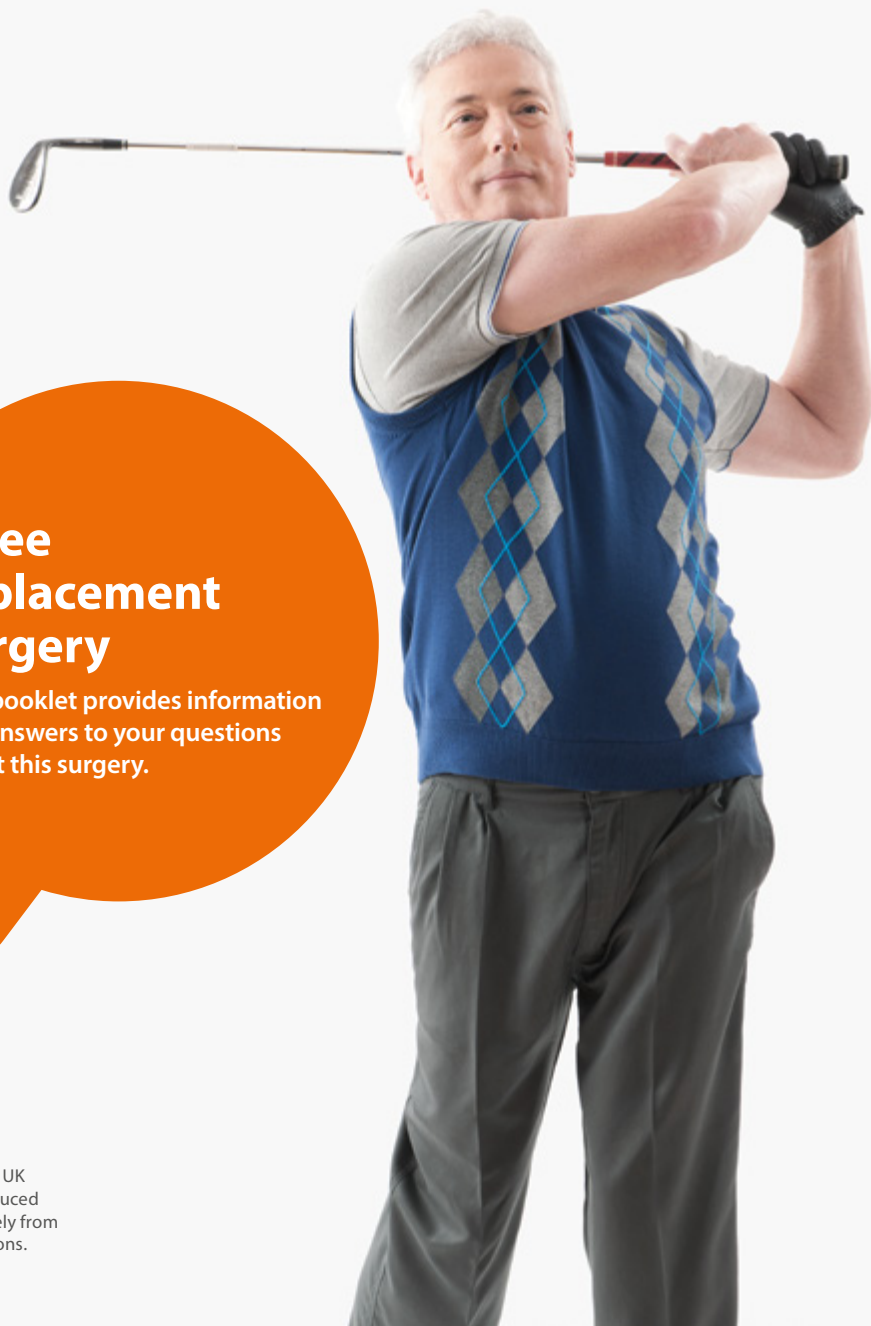


Knee replacement surgery

This booklet provides information
and answers to your questions
about this surgery.



What is knee replacement surgery?



In this booklet we'll explain when knee replacement might be needed and what you can expect from surgery. To help you in making an informed decision we'll also look at the potential complications of knee surgery and suggest where you can find out more.

At the back of this booklet you'll find a brief glossary of medical words – we've underlined these when they're first used.

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At a glance

Knee replacement surgery

Knee replacements are most commonly recommended for osteoarthritis but sometimes for rheumatoid arthritis or other inflammatory joint diseases. Most people who have a knee replacement are over 60, and slightly over half the patients who have knee replacement surgery are women.

Do I need a knee replacement?


You may need a knee replacement if:

- your arthritis causes pain, stiffness, instability or loss of function that severely affects your daily life and activities
- other, non-surgical treatments haven't worked.

What are the possible advantages?

The likely advantages of having surgery are:

- pain relief
- improved mobility
- improved quality of life.



Ask your healthcare team to explain anything you're unsure about.

What are the possible disadvantages?

The disadvantages of having surgery can include:

- some limitations in movement
- finding kneeling uncomfortable
- risks associated with surgery, including pain that won't go away.

What should I ask my hospital team?

You might want to ask your hospital team the following questions:

- Is my knee bad enough to need a knee replacement at this stage?
- What can I expect from surgery?
- What can I expect if I don't have surgery?
- What are the alternatives?
- What are the risks?
- How long will I be in hospital?
- How will I manage at home while I'm recovering from surgery?
- When will I get back to normal?
- What if I have problems after surgery?

What are the possible complications?

Possible complications include:

- ongoing pain
- blood clots
- wound haematoma (bleeding)
- infection
- instability or dislocation
- bone fracture
- nerve, blood vessel or ligament damage
- wear
- early revision surgery
- loosening of the parts
- stiffness.

In the weeks after you have surgery, you should seek medical advice straight away if you have:

- pain and/or swelling in your leg
- chest pain or sudden breathlessness.

How long will a new knee joint last?

Modern knee replacements last for at least 20 years in around 8 out of 10 patients. In more active patients the joints may wear out more quickly. However, it's usually possible to have further knee replacements, if necessary.



Do I need a knee replacement?

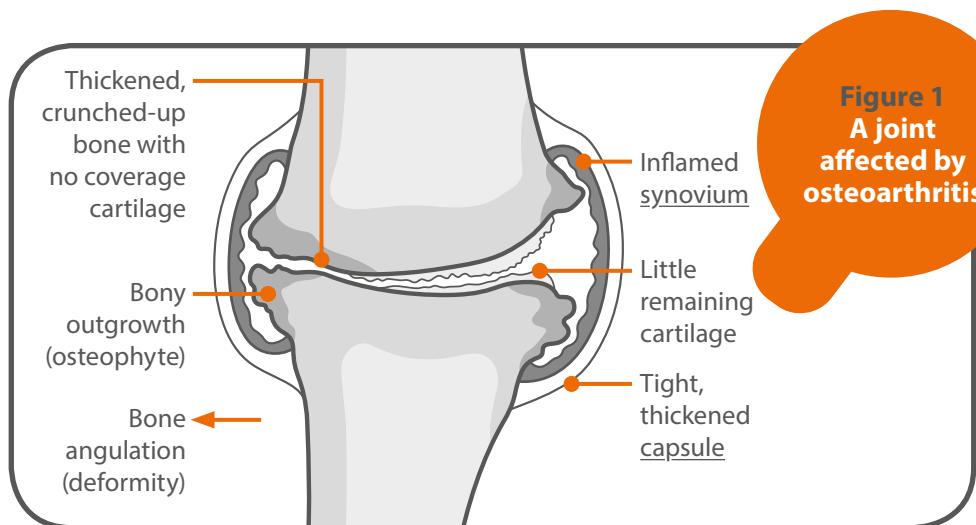
Because knee replacement surgery is a major operation it's normally only considered if you have severe pain and serious mobility difficulties, and if your arthritis isn't responding to other measures. The operation works best for patients whose joint surface has worn right down to the bone (bone-on-bone arthritis). If your symptoms are still manageable and your medication is effective then you may prefer to wait. You should try to lose weight if you are overweight and you should also try physiotherapy if you have not already done so.

Your orthopaedic surgeon will be able to advise on the surgical options and the potential pros and cons of having or delaying surgery, taking into account your age, health and level of activity.

Most people who have a knee replacement are over 60. The earlier you have a knee replacement the greater the chances that you'll eventually need further surgery. However, there's evidence that the surgical outcome may be better if you don't wait until the knee becomes very stiff or deformed.

Unfortunately, some people may not be able to have a knee replacement even though their arthritis is very bad:

- If the thigh muscles (quadriceps) are very weak they may not be able to support the new knee joint.
- If there are deep or long-lasting open sores (ulcers) in the skin below the knee the risk of infection may be too great to consider surgery.



What are the possible advantages of knee replacement surgery?

Freedom from pain is the main advantage of a knee replacement, and you should expect to become more mobile too. Everyday activities including driving or climbing stairs should become easier, and exercise such as swimming, cycling, tennis or golf should also be possible.

Research has shown that four out of five people who've had knee replacement surgery are happy with their new knees. For those who aren't happy, the main reason is continuing pain, which may not be due to a problem with the operation. This is more of a risk if you have relatively minor joint damage (which may still cause severe symptoms) before surgery. If your joint damage isn't very severe it may be better to carry on with non-surgical treatment rather than risk a poor outcome from surgery.

What are the possible disadvantages of knee replacement surgery?

We now know that knee replacements are not so likely to be effective in the early stages of arthritis. We can be much more confident that the operation is likely to be effective where the arthritis is more advanced.

A replacement knee can never be quite as good as a natural knee. Most knee replacements aren't designed to bend as far as your natural knee. You may

Most people who've had knee replacement surgery find that it improves their mobility.

also have some clicking or clunking in the knee replacement. However, most people rate the artificial joint about three-quarters normal.

It's usually possible to kneel, although some people find it uncomfortable to put weight on the scar at the front of the knee. To begin with, there will be some numbness on the outer edge of the scar. It's unlikely that the feeling will completely return to normal but it usually improves over about two years.

A replacement knee joint may wear out after a time or become loose. For most people an artificial knee will last for 20 years or more. Younger patients are more likely to need a repeat knee operation at some point in later life. The likelihood of needing another operation is increased if you're overweight or do heavy manual work. Running or playing vigorous sport can also increase the risk of wear or loosening of the new joint.

Artificial joints can be replaced again if necessary, although revision surgery is more complex and the benefits tend to lessen with each revision.

What is knee replacement surgery and how does it work?

In a healthy knee, the ends of the thigh and shin bones are covered with hard cartilage which allows the bones to move easily against each other. Arthritis damages the hard cartilage so that it becomes thin. In time, the cartilage wears away so that the bones rub against each other and become worn.

In a knee replacement operation, the surgeon removes the worn ends of the bones and any remaining hard cartilage (see Figure 1) and replaces them with metal and plastic parts. The plastic acts like hard cartilage, helping the joint to move freely. The interlocking parts of the artificial (man-made) joint allow the knee to bend while also making it more stable.

i See Arthritis Research UK booklets
Osteoarthritis; Rheumatoid arthritis; What is arthritis?

What are the different types of knee replacement surgery?

There are several kinds of artificial knee joint as well as differing surgical techniques. Your doctor and surgeon should help you to choose the best option for you, taking into account the condition of your knee and your general health.

Total knee replacement

Most total knee replacement operations involve replacing the joint surfaces at the end of the thigh bone (femur) and at the top of the shin bone (tibia).

A total knee replacement may also involve replacing the undersurface of the kneecap (patella) with a smooth plastic dome (see Figure 2). Some surgeons prefer to preserve the natural patella if possible, but sometimes the decision will need to be made during the operation.

Some people who are thinking of having a total knee replacement may have had a previous operation to remove the patella altogether (patellectomy). This operation is rarely done nowadays, but if you've had a patellectomy in the past then it doesn't prevent a knee replacement from being performed. However it may affect the type of prosthesis (replacement part) used.

The new parts are normally cemented in place. If cement is not used then the surface of the component facing the bone is textured or coated to encourage bone to grow onto it, forming a natural bond.

Another technique is to use a mobile plastic bearing which isn't firmly fixed to the metal parts. This may help to reduce wear on the new joint, though it hasn't been shown to provide better long-term results.

Figure 2
An artificial
knee joint
in place

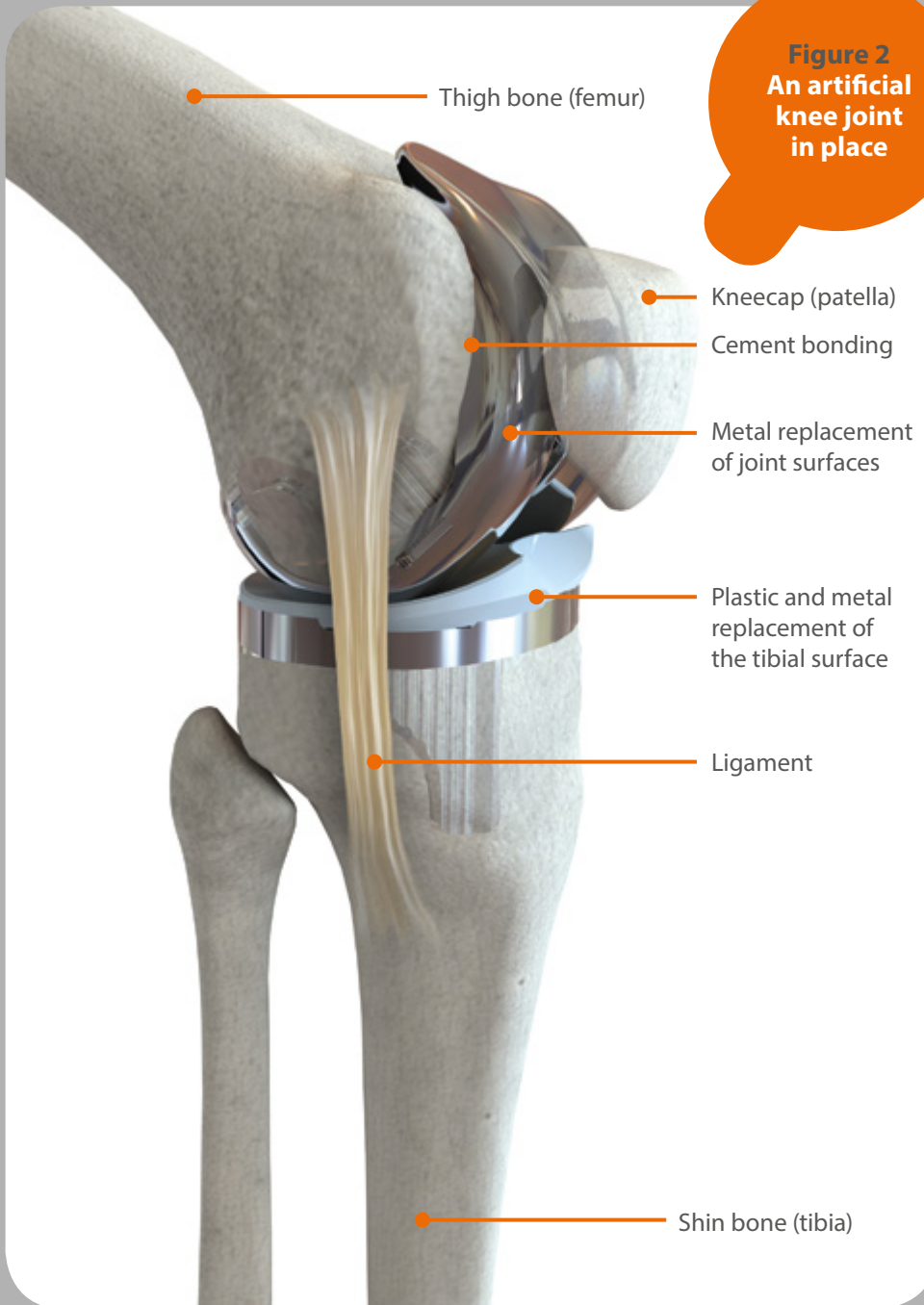
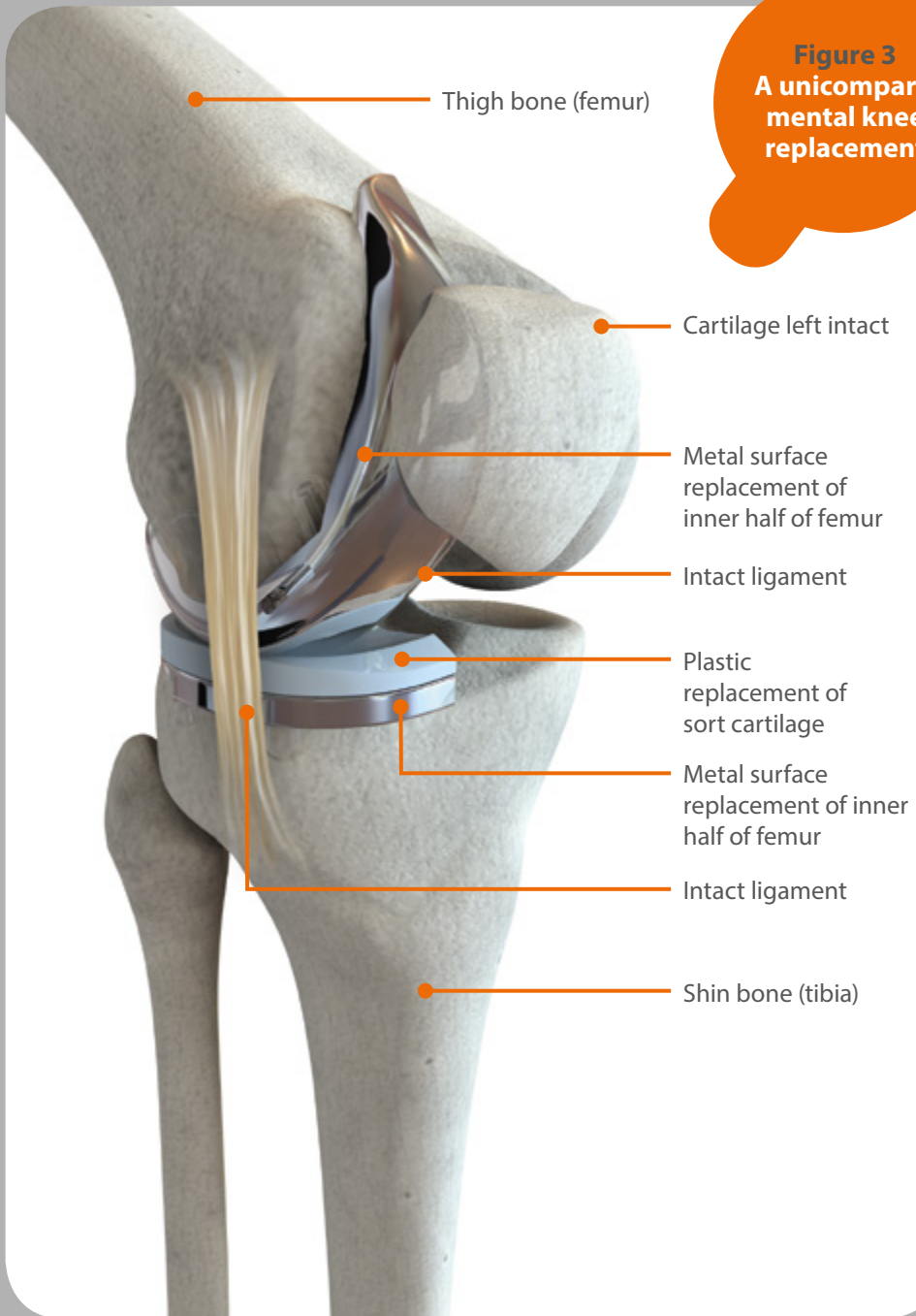


Figure 3
A unicompart-
mental knee
replacement



Unicompartmental (partial) knee replacement

There are three compartments of the knee, the inner (medial), the outer (lateral) and the kneecap (patellofemoral). If arthritis affects only one side of your knee – usually the inner side – it may be possible to have a half-knee replacement (sometimes called unicompartmental or partial replacement – see Figure 3). Because this involves less interference with the knee, it usually means a quicker recovery and better function.

Partial knee replacements can be carried out through a smaller cut (incision) than a total knee replacement, using techniques called reduced invasive or minimally invasive surgery. A smaller incision may reduce the recovery time.

Partial knee replacement isn't suitable for everyone because you need to have strong, healthy ligaments within your knee. Sometimes this won't be known until the time of surgery.

Recent research shows that patients who have partial knee replacements are more likely to have the knee revised than patients who have a total knee replacement – about 1 person in 10 needs further surgery after 10 years. Even though the operation involves less interference with the knee it is often a more complex operation than a total knee replacement. Your surgeon may therefore prefer to offer you a more predictable total knee replacement.

Partial knee replacement can be considered at any age. For younger patients it offers the opportunity to preserve more bone, which is helpful if a revision is needed at a later stage. For older patients, it is good because it's a less stressful operation with less risk of bleeding and less pain. The outcome of the surgery depends on the type of arthritis, rather than your age.



A partial knee replacement may be a good option if arthritis only affects one side of your knee.

Kneecap replacement (patellofemoral arthroplasty)

It's possible to replace just the under-surface of the kneecap and its groove (the trochlea) if these are the only parts of your knee affected by arthritis. This is also called a patellofemoral replacement or patellofemoral joint arthroplasty (see Figure 4).

The operation has a higher rate of failure than total knee replacement – which may be caused by the arthritis progressing to other parts of the knee. Some surgeons prefer a total knee replacement as the results are more predictable. Others feel that it's better to preserve the rest of the knee joint if it isn't affected by arthritis. The operation is only suitable for about 1 in 40 people with osteoarthritis. However, the outcome of kneecap replacement can be good if the arthritis doesn't progress, and it's a less major

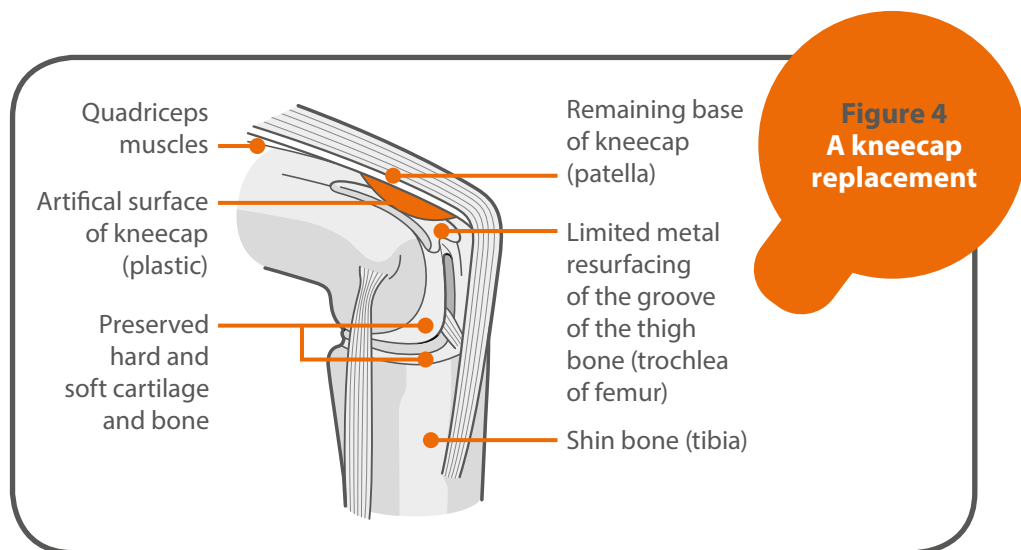
operation offering speedier recovery times. More research is needed to understand which patients are more likely to do well with this operation.

Complex or revision knee replacement

Some people may need a more complex type of knee replacement. The usual reasons for this are:

- major bone loss due to arthritis or fracture
- major deformity of the knee
- weakness of the main knee ligaments.

These knee replacements usually have a longer stem, which allows the component to be more securely fixed into the bone cavity. The components may also interlock in the centre of the knee, forming a hinge to give greater stability. Extra pieces of metal and/or plastic may



be used to make up for any removed or badly damaged bone (see Figure 5).

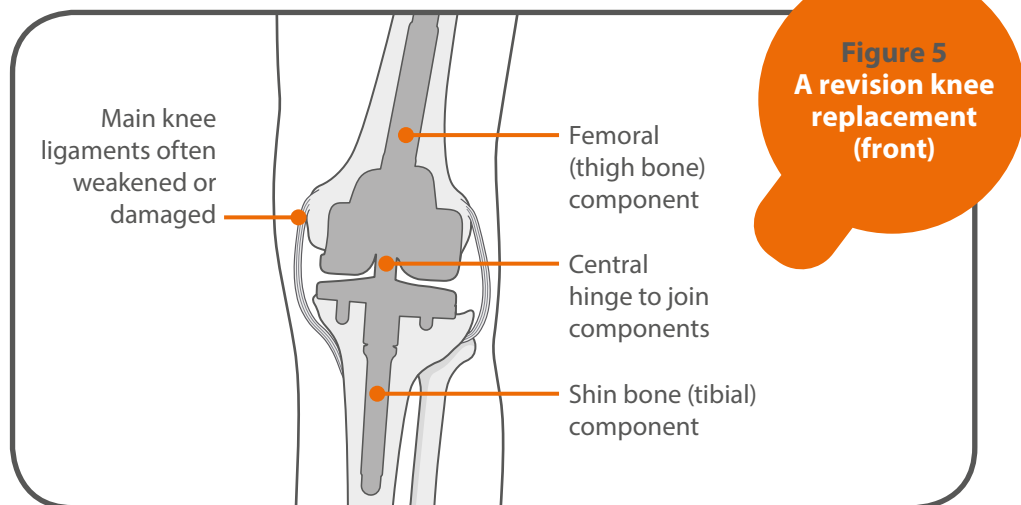
A complex knee replacement may be necessary if you're having a second or third joint replacement in the same knee, and could be better from the start if you have very severe arthritis.

What are the alternatives to knee replacement surgery?

Most doctors recommend non-surgical (conservative) treatments before considering a knee replacement, not only because of the risks of surgery but also because of recent evidence of dissatisfaction amongst patients who have had the operation too early for mild arthritis. Non-surgical options include:

- **diet** – Losing weight will reduce the strain on your knee.
- **exercise** – Even though this may be difficult because of the pain, there's usually some form of non-impact exercise (for example swimming or cycling) that you can start gently and which will improve the strength and flexibility of your knee.
- **medication** – Painkillers can reduce the pain in your joint, while anti-inflammatory tablets may help if your knee is swollen; although, as with all medications, there's a risk of side-effects.

If you've tried these options, you may want to think about the surgical alternatives to knee replacement. Generally these don't provide such good results as a new knee joint but they may allow you to delay having a knee replacement operation.



Arthroscopic washout and debridement

Keyhole surgery techniques (arthroscopy) to smooth damaged cartilage and remove debris from the knee joint may only be used in very specific circumstances. If there are mechanical symptoms such as 'locking' of the knee then removing loose fragments of bone and cartilage may avoid having to have a knee replacement at that stage. However, there's no evidence of benefit for arthritis generally.

Microfracture

This operation, which is performed by keyhole surgery, involves making holes in exposed bone surfaces with a drill or pick. This encourages new cartilage to grow from the bone marrow. The technique isn't recommended for advanced arthritis.

Osteotomy

This is an operation which may be helpful in younger patients. It involves cutting the shin bone crosswise, creating a wedge to shift the load away from the area affected by arthritis. Osteotomy may be considered as a way of putting off a knee replacement operation. However, it can make it more difficult to carry out a successful total knee replacement later on – especially if during the osteotomy the surgeon has to cut through the medial collateral ligament on the inner surface of the knee. Rarely, if the outer part of the knee is affected by arthritis, this operation is performed on the end of the thigh bone to shift the load inwards.

Autologous chondrocyte therapy (ACT)

If only the hard cartilage is damaged, new cartilage can be grown in a test tube from your own cells. The new cartilage is then applied to the damaged area. This technique is mainly designed to repair small areas of cartilage damage resulting from accidental injury to the knee joint. It isn't yet proven for arthritis and would only be suitable for younger patients whose cartilage cells are more active. It's usually therefore only done as part of a research trial, as are newer techniques using stem cells.

How should I prepare for surgery?

It's advisable to make sure your general health is as good as it can be before your operation, for example blood pressure control and diabetes management. It's also a good idea to have a dental check-up and get any problems dealt with well before your knee operation. This is because there's a risk of infection if bacteria from dental problems get into the bloodstream.

Your surgeon will probably suggest exercises to strengthen the muscles at the front of your thigh (quadriceps), which often become weak with arthritis. The stronger these muscles are before surgery, the quicker your recovery will be. Exercises that involve raising your foot against gravity are best.

Pre-admission clinic

You'll usually be invited to a pre-admission clinic a few weeks before the operation. This will involve a number of tests to assess whether you're generally fit and healthy enough to undergo surgery. The tests may include:

- blood tests to check for anaemia and to make sure your kidneys are working properly
- an MRSA swab to check that you're not carrying resistant bacteria
- a urine sample to rule out infection if you have a history of symptoms
- an electrocardiogram (ECG) tracing to make sure your heart is healthy.

You should discuss with your surgeon, anaesthetist or nurse whether you should stop taking any of your medications or change the dosage or timings before you have your surgery. Different units may have differing views.

You'll also have the opportunity to ask questions and discuss anything you're concerned about. You need to plan for return home and recovery arrangements as early as possible.

You may also meet a physiotherapist or occupational therapist, who'll talk about the exercises you'll need to do after your surgery and your arrangements for going home. Your occupational therapist will discuss with you how you'll manage at home and will advise on aids and

appliances that might help you.

If you're not invited to see an occupational therapist and you're worried about coping at home after the operation, you should ask about home help and aids when you go for your pre-admission clinic.

i See Arthritis Research UK booklets

*Meet the rheumatology team;
Occupational therapy and arthritis;
Physiotherapy and arthritis.*



Going into hospital

You'll usually be admitted to hospital on the day of your operation. You'll be asked to sign a consent form if you haven't already completed one, which gives the surgeon permission to carry out the treatment, and your knee will then be marked for the operation. It's important to ask any questions you may still have at this stage.

Figure 6 Pre-admission checklist – before you go into hospital, you should think about the following:

Do you need someone to stay with you for a while after your operation? If not, have you arranged a period of time in a nursing home?

Have you set up your home ready for your return, with everything you need within reach and any obstacles or trip hazards tidied away?

Do you have any specialist equipment ready for when you leave hospital?

Do you need someone to stay with you for a while after your operation?



You'll be asked if you're willing for details of your operation to be entered into the National Joint Registry (NJR) database. The NJR collects data on hip and knee replacements in order to monitor the performance of joint implants. It is only by measuring the outcomes of all knee replacements that we can learn more about what works best and for which patients.

If you're taking drugs that affect blood clotting, such as warfarin and clopidogrel, you should follow instructions to prevent too much bleeding during and after surgery.

The operation

Just before your operation you'll be walked or taken in a chair or bed to the operating theatre. You'll probably be given a sedative medication (a pre-med) while waiting in the admission ward. You'll then be given an anaesthetic.

Most knee joint replacements are now done under either a spinal anaesthetic or an epidural anaesthetic. These numb the body from the waist down, but you'll remain awake throughout the operation. If you have a general anaesthetic instead you may be given a nerve block (injections around the nerves in the thigh). This will block pain in the leg for up to 36 hours after surgery but unfortunately this will temporarily weaken the leg. Many surgeons instead inject a type of local anaesthetic into the tissues all around the knee during the operation to numb the pain but still allow

the muscles to work so you can get up sooner after the surgery.

The operation itself may take from 45 minutes to over two hours, depending on how complex the surgery is.

What will my recovery involve?

After the operation

Before going back to the ward you'll spend some time in the recovery room, where you may be given fluids and painkillers through a tube in your arm.

This may include patient-controlled analgesia (PCA) – a system where you can control your own supply of painkiller going into a vein by pressing a button. You may also be given painkilling injections or tablets.

Oxygen therapy is likely to be given through a mask or through tubes into your nose.

There's often no need for you to have a blood transfusion because your body can replace any blood lost during or after surgery. If the operation is more extensive you may need blood from a donor. An alternative is to recycle the blood which drains from your knee – returning it into your body through a tube in a vein (auto-transfusion).

After the first day or so, the tubes giving painkillers, fluids or oxygen will be removed. You may have a tube (catheter) inserted for a few days to drain urine from

The enhanced recovery programme (ERP) focuses on making sure you play an active part in your own recovery process.

your bladder, especially if both knees have been replaced at the same time.

Pain will usually be worse on the second or third day after surgery when the anaesthetic and strong medication wears off, and you'll probably need painkillers to control this. Without them it'll be difficult to do the exercises needed to strengthen the muscles and restore mobility.

How quickly you get back to normal depends on many factors, including your age, your general health, the strength of your muscles and the condition of your other joints.

Enhanced recovery programme

These days most patients are able to start moving about soon after surgery, which is good for lung function and the circulation. The hospital team encourage most patients to follow the enhanced recovery programme (ERP). This programme aims to get you walking and moving within 12–18 hours and home within four days. If you're suitable, the ERP will start when you go for your pre-admission clinic to make sure you're fully prepared for the surgery and understand the programme. After the operation the programme aims to get you moving and

eating normally as soon as possible, and when you're discharged from hospital you'll be given supporting therapy and follow-up checks. The programme focuses on making sure that you take an active role in your own recovery process.

Getting mobile again

Nursing staff and physiotherapists will help you to start walking. If you've had minimally invasive surgery or are taking part in the ERP, this may be on the same day as your operation. At first you'll need crutches or a walking frame. If you've had a spinal anaesthetic or nerve block you'll have very little feeling in your leg for the first day or two, and it's important to be aware of your state of recovery to avoid falling over.

You may have a temporary brace called a cricket pad splint (designed to support your knee until your quadriceps are working effectively) on your leg if there's a risk of weak ligaments, deformity or poor wound healing.

Your physiotherapist will be able to advise you on getting about and will explain the exercises you need to do to keep improving your mobility. Keeping up your exercises will make a big difference to your recovery time. Build up the exercises gradually to strengthen your muscles so that you can move more easily.

Going home

It's usually possible to go home as soon as your wound is healing well and you can safely manage to get about at home with the help of crutches or a frame. Before you leave hospital an occupational therapist

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Knee replacement surgery

or physiotherapist will explain the best ways to get dressed, take a shower and move about, and they'll assess what equipment you might need to help you. You should also make arrangements for wound care. If you have stitches or clips that need removing, this can be done on a return visit to hospital, at home by a visiting nurse or at your GP's surgery.

You'll usually have a follow-up hospital appointment about six weeks after your operation to check on your recovery. Further follow-up appointments are usually recommended to check on any difficulties that may arise.

If you stopped taking any of your regular drugs before the operation, it's very important to talk to your rheumatologist for advice on when you should restart your medication.

Usually you can return to work when you feel comfortable that you can continue with your normal role. For a job that is mostly done in a sitting position, this may be 6–8 weeks, but if your job involves standing for long periods of time or manual work you may need 10–12 weeks. If your job involves heavy manual work, you should discuss with your employer whether a lighter alternative can be found when you return to work as heavy lifting may damage the prosthesis.

Looking after your new knee

Your new knee will continue to improve for as much as two years after your operation as the scar tissue heals and

the muscles are restored by exercise. During this time you need to look after yourself and pay attention to any problems such as stiffness, pain or infection.

Stiffness – Sometimes the knee can become very stiff in the weeks after the operation for no obvious reason. Try placing your foot on the first or second step of the stairs, hold on to the banister and lean into your knee. This should help to improve movement and flexibility in your knee. It's very important to continue with the exercises you were working on in the hospital.

If the stiffness doesn't improve after about six to twelve weeks your surgeon may need to move or manipulate your knee. This will be done under anaesthetic.



Pain – Pain caused by bruising from the operation is normal in the first two months, and you'll probably still need to take painkillers at six weeks to help you sleep through the night. You may still have some pain for as long as six months. If you still have pain after this, speak to your physiotherapist or GP.

Swelling – This is a very common problem after a knee replacement, particularly affecting the ankle and foot, and may last for up to three months or so after the operation. The ankle swelling usually settles as your walking ability improves. Swelling of the knee itself is also common over the first few months after surgery. Applying ice can be very helpful for a swollen joint, making sure you protect your skin from direct contact with the ice pack. Ice can be applied for up to 20 minutes at a time. Raising your foot above hip height (on a footstool or

similar) is another good way of reducing swelling, but make sure you get up and walk around for at least five minutes every hour to help reduce the risk of a blood clot.

Infection – If you notice any signs of infection (for example breakdown of the wound with oozing/pus or sores, increased pain, redness and the affected area feeling warmer than usual or smelling unpleasant), you should seek early advice from your GP or hospital. You should also look after your feet – see a doctor or podiatrist if you notice any problems such as ingrown toenails that could become infected.

! Warning signs

Contact your GP, hospital doctor or nurse if you have any hot, reddened, hard or painful areas in your legs in the first few weeks after your operation.



This may just be bruising from the surgery but it could mean a blood clot has developed that needs treatment.

Contact your nearest hospital or GP immediately if you experience chest pains and/or breathlessness at any time after your operation. Although very rare, this could mean you have a clot on your lung that needs urgent treatment.

Getting back to normal

It'll be some weeks before you recover from your operation and start to feel the benefits of your new knee joint. Your knee is likely to be sore at first. Make sure you have no major commitments – including long-haul air travel – for the first six weeks after the operation.

Keeping up your exercises will make a big difference to your recovery time. You'll probably need painkillers as the exercise can be painful at first. Gradually you'll be able to build up the exercises to strengthen your muscles so that you can move more easily.

It's important to use crutches or walking sticks during the first few weeks after surgery as falling could damage your new joint. You'll also need to take care in the first few weeks when moving around and doing household jobs so that you don't damage your new knee. Your physiotherapist or occupational therapist should advise you on these tasks, but here are a few tips:

An exercise programme will form an important part of your recovery.

Walking – Don't twist your knee as you turn around. Take several small steps instead. It should be possible to walk outside within three weeks of having surgery but make sure you wear good supportive outdoor shoes. After three weeks, try to take longer strides to regain full straightening (extension) of the leg.

Walking aids – Crutches are useful at first because the thigh muscles (quadriceps) will be weak after the operation. After two weeks, or sooner if you're confident, you can go down to one crutch and then a walking stick. After about six weeks, if your muscles feel strong and supportive, you can try walking without aids. This process may take less time if you've had a partial knee replacement or longer if you've had a more complex operation. Your surgeon or physiotherapist will be able to advise you on this.

Going up and down stairs – When going up stairs put your unoperated leg onto the step first, then move your operated leg up. When going down stairs, put your operated leg down first, followed by your unoperated leg.

Sitting – Don't sit with your legs crossed for the first six weeks.

Kneeling – You can try kneeling on a soft surface after three months when the scar tissue has healed enough, although most people find kneeling with a cushion is better. Kneeling may never be completely comfortable but should become easier as the scar tissue hardens.

Sleeping – You don't need to sleep in a special position after knee surgery. However, you shouldn't lie with a pillow underneath your knee. Although this may feel comfortable it can affect the muscles, making it difficult to straighten your knee.

Household jobs – You should be able to manage light household tasks like dusting or washing dishes. But avoid heavier jobs like vacuuming or changing the beds, or get help with them, for the first three months. Avoid standing for long periods as this could lead to your ankles swelling. If you're ironing, sit down if possible and take care not to twist. Avoid reaching up or bending down for the first six weeks.


Driving – You'll be able to drive after your joint replacement as long as you can safely control the vehicle and do an emergency stop. It's important to check with your insurance company whether you're covered during your recovery, and you need to be confident that you can control the vehicle in all circumstances.

It's likely that you'll be able to drive again after about six weeks if you have total knee replacement, or about three weeks if you have a partial knee replacement. If you've had surgery on your left knee and you drive an automatic you may be able to drive earlier – as long as you're not taking strong painkillers.

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Everyday living and arthritis;
Feet, footwear and arthritis.

What about sport and exercise?

Exercises and sport are recommended after knee replacement, apart from contact sports, which may weaken the cement and lead to loosening of the joint components. Recreational sports – including golf, tennis and skiing – gradually become possible depending on how fit and sporty you were before the operation.

A photograph of two men cycling on a dirt trail. The man in the foreground is wearing a blue long-sleeved shirt, black shorts, a black helmet, and black gloves. He is smiling and looking towards the right. The man in the background is wearing a light-colored shirt, dark shorts, and a white helmet. He is also smiling and looking towards the right. The background is a blurred natural setting with greenery and a dirt path.

Cycling is a very good way of building up strength and mobility after knee surgery.

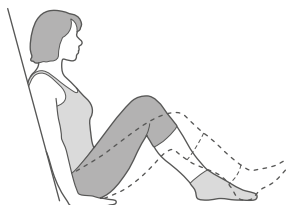
Specific exercises for knee replacement patients

Exercising the main muscle groups around the knee is very important both before and after having a knee replacement. Try to do these exercises regularly, for instance for 10 minutes six to eight times a day. However, it's important to find a balance between rest and exercise so you don't overwork your knee.

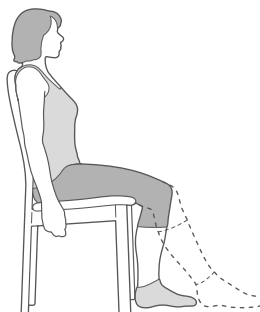
Exercises following knee replacement surgery aim to help straighten, strengthen and aid bending the knee.

For more information contact your local physiotherapy department.

Knee bending exercises



Knee bends on bed: Using a sliding board, keep your heel down on the board and slide your foot towards you, bending your knee. Hold it at the full bend for three seconds and then release.



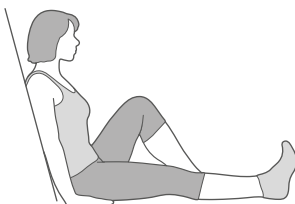
Knee bends on chair: Sit in a chair with your foot on the ground. Slide your foot firmly towards you and then release. Hold for three seconds each time in the fully bent position. Don't allow your hips to move, just the foot.

Straight knee exercise

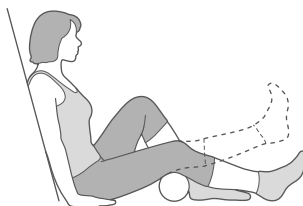


Passive knee stretches: Sit or lie with your leg out in front of you. Put your heel up on a block or pillow so that the knee hangs in mid-air. Let your knee stretch for a short time under its own weight, building up to about five minutes (or less if it's painful).

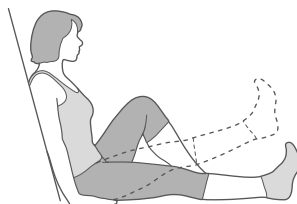
Strong knee exercises



Static quads exercise: With your knee straight, tense up the front muscles of your thigh as if you're trying to straighten your knee and lift your heel. Hold for a few seconds then relax. Try not to tense your buttock muscles.



Inner range quads exercise: Sit with your knee bent over a rolled up towel and tighten up your knee muscles to lift your heel off the ground. Keep your knee firmly down on the roll. Hold for a few seconds, trying to get your heel as high as you can, then relax and repeat. If you have kneecap problems you may need to avoid this exercise if it causes pain.



Straight-leg raise: Sit or lie with your leg out straight. Tighten your thigh muscles, straighten your knee and lift your whole leg 6 inches up off the bed or floor. Hold for three seconds and then lower slowly. Don't do this exercise if you've had a total hip replacement on the same side.

What are the possible complications of knee replacement surgery?

Most knee joint operations are problem-free but complications can arise in about 1 in 20 cases. Most of these complications are minor and can be successfully treated.

The risk of complications developing will depend on a number of factors including your age and general health. In general, a younger patient with no other medical problems will be at lower risk of complications. It's important to remember that any drugs used throughout your stay in hospital, for example anaesthetic or painkillers, may also have side-effects. Your surgeon or anaesthetist will be able to discuss these risks and side-effects with you.

Blood clots

After surgery, some people can suffer from blood clots which form in the deep veins of the leg (deep vein thrombosis, or DVT), causing pain and/or swelling in the leg. This is because of changes in the way blood flows and its ability to clot after surgery. There are various ways to reduce the risk of this happening, including special stockings, pumps to exercise the feet and drugs that are given by injection such as heparin. Blood-thinning drugs can increase the risk of bleeding, bruising or infection so your surgeon will need to balance these risks.

Rivaroxaban, dabigatran and apixaban are tablets to help prevent DVT which have recently become available as an alternative to injections. The tablets are more convenient than injections, which makes them easier to take at home, but all have a risk of bleeding.

Pulmonary embolism

In a very small number of cases a blood clot can travel to the lungs, leading to breathlessness and chest pains. In extreme cases a pulmonary embolism can be fatal. However, it's usually possible to treat pulmonary embolism with blood-thinning medicines and oxygen therapy.

Wound infection

As with all operations, there's a small risk that the wound will become infected. On average this happens in about 1 in 50 cases. Usually the infection can be treated with antibiotics. About 1 in 100 patients develops a deep infection, which may mean washing out the joint or removing the new joint until the infection clears up, and then putting in a new knee replacement. In extreme cases, where the infection can't be cured, the knee replacement has to be removed permanently and the bones fused together so the leg no longer bends at the knee. Very rarely, the leg may have to be amputated above the knee and replaced with an artificial leg – but this is extremely unusual.

Nerve and other tissue damage

There's a small risk that the ligaments, arteries or nerves will be damaged during surgery.

- Fewer than 1 in 100 patients have nerve damage and this usually improves gradually in time.
- About 1 in 100 have some ligament damage – this is either repaired during the operation or protected by a brace while it heals.
- About 1 in 1,000 suffer damage to arteries that usually requires further surgery to repair.
- In about 1 in 5,000 cases blood flow in the muscles around the new joint is reduced (compartment syndrome). This usually also requires surgery to correct the problem.

Bone fracture

The bone around the artificial knee joint can sometimes break after a minor fall – usually after some months or years and in people with weak bones (osteoporosis). This is extremely rare but when it happens further surgery is usually needed to fix the fracture and/or replace the joint components.

Dislocation

When a mobile plastic bearing is used there's a small risk of dislocation of the knee, and this would also require further surgery.

Bleeding and wound haematoma

A wound haematoma is when blood collects in a wound. It's normal to have a small amount of blood leak from the wound after any surgery. Usually this stops within a couple of days. But occasionally blood may collect under the skin, causing a swelling.

This can either be reabsorbed by the body or discharge itself, causing a larger but temporary leakage from the wound usually a week or so after surgery, or it may require a smaller second operation to remove the blood collection. Drugs like aspirin and anticoagulants can increase the risk of haematoma after surgery.

Pain

For most people, pain gradually eases during the first few months after knee replacement surgery. However, some people seem to have ongoing pain or develop new types of pain. Research shows that 10–20% of people still have moderate or severe pain in the long term. This isn't always caused by a technical fault or recognisable complication, and therefore it can't be fixed by a repeat operation. This complication is known as chronic regional pain syndrome (CRPS). Some hospitals have pain clinics that can help with this.

Stiffness

Some people experience continuing or increasing stiffness after surgery. Usually this resolves with exercise, and as the swelling improves. Pain may contribute

to this complication if it stops you doing your exercises, allowing scarring to 'glue' together the soft tissues around the joint. Occasionally knee stiffness may be treated by manipulation of the joint under anaesthetic, followed by intensive physiotherapy.

How long will the new knee joint last?

In time, the new joint will wear out and may become loose. For most people (80–90%) the artificial knee should last about 20 years, and it may well last longer. For partial knee replacements the likelihood of a repeat operation is slightly greater – about 1 person in 10 needs further surgery within 10 years. Younger patients are likely to need a repeat knee operation at some point in later life. The likelihood of needing another operation is increased if you're overweight or involved in heavy manual work.

Revision surgery

Some people need a repeat knee replacement operation on the same knee. This is called a revision. The repeat operation is more difficult than the first, but the techniques are becoming more routine and more successful all the time. If you're having a second or third operation on the same leg, your surgeon may suggest using the more complex knee replacement components rather than the standard type.

Research and new developments

Image-guided and robotic surgery

Image-guided surgery (sometimes called computer-assisted surgery) is a technique where surgery is performed with the aid of computerised images. Usually this is done by attaching infrared beacons to parts of the leg and to the operating tools. These are tracked on infrared cameras in the operating theatre. Only about 1 in 100 knee operations are currently performed in this way. Results so far suggest this technique offers greater accuracy in positioning the new knee joint. However, there's no evidence that it leads to better function or survival of a knee replacement.

There are also developments in the use of robotic appliances linking operating tools with computerised scans of the knee. These may provide more accurate surgery, although these techniques are still under review.

Cementless knee replacements

Cemented total knee replacements have been the most popular so far but cementless knee replacements are possible. Components with a coating which has tiny holes in or which is made from crystal can be used. This allows the bone to grow on to and bond directly to the component. It's thought that this could provide a longer-lasting bond than cement, which may break down in time.

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Knee replacement surgery

However, there's currently no evidence that the components themselves are better in terms of pain relief, function, or how long they last. Research continues into the pros and cons of cementless versus cemented knee replacements. There is an increasing use of cementless partial knee replacements as recent x-ray evidence suggests some varieties offer a better bond between the shin bone (tibia) and the metal component.



Glossary

Anaesthetic – a drug that's used during surgery to stop you feeling any pain. It's given by an anaesthetist. You may be given a local, spinal or general anaesthetic, depending on the type of operation.

Anaemia – a shortage of haemoglobin (oxygen-carrying pigment) in the blood, which makes it more difficult for the blood to carry oxygen around the body. Anaemia can be caused by some rheumatic diseases such as rheumatoid arthritis or lupus, or by a shortage of iron in the diet. It can also be a side-effect of some drugs used to treat arthritis.

Arthroplasty – the medical name for a joint replacement operation.

Arthroscopy – the medical name for keyhole surgery where small (less than 1 cm) incisions are used to allow a special light and camera to look at the inside of a joint. This can be seen by the surgeon on a television screen. The technique can be used to help with diagnosis or for treatment or surgery using miniaturised instruments.

Capsule – the tough, fibrous sleeve of ligaments around a joint, which prevents the bones in the joint from moving too far.

Cartilage – a layer of tough, slippery tissue that covers the ends of the bones in a joint. It acts as a shock absorber and allows smooth movement between bones.

Clopidogrel – a tablet used to thin the blood in people who might be at risk of heart attack or stroke.

Deep vein thrombosis (DVT) – a blood clot that forms in the deep-lying veins (usually in the leg or pelvis).

Electrocardiogram (ECG) – a test that records the electrical activity of the heart using a machine called an electrocardiograph. The aim of an ECG is to detect unusual heart rhythms and to identify heart problems.

Epidural – an injection given into the epidural space around the spinal cord in the small of your back to anaesthetise the lower half of the body. The full name is epidural blockade.

Ligaments – tough, fibrous bands anchoring the bones on either side of a joint and holding the joint together. There are four important ligaments holding the knee joint together.

Manipulation – a type of manual therapy used to adjust parts of the body, joints and muscles to treat stiffness and deformity. It's commonly used in physiotherapy, chiropractic, osteopathy and orthopaedics. A small, high-velocity thrust is given at the end of the available range of a joint's movement and outside the patient's control.

MRSA (Methicillin-resistant Staphylococcus aureus) – bacteria that cause infections. It can cause different symptoms depending on which part of the body it affects. MRSA infections are difficult to treat because they're resistant to some widely used antibiotics.

Nerve block – an injection of local anaesthetic around a nerve, which causes a temporary loss of sensation. Loss of muscle power is a temporary side-effect.

Occupational therapist – a trained specialist who uses a range of strategies and specialist equipment to help people to reach their goals and maintain their independence by giving practical advice on equipment, adaptations or by changing the way you do things (such as learning to dress using one-handed methods following hand surgery).

Osteoarthritis – the most common form of arthritis (mainly affecting the joints in the fingers, knees, hips), causing cartilage thinning and bony overgrowths (osteophytes) and resulting in pain, swelling and stiffness.

Osteoporosis – a condition where bones become less dense and more fragile, which means they break or fracture more easily.

Oxygen therapy – oxygen given through a mask or tube in the nose to increase the amount of oxygen in the blood and ease breathing after surgery.

Physiotherapy – a therapy given by a trained specialist that helps to keep your joints and muscles moving, helps ease pain and keeps you mobile.

Podiatrist – a trained foot specialist. The terms podiatrist and chiropodist mean the same thing, although podiatrist tends to be preferred by the profession. NHS podiatrists and chiropodists are registered with the Health Professionals Council (HPC), having followed a

three-year university-based training programme. The podiatrist or chiropodist can deal with many of the foot problems caused by arthritis.

Quadriceps – a muscle group at the front of the thigh which is vital to movements such as climbing stairs.

Rheumatoid arthritis – an inflammatory disease affecting the joints, particularly the lining of the joint. It most commonly starts in the smaller joints in a symmetrical pattern – that is, for example, in both hands or both wrists at once.

Spinal anaesthetic – a local anaesthetic injected into the subarachnoid space in the spinal canal to stop the transmission of sensory and motor nerve signals to and from the lower limbs.

Synovium – the inner membrane of the joint capsule that produces synovial fluid.

Warfarin – a drug used to prevent blood clots from forming or growing larger. It works by thinning the blood, making it less sticky and reducing the blood's ability to clot.

Where can I find out more?

If you've found this information useful you might be interested in these other titles from our range:

Conditions

- *Osteoarthritis*
- *Osteoporosis*
- *Rheumatoid arthritis*

Therapies

- *Meet the rheumatology team*
- *Occupational therapy and arthritis*
- *Physiotherapy and arthritis*

Self-help and daily living

- *Diet and arthritis*
- *Everyday living and arthritis*
- *Feet, footwear and arthritis*
- *Keep moving*

You can download all of our booklets and leaflets from our website or order them by contacting:

Arthritis Research UK

Copeman House
St Mary's Court
St Mary's Gate, Chesterfield
Derbyshire S41 7TD
Phone: 0300 790 0400
www.arthritisresearchuk.org

Related organisations

The following organisations may be able to provide additional advice and information:

Arthritis Care

Floor 4, Linen Court
10 East Road
London N1 6AD
Phone: 020 7380 6500
Helpline: 0808 800 4050
Email: info@arthritiscare.org.uk
www.arthritiscare.org.uk

Offers self-help support, a helpline service (on both numbers above), and a range of leaflets on arthritis.

Joint Action

British Orthopaedic Association
35–43 Lincoln's Inn Fields
London WC2A 3PE
Phone: 020 7405 6507
www.boa.ac.uk

National Joint Registry (NJR)

The NJR Centre, Peoplebuilding
2 Peoplebuilding Estate
Maylands Avenue
Hemel Hempstead HP2 4NW
Helpline: 0845 345 9991
Email: enquiries@njrcentre.org.uk
www.njrcentre.org.uk
www.njrsurgeonhospitalprofile.org.uk

Links to third-party sites and resources are provided for your general information only. We have no control over the contents of those sites or resources and we give no warranty about their accuracy or suitability. You should always consult with your GP or other medical professional.

Notes



We're here to help

Arthritis Research UK is the charity leading the fight against arthritis.

We're the UK's fourth largest medical research charity and fund scientific and medical research into all types of arthritis and musculoskeletal conditions.

We're working to take the pain away for sufferers with all forms of arthritis and helping people to remain active. We'll do this by funding high-quality research, providing information and campaigning.

Everything we do is underpinned by research.

We publish over 60 information booklets which help people affected by arthritis to understand more about the condition, its treatment, therapies and how to help themselves.

We also produce a range of separate leaflets on many of the drugs used for arthritis and related conditions. We recommend that you read the relevant leaflet for more detailed information about your medication.

Please also let us know if you'd like to receive our quarterly magazine, *Arthritis Today*, which keeps you up to date with current research and education

news, highlighting key projects that we're funding and giving insight into the latest treatment and self-help available.

We often feature case studies and have regular columns for questions and answers, as well as readers' hints and tips for managing arthritis.

Tell us what you think of our booklet

Please send your views to:

**bookletfeedback@
arthritisresearchuk.org**

or write to us at:

Arthritis Research UK, Copeman House, St Mary's Court, St Mary's Gate, Chesterfield, Derbyshire S41 7TD.

A team of people contributed to this booklet. The original text was written by Steve White, who has expertise in the subject. It was assessed at draft stage by orthopaedic surgeon Tahseen Chaudhry. An **Arthritis Research UK** editor revised the text to make it easy to read, and a non-medical panel, including interested societies, checked it for understanding. An **Arthritis Research UK** medical advisor, Prof. Mark Wilkinson, is responsible for the content overall.

Get involved

**You can help to take the pain away
from millions of people in the UK by:**

- volunteering
- supporting our campaigns
- taking part in a fundraising event
- making a donation
- asking your company to support us
- buying products from our online and high-street shops.

To get more **actively involved**, please
call us on **0300 790 0400**, email us at
enquiries@arthritisresearchuk.org
or go to
www.arthritisresearchuk.org



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