

Awake craniotomy surgery



Information for patients

This information leaflet explains awake craniotomy surgery, including the risks, the benefits and the alternatives. It also explains the tests and assessments you will have before your surgery and what happens during the procedure.

This surgery is an important part of your treatment. We in the neuro-oncology team are deeply committed to your wellbeing and are aware of the challenges and fears you face when considering this procedure.

We want to ensure you have all the information and support you need to understand more about what happens and why we have recommended you have this procedure.

If you have any questions or concerns, please do not hesitate to speak to any member of the team caring for you.

Confirming your identity

Before you have a treatment or procedure, our staff will ask you your **name** and **date of birth** and check your **ID band**. If you don't have an ID band we will also ask you to confirm your address.

If we don't ask these questions, then please ask us to check.
Ensuring your safety is our primary concern.

Contents

What is awake craniotomy surgery?	3
Why do I need this procedure?	4
What are the risks?	5
Consent	5
What are the benefits?	6
What are the alternatives?	6
When will I have my operation?	6
What happens before surgery?	7
Pre-Assessment Clinic (PAC)	8
Research at King's	9
Neuro-anaesthetic assessment	9
Other assessments and scans to help us plan your surgery	11
Therapy assessments	13
Neuro-psychological assessment	14
What happens on the day of surgery?	14
What happens during surgery?	15
How long does the procedure take?	17
What happens after surgery?	17
Recovery on the ward	17
Stitches and staples	18
Caring for your wound – signs to look out for	18
What happens next?	19
Your treatment and care team	20
Who can I contact with queries or concerns?	20
Your experience	20
Brain tumour support group	20
More information	21
MyChart	21
Sharing your information	21
Care provided by students	22
PALS	22

What is awake craniotomy surgery?

An awake craniotomy is a surgical procedure that is used to remove tumours (lesions) from the area of your brain that controls:

- speech and language, including talking, reading and writing
- fine motor movements, such as small movements of your hands, wrists, fingers, feet and toes.

Because you are awake for part of the procedure, the team can ask you questions while operating, to check your speech and movement and ensure these are not being affected by the surgery.

It also means the surgeon can remove as much of the tumour as possible while reducing the risk of damaging your brain and causing long-term disability after the procedure.

Although there are risks, operating on you while you are awake means tumours can be removed that would otherwise not be suitable for surgery because the surgeon can keep testing your speech and movement while they are operating. If there are any changes, they can stop and change what they are doing.

You are usually asleep or sedated for the first part of the operation and woken when the surgeon is ready to operate on your brain. You will not feel any pain during any part of the procedure, including the awake phase.

Why do I need this procedure?

You have been referred to King's College Hospital's neuro-oncology team by your local hospital or your GP because your symptoms and test results suggest that you may have a brain tumour which needs specialist surgery.

Your case has been discussed by a group of specialists in a neuro-oncology multidisciplinary team meeting at King's. The team includes neurosurgeons, neuro-radiologists, neuropathologists, medical oncologists, neuro-oncology specialist nurses (CNSs), physiotherapists, occupational therapists (OTs) and speech and language therapists (SLTs).

They will have discussed some of your possible treatment options, including:

- 'active surveillance', where we do not operate but keep a very close eye on you and your condition
- surgical biopsy, where a sample of the tumour is taken to diagnose the type of brain tumour
- surgery while you are asleep.

You will be able to discuss some of these options when you come to King's to talk about your planned surgery.

Once the decision has been made that you may be suitable to have surgery while you are awake, the team will make appointments for you to come to the hospital to discuss your treatment plan and to have some tests.

What are the risks?

Awake craniotomy surgery has a number of risks, some of which are very serious. Your consultant or neurosurgeon will discuss these with you before you give consent to have the operation.

They include:

- wound healing problems
- surface and deep infection
- leak of the liquid (cerebrospinal fluid/CSF) that surrounds your head and brain
- build-up of CSF in your brain (hydrocephalus)
- seizures
- temporary or permanent cognitive, speech and motor skill problems
- stroke
- getting an infection in hospital
- blood clots (deep vein thrombosis or DVT) in your body or in your lungs (pulmonary embolism or PE)
- risk to life.

Consent

We must by law obtain your written consent to any operation and some other procedures beforehand. Staff will explain all the risks, benefits and alternatives before they ask you to sign a consent form. If you are unsure about any aspect of the treatment proposed, please do not hesitate to speak with a senior member of the staff again.

What are the benefits?

By having the operation while you are awake, the neurosurgery team can remove as much of the tumour as possible and minimise the risk of causing brain damage and disability. This will provide both diagnosis and treatment for the tumour or lesion.

What are the alternatives?

There are a number of other options which will have been discussed in the neuro-oncology multidisciplinary team meeting after you were referred to King's College Hospital and which will also be discussed with you. They include active surveillance, biopsy and asleep craniotomy.

After these discussions and the results of investigations, the team has recommended that you have an awake craniotomy.

When will I have my operation?

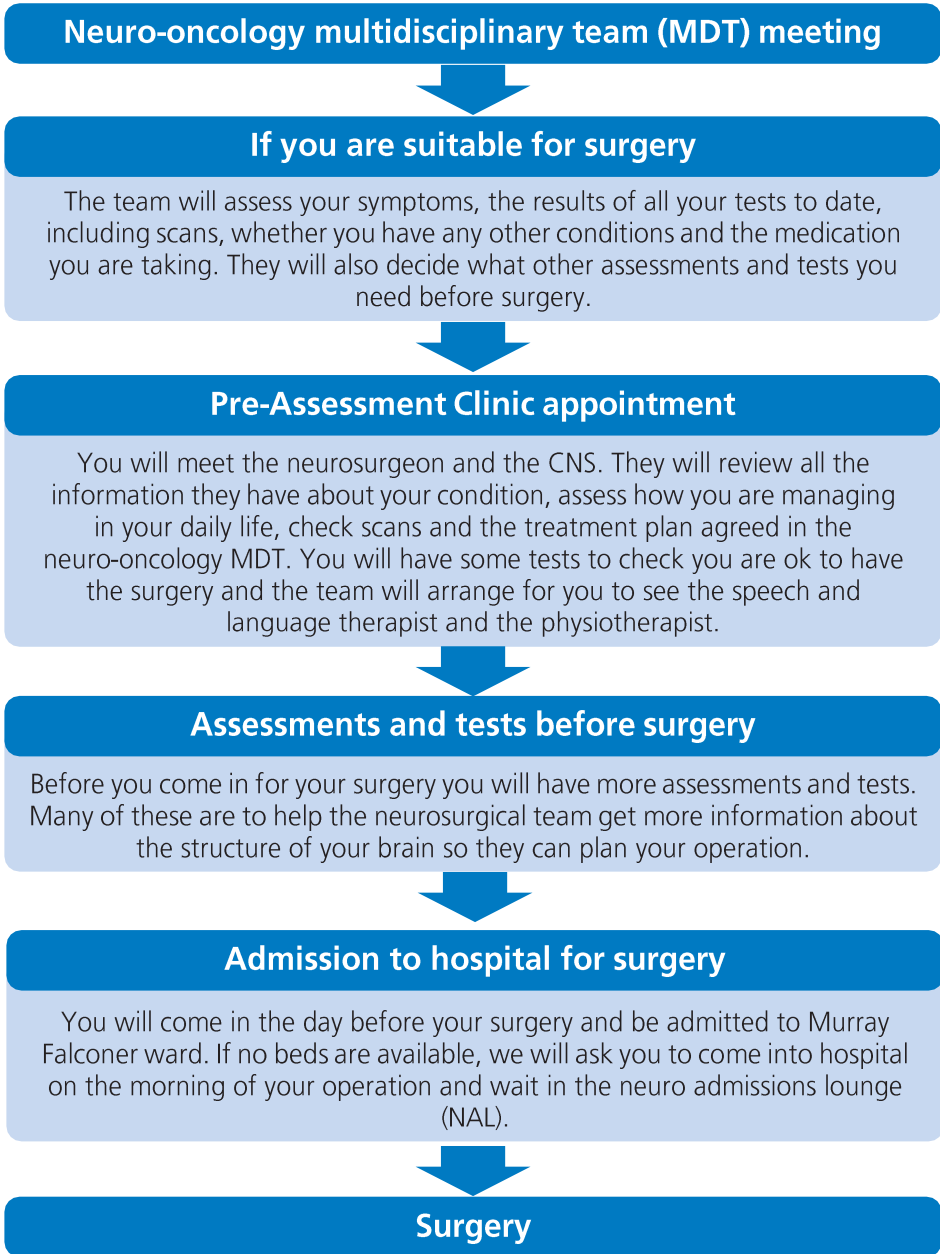
The neuro admissions team will contact you to give you a confirmed surgery date.

You will almost certainly be admitted the day before the operation, usually to Murray Falconer ward, which is for planned (elective) surgery.

Rarely, when there is no bed available the day before surgery, you will be asked to come into hospital on the morning of the operation and go to the neuro admissions lounge (NAL).

What happens before surgery?

This flowchart shows the stages before you have your surgery.



Pre-Assessment Clinic (PAC)

Once you have consented to surgery, the next step is to come for an assessment at the Pre-Assessment Clinic (PAC). You may be booked into this clinic from the neuro-oncology MDT, the joint Neuro-oncology Clinic or the Lower-Grade Glioma Clinic. This may be the first time you meet with someone from our team.

You will see one of our neurosurgeons and a neuro-oncology CNS. They will do their best to help you understand your condition and what the signs and symptoms you are having are likely to mean. They will also explain the results of the investigations you have had up to now and your treatment options.

They will explain the different treatments – active surveillance, biopsy, asleep craniotomy and awake craniotomy – and why they think an awake craniotomy is best for you. Reasons include being able to take out as much of the tumour as possible and ensuring your speech and ability to move your hands, fingers, toes and so on are not affected.

They will also ask you to fill in a self-assessment form about your home and how you are managing.

After you have been reviewed in the clinic, you will have blood tests, an electrocardiogram (ECG or heart trace) and a lower limb ultrasound. These all check that you are fit and well enough for the surgery.

The lower limb ultrasound checks that you do not have any blood clots in the veins in your legs. Patients with brain tumours are more likely to have them. If we do find blood clots in your legs you may need treatment before surgery. This includes taking blood-thinning

medication or having a filter put into the major vein in your abdomen (tummy) to stop the blood clot from moving to your lungs before surgery.

This PAC appointment is likely to be the last consultation you have with the whole team before you come in for your surgery. If the neurosurgical team need to see you again, they will contact you.

Research at King's

The neuro-oncology team puts your care and treatment first. We carry out research because we are strongly committed to improving the quality of care we offer our patients.

After your PAC appointment, our research team may contact you about taking part in one of our projects. This will not affect your treatment and you do not have to take part.

Neuro-anaesthetic assessment

On the morning of your operation, you are admitted for your operation.

A neuro-anaesthetist will check your medical history and review your tests and investigations. They will give you as much information as possible about what to expect during the operation, to put you at ease and to ensure you feel able to go ahead with the procedure.

They will discuss the best anaesthetic for you, taking into account your medical history and the surgery you are having.

You will not feel pain with any of these types of anaesthesia or during the awake phase.

Types of anaesthetic used for awake craniotomy surgery

1 Asleep-awake-asleep	You may be given a general anaesthetic at the start. You are then woken up when the surgeon needs you to respond while they are testing your brain. You will go to sleep again for the final part of the procedure.
2 Asleep-awake-sedated	This is similar to 1, but if you are comfortable and content the anaesthetist can increase your sedation for the final part of the procedure. You will be assessed and monitored the whole time.
3 Sedation	You are sedated to different depths of awareness, ranging from having no memory of the operation to being fully aware. Your anaesthetist will alter your sedation depending on what you need for the different stages of the procedure.
4 Local anaesthesia	You are given medication to numb the area being operated on and you are given no general anaesthesia or sedation.

The best results for awake neurosurgery are when you and your neuro-anaesthetist can find what works best for you on the day. It is important to remember that they are guided by you. If you feel that you are not coping, the neuro-anaesthetist can change what they are doing to ease your concerns.

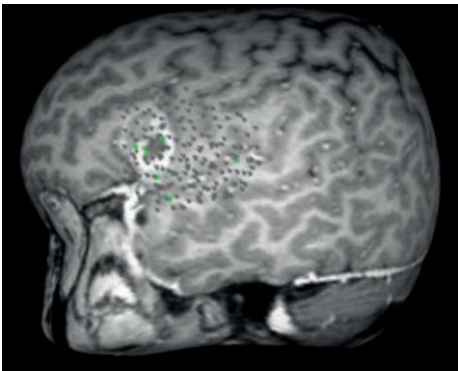
Please speak to a member of the neurosurgical team if you would like to talk with an anaesthetist before the day of your surgery.

Other assessments and scans to help us plan your surgery

You will need to have some specialist assessments and scans of your brain before your operation. The neurosurgery team will organise these for you and contact you with your appointment date(s) and time(s). You will have them in our Neuroradiology department.

Pre-Operative Brain mapping:

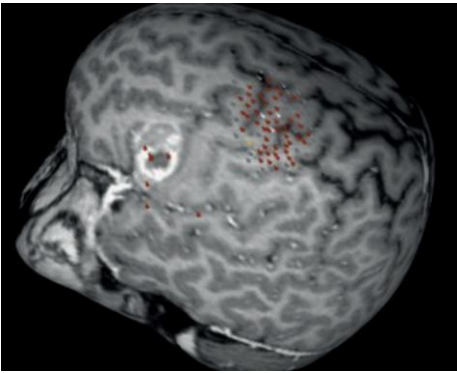
This is a very important part of planning your surgery to ensure it is a success. You may have a number of brain-mapping assessments to help the surgical team get as much information about the structure of your brain as possible. Having these assessments will also give you a better understanding of the benefits and the potential risks of awake craniotomy.



Volumetric MRI and TMS: You will have volumetric magnetic resonance imaging (MRI) scans and transcranial magnetic stimulation (TMS) assessments.

TMS uses a magnetic coil to stimulate specific areas of your brain. Different parts of your

brain control different functions – such as your movement and your speech. By assessing how you respond when certain parts of your brain are stimulated by TMS, the team can map out the motor and speech areas in your brain and see them on the brain surface in

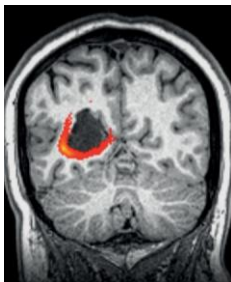
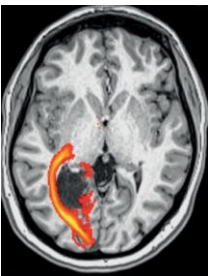
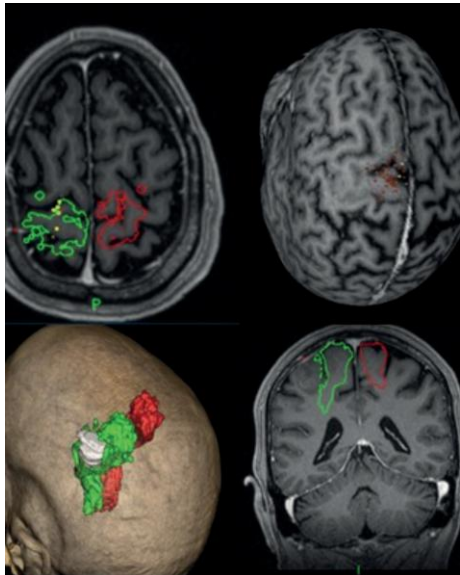
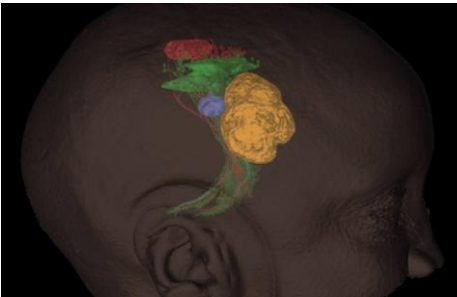


the MRI images. It gives them a better understanding of where the tumour is in relation to important parts of your brain and the surgeon will use it to guide them during operation.

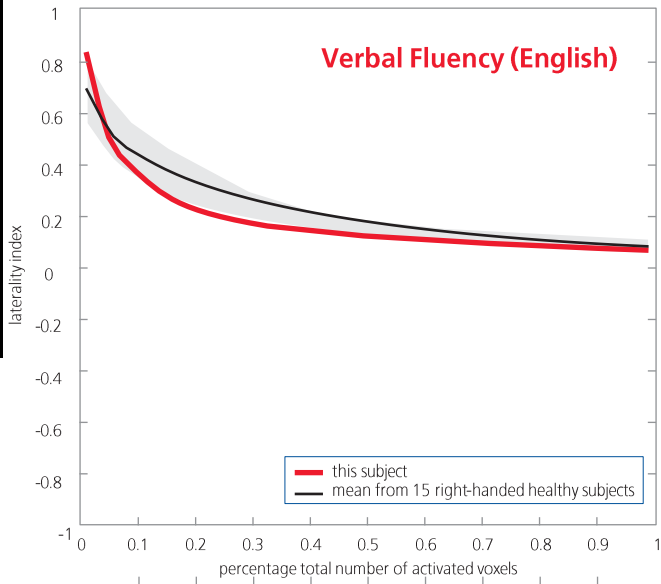
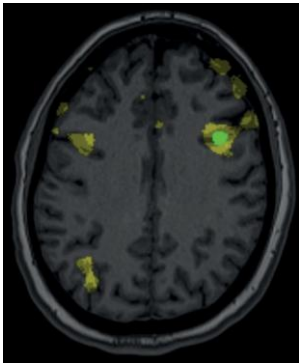
You have TMS in our brain-mapping laboratory and it should

take no longer than two hours. During the investigation, you will be asked to do some simple language tests and/or some fine motor tasks. It can cause some mild discomfort but it is not painful.

Tractography: You are likely to have tractography (DTI-fibre tracking) before your operation. This involves having another MRI scan. It provides detailed three-dimensional images of what the inside of your brain – the deep white matter – looks like. This mapping modality will provide us with a greater understanding about the connections between different areas of your brain.



Functional MRI: You may have this scan to help the surgical team identify the parts of your brain that control your main language skills and the movements in your upper and lower limbs and face



Therapy assessments

Speech and language assessment: You will see a member of our speech and language therapy (SLT) team before you are admitted for your operation. They will do a short assessment of your ability to speak and understand, and explain the tests they will be doing with you during the surgery. Which tests they do depends on where your tumour is.

They will also take time to get to know you a little and talk with you about what happens during surgery. When you are having your operation, you need to talk to the therapist so they can check you are able to speak ok. They will also ask you to do some short language tasks during the procedure.

Physiotherapy motor assessment: You may see a member of our physiotherapy team so they can check how well you can use your limbs, as well as your muscle strength and your sense of touch. They may also want to talk to you about the tests they will do with you during surgery.

Neuro-psychological assessment

You may be referred to our neuropsychologist, who will assess your cognitive function – your ability to think. This will help the neurosurgical team understand whether the tumour is affecting your thinking skills, which include attention, memory, planning and organisation.

What happens on the day of surgery?

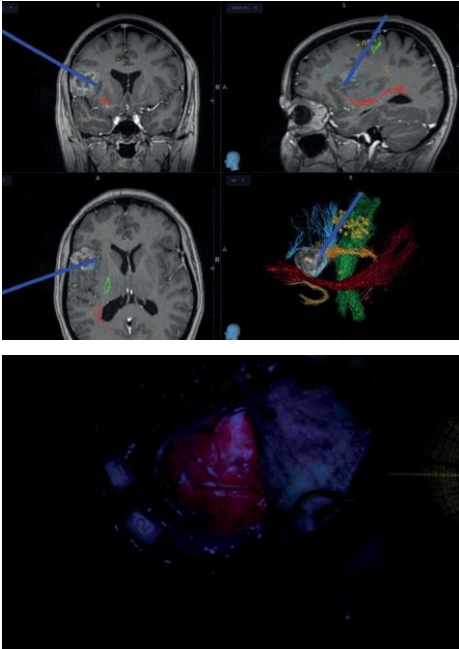
On the day of your operation your neuro-anaesthetist will discuss with you the plan for your anaesthetic. You might be awake for the whole procedure or for only for part for it.

Once you are in theatre, the anaesthetic team will put a drip into a vein in your arm through which they will give you some drugs to make you more comfortable and relaxed. You will be given all your medication through this drip.

The neuro-anaesthetist will make you as comfortable as possible during your operation and carefully monitor your breathing and blood pressure. They will work with your surgeon to ensure the best possible conditions and that you are kept alert and co-operative during the awake part of your procedure.

What happens during surgery?

Asleep phase



The first part of surgery is your asleep phase. Your head is usually fixed in a frame to stop it from moving. This is not painful but during your awake phase you may be aware of pressure where the frame holds your head in place. You will have a urinary catheter put in to safely drain urine from your bladder during the procedure.

The surgeon will make a cut in your scalp and pull back the skin so they can see your skull. They will then open up an area of your

skull so they can see your brain. During the operation they will use specialist equipment and techniques such as: a neuronavigation; a surgical microscope, ultrasound, a dye called Gliolan, which helps them to check that they are removing as much of the tumour as possible; speech mapping; and complex motor mapping.

Awake phase

You will be gradually woken up and you will first hear the familiar voice of your neuro-anaesthetist.

At this point, you will be able to see and communicate with the team involved in your surgery. The speech and language therapist and/or physiotherapist will then be the main people who speak to

you. Your neuro-anaesthetist will still be available to speak to you as they monitor you and give you constant pain relief and sedation medication.

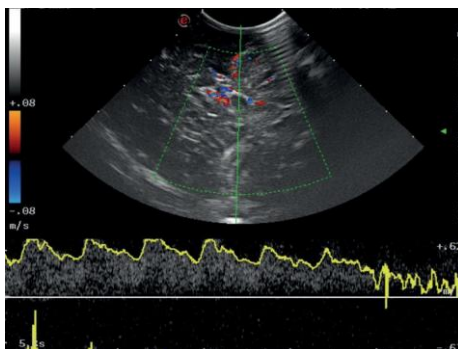
Once you are fully awake, the surgeon will use brain mapping to map out the relevant areas of your brain. While your brain is being stimulated, you might feel a twitch in one of your arms or legs, or pins and needles, or you might be unable to talk for a short time.

The speech and language therapist will keep testing your ability to speak while the surgeon is operating and removing the tumour.

The neurophysiologist will test your motor function by using special needles, which they put in your muscles under general anaesthetic during your asleep phase. A physiotherapist may also test and monitor your more complex motor skills.

If at any point during the procedure you feel pain, please let the team know and they will ease your discomfort.

The team will regularly let you know how the procedure is going. If they have any concerns, they will stop removing the tumour.



Asleep or sedated phase

Once the surgeon has removed as much of the tumour as possible or no more tests are needed, the neuro-anaesthetist will either put you to asleep again or sedate you, so the team can finish the procedure.

How long does the procedure take?

You are expected to be in theatre the whole day as the operative and perioperative care takes place in the neurosurgical theatres and neuro-recovery.

What happens after surgery?

You will wake up in theatre and be taken to the recovery bay where you will be monitored for one to two hours. You will then be taken to the ward.

Recovery on the ward

The surgical and anaesthetic teams will check you the day after surgery and you may also have a CT and /or MRI scan. You will be seen by a consultant, senior medical fellow, medical registrars and the CNS during a neuro-oncology ward round.

If your tumour was close to areas of your brain controlling speech and language, you may have some problems speaking and/or understanding.

If it was close to areas that control the movement of your arms and legs, you may have some weakness on one side.

This is common after surgery and should improve during the first few weeks after the procedure.

A speech and language therapist, a physiotherapist and, if needed, an occupational therapist will review you after your surgery and start to work with you while you are recovering.

You are usually in hospital for between three to seven days. Once you have started to recover, you will be either discharged home or moved to a neurorehabilitation unit or your local hospital to complete your recovery.

Once you are safely discharged home you will be advised how to take your medication and you may also be given advice on how to care for your wound.

Stitches and staples

The cut in your scalp will be sewn up using one of three methods.

- **Dissolvable sutures:** these take a few weeks or more to dissolve and they do not need to be taken out.
- **Non-dissolvable stitches:** These must be taken out at least 10 days after surgery. This can be done at your GP practice if you are discharged home before they are due to be taken out.
- **Staples:** These must be taken out at least 10 days after surgery. This can be done at your GP practice if you are discharged home before they are due to be taken out. We will give you staple removers to take to the GP practice.

Caring for your wound – signs to look out for

Your wound needs to be kept clean and dry. The dressings normally stay on for at least 48 hours after surgery. There is usually dry blood around the wound. Please do not try to remove it. Let it come off naturally. Removing it can damage your skin and make you more likely to get an infection.

Please call us or send us a picture of your wound immediately if you notice any of the following:

- leaks or fluid coming from the wound
- the wound opening up
- an offensive smell from the wound or unusual pain.

Call **07929 854244** or email a picture with a description to:

kch-tr.Neuro-OncologyNurses@nhs.net

Your treatment and care team

Your treatment and care will be provided by professionals from King's College Hospital's Neuro-oncology, Neuroradiology and Neuropathology departments; Guy's Cancer Centre; and Kent Cancer Centre.

Who can I contact with queries or concerns?

Weekdays, 9am to 5pm

King's College Hospital

Neuro-oncology administration team for non-clinical matters

Tel: **020 3299 4151**

Neuro-oncology clinical nurse specialists (CNSs)

Tel: **07929854244** or email kch-tr.neuro-oncologynurses@nhs.net)

MRI appointments at King's

Email: kch-tr.neuroradiologyappointments@nhs.net

Guy's Cancer Centre

Neuro-oncology consultant's secretary, tel: **020 7188 1447**

MRI appointments at Guy's, tel: **020 7188 9793**

Out of hours

The 24/7 contact number for both hospitals is **020 7188 3754**

(AOS Telephone Helpline at Guy's Cancer Centre)

Your experience

We would welcome any feedback you have to offer about the care you received from neuro-oncology. Please help us by filling the form you can find in the following link:

<https://forms.gle/HxBN3URf11yTv8kG9>

Brain tumour support group

We hold a programme of support groups online throughout the year.

Please email kch-tr.neuro-oncologynurses@nhs.net or contact the King's Macmillan Information and Support Centre on 020 3299 5228 or kch-tr.macmillan1@nhs.net for further information.

More information

King's College Hospital neuro-oncology service

www.kch.nhs.uk/services/services-a-to-z/neuro-oncology/

The Brain Tumour Charity

www.thebraintumourcharity.org

Brainstrust

www.brainstrust.org.uk

DVLA: advice on driving with medical conditions

www.gov.uk/browse/driving/disability-health-condition

MyChart

Our MyChart app and website lets you securely access parts of your health record with us, giving you more control over your care. To sign up or for help, call us on 020 3299 4618 or email kings.mychart@nhs.net. Visit www.kch.nhs.uk/mychart to find out more.

Sharing your information

King's College Hospital NHS Foundation Trust has partnered with Guy's and St Thomas' NHS Foundation Trust through the King's Health Partners Academic Health Sciences Centre. We are working together to give our patients the best possible care, so you might find we invite you for appointments at Guy's or St Thomas' hospitals. King's College Hospital and Guy's and St Thomas' NHS Foundation Trusts share an electronic patient record system, which means information about your health record can be accessed safely and securely by health and care staff at both Trusts. For more information visit www.kch.nhs.uk.

Care provided by students

We provide clinical training where our students get practical experience by treating patients. Please tell your doctor or nurse if you do not want students to be involved in your care. Your treatment will not be affected by your decision.

PALS

The Patient Advice and Liaison Service (PALS) is a service that offers support, information and assistance to patients, relatives and visitors. They can also provide help and advice if you have a concern or complaint that staff have not been able to resolve for you. They can also pass on praise or thanks to our teams. The PALS office is located on the ground floor of the Hambleton Wing, near the main entrance on Bessemer Road - staff will be happy to direct you.

PALS at King's College Hospital, Denmark Hill, London SE5 9RS

Tel: **020 3299 4618**

Email: **kings.pals@nhs.net**

If you would like the information in this leaflet in a different language or format, please contact our Interpreting and Accessible Communication Support on 020 3299 4618 or email kings.access@nhs.net.