You can find more information leaflets on the College website: rcoa.ac.uk/patientinfo

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This leaflet has been reviewed by the RCoA Patient Information Group which consists of patient representatives and experts in different areas of anaesthesia.



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We try very hard to keep the information in this leaflet accurate and up-to-date, but we cannot guarantee this. We don't expect this general information to cover all the questions you might have or to deal with everything that might be important to you. You should discuss your choices and any worries you have with your medical team, using this leaflet as a guide. This leaflet on its own should not be treated as advice. It cannot be used for any commercial or business purpose.

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Information for anaesthetic departments on printing this leaflet

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Tell us what you think

We welcome suggestions to improve this leaflet. Please complete this short survey at: surveymonkey.co.uk/r/testrisk. Or by scanning this QR code with your mobile:



If you have any general comments, please email them to: patientinformation@rcoa.ac.uk

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