NHS
Ayrshire
& Arran

MSK self-management
Knee workbook

Disclaimer

This workbook provides general advice which may not be specific to you. It is important that if you are in pain you see a health care professional for an assessment to rule out serious, albeit rare, pathology. Please talk to health care provider if you have not seen one before. This workbook can be used on your own, however we recommend that you use this book alongside a health professional.

Health and safety

This workbook is designed to help you manage your condition. It is recommended that the workbook is used alongside advice from a health professional. Together you can work to help with your recovery.

You may progress more rapidly or slowly through this workbook depending on your symptoms and other factors related to your condition.

It is important that if you are experiencing pain during the activities in this workbook then you should discuss your symptoms with a health professional.

Purpose of workbook

This workbook has been designed to provide a general overview of the management of your condition.

The workbook is split into different sections with the main focus being education, self-management advice and exercise. To allow you to access the sections that are relevant to you we have two themes within the workbook:

- non traumatic, meaning that there was no injury to aggravate your symptoms
- traumatic, meaning that you have injured your knee.

In general non traumatic knee pain will be present in older individuals with reduced range of movement and limited function but can also happen in younger people particularly if you have increased an activity too quickly or even done activity you haven't done before. For example lifting weights at the gym.

The trauma section will give you advice and help to allow you to recover from your injury and will also give you guidance of what to do should your symptoms fail to resolve.

The exercise section has been designed to give you the choice of what feels the appropriate level based on your pain and confidence levels. You then have the option over time to make these exercises more challenging or reduce to a more basic level that meets your needs.

The self-management section has been developed to provide education on other management options that could be used in conjunction with exercise to improve your condition.

This workbook will also show a range of other resources that are available that you may find useful, such as leaflets, videos and contact details for other services.

Contents page

Introduction to Knee

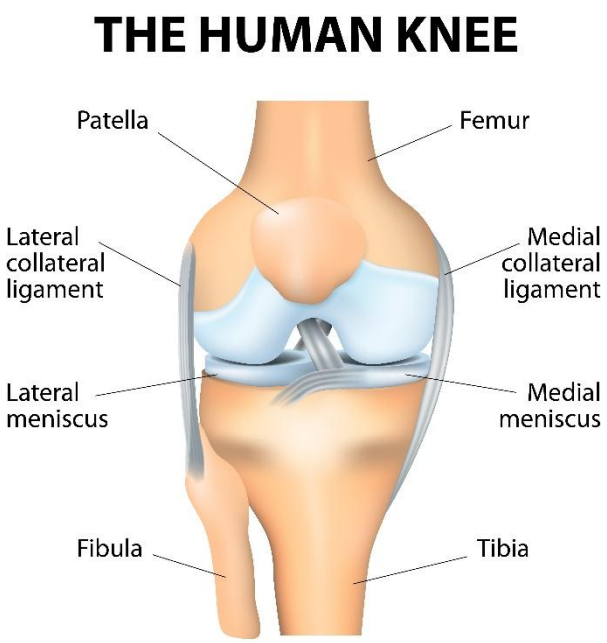


Diagram: The human knee

- The knee joint is a hinge joint, which mainly allows for bending (flexion) and straightening (extension) of your knee. The knee joint consists of two joints- tibiofemoral and patellofemoral. The joint surfaces are lined with cartilage (meniscus), and are enclosed within a single joint cavity.

- The weight-bearing component of the knee joint is between the femur and the tibia. Between these two bones you have two meniscus (cartilage) and they act as Shock absorbers. They spread the load evenly within the joint, help increase stability and lubricate the joint.

- There are a number of ligaments related to the knee. However the main ones are the collateral and the cruciate ligaments. These ligaments work to stabilise the knee and give the knee its awareness of its position in space.

- The Patellofemoral is joint between your knee cap and femur. Its primary function is to act as a pulley for the muscles above the knee (quadriceps) to straighten it. It also has a role in weight bearing particularly when the knee is in a flexed position such as kneeling. When the knee is in a position such as kneeling, it has been found that as much as two to three times your body weight can be transmitted through your patella.

Muscles of the knee

The Hamstrings

The Quadriceps

The main muscles of the knee joint consist of two groups that work together to extend and flex the knee joint during activities such as walking and running.

The muscles at the front of the thighs are called the quadriceps. They are a group of four muscles which work to extend or straighten the knee. They attach to the shin bone by a thick tendon called the Patellar tendon.

At the posterior aspect of the thigh are a group of three muscles called the Hamstrings. They work together to flex the knee during activities.

These are the main muscles which directly control the knee. However other muscles such as the gluteal muscles are important to help control the position and alignment of the knee. **Remember** general muscle conditioning is also important!

Common Myths about Knee Pain

1. **A scan will explain my level of pain and disability**?
   It is common for patients to belief that the amount of damage seen on a scan such as an X-ray is directly related to the amount of pain and disability a person has. **Research suggests this isn't the case!** Structural changes play a role but the amount of degeneration does not correlate with pain or disability and there are other factors which also contribute to each person's experience of pain

2. **Exercise is bad for my knee**

   Exercise is in fact very good for your knee and is recommended as a safe and effective treatment for all persons with knee pain and osteoarthritis. There will be differences regarding the amount and intensity of exercise that an individual can tolerate. It is important that you get into a regular routine.

3. **Will rest help with my pain**

   Rest used to be prescribed for knee pain. In most instances, rest and avoidance of exercise makes pain worse-especially in the long term.

4. **Surgery is the answer to my knee pain**

   Guidelines suggest that surgery should be a last resort treatment for those who have not responded to **prolonged** conservative management. For example, we know 10% of those undergoing knee replacement continue to have pain.

5. **Pain means I am damaging my knee**

The most important thing you should know is that pain does not always mean harm. We can experience pain as a result of tissue damage, however it's also possible to feel no pain with damage to our body. It's also possible to experience significant amounts of pain even when no damage to our bodies has been shown.

We know now that pain is far more complex than solely what is going on in our bodies and can be influenced by other areas of your life. These include:

- Mood and emotions
- Beliefs about pain
- Avoidance of meaningful activities/social contact.
- Lifestyle choices

This often referred to as *“The Bio - Psycho - Social model of pain”.* Meaning all areas of your life can influence pain. It is important therefore to look at your life as a whole when dealing with knee pain to see if there are any other contributing factors.

Further information can be found on understanding pain by clicking the link below:

https://www.nhsaaa.net/pain-management-service/

Non traumatic conditions of the knee joint

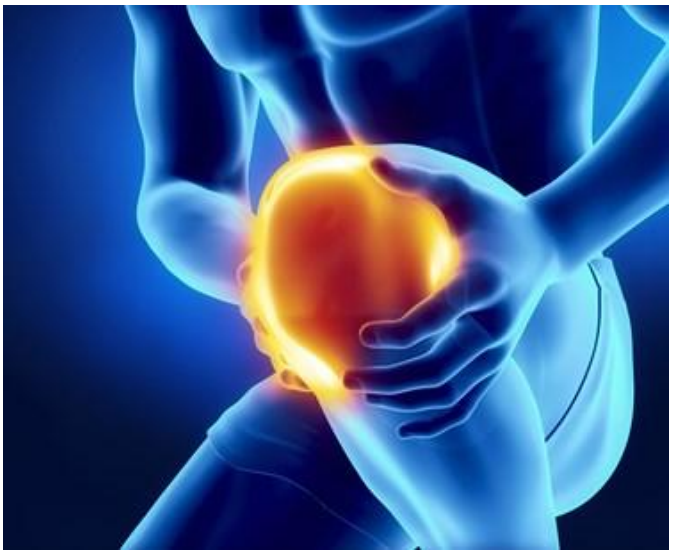
Degenerative meniscal tears

Often offered as a separate diagnosis but essentially the beginning of the arthritic process is a degenerative meniscal tear. Older individuals are more likely to have meniscal tears. Risk factors for degenerative tears include being over 60 years of age,doing work related to kneeling, squatting and climbing stairs

Surgery for degenerative meniscal tears

Studies show that in patients with a degenerative meniscal tear knee arthroscopy (key hole) surgery had no better outcomes long term than exercise therapy.

Osteoarthritis of the knee



Osteoarthritis of the knee is a degenerative form of arthritis. When a joint develops osteoarthritis some of the cartilage covering the joint surfaces gradually wears away. It occurs most often in people 50 years of age and older but can occur in younger age groups as well. Osteoarthritic changes in the joint are partly the result of the inflammatory process and partly your body`s attempt to repair the affected area.

What are the causes of Osteoarthritis

There are many factors that can increase the risks

Age

Knee osteoarthritis usually starts from the late 40s onwards. We don't fully understand why it is more common in ageing individuals. However research indicates that as people age their muscles weaken.

Gender

Knee Osteoarthritis is twice as common in women as in men. Researchers believe that female hormones have an effect on the cartilage that sits between and cushions the bones. After the menopause women's hormone levels can reduce, which means they lose the protection on the cartilage, and the risk of developing changes in the knee joint is increased.

Overweight

Research shows that individuals who are classified as` Obese' are up to four times as likely to develop knee Osteoarthritis. Body Mass Index (BMI) is how the relationship between your weight and height is calculated and deemed to be normal or abnormal. Being overweight can increase the load on the joint, which in turn can speed up the wear in the cartilage, increasing the risk of developing Osteoarthritis.

Joint Injury

Normal movement and exercise don't cause Knee Osteoarthritis. However, very hard and repetitive activities or physical jobs can increase the risk. High intensity activities such as kneeling for long periods can lead to joint injury.

Genetic

The genes inherited from your parents can play a role in osteoarthritis of the knee. If you have a parent, brother or sister with knee osteoarthritis you will have a higher chance of developing it yourself. Some researchers claim this is due to factors that families tend to share such as dietary intake, physical activity levels and occupations.

What are the symptoms of Osteoarthritis

- Pain: Worse with movement, better with rest.
- Stiffness: Worse in mornings after period of rest
- Restricted Range of movement:: Can feel/sound like it crunches/creaks
- Giving way of knee
- Loss of muscle bulk at front of thigh

  Exercise can help build up your muscles to reduce or prevent the giving way and give you a feeling of stability. **But be aware that the benefits of exercise take time and you must progress slowly over time.**

Are there any surgical options for knee osteoarthritis?

If your symptoms of pain and reduced ROM are significantly disabling then total knee joint replacement is the surgical treatment of choice. This involves removing the affected bone of the knee joint and replacing it with a “prosthesis” or “artificial joint” made from metal and plastic .This new joint prevents the bones from rubbing together and provides a smooth knee joint.

The focus of knee joint replacement is pain relief. Be aware there are complications in approx. 10% of patients. Indications for surgery are high levels of pain despite conservative care, difficulty sleeping due to pain and reduced levels of function secondary to pain. It is important to note that a significant amount of physiotherapy and exercise are required to achieve best results in regard to function and range of movement post-surgery.

What you can expect from a total knee replacement

- Pain relief in about 90% of cases
- Restored function and mobility

A total knee joint replacement will allow you to carry out normal activities of daily living. It may or may not allow you to return to active sports or heavy labour. If you take part in high impact activities and are overweight this may speed up the wear and tear process and could result in the artificial knee loosening or becoming painful.

- Correction of deformity

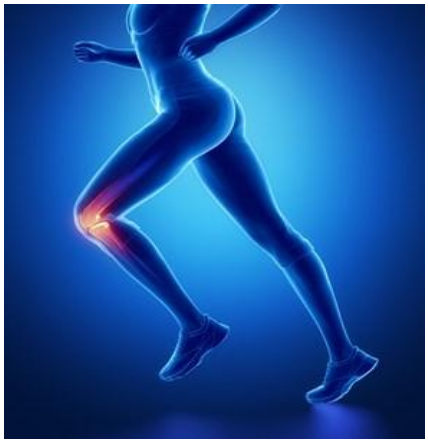
Often with severe arthritis of the knee you can have ‘bow legs’. During surgery your surgeon will try and correct this deformity for you.

Are there any potential complications under-going a total knee replacement?

There are potential complications involved in having a total knee joint replacement which are as follows:

- Infection: Occurs in less than 2% of patients.
- Major medical complications such as heart attack or stroke.
- Chronic illness may increase the potential for complications.
- Wound infection
- A foot drop: this is where the muscles that help move your ankle become permanently weak or not working at all. This is due to nerve damage and may or may not fully recover.
- Difference in leg length
- Deep Vein Thrombosis (DVT) which is a blood clot in your leg. Symptoms of this include calf pain/tightness, calf throbbing, lower limb swelling which is new or increasing, redness or inflammation to your calf or thigh or calf feeling hot.
- Pulmonary Embolism (PE): Blood clot formed in your leg breaks out and travels to your lung. Risks of this being life threatening is low.

Non traumatic knee pain : Patellofemoral Pain Syndrome



Patellofemoral Pain Syndrome is a term used to describe pain or discomfort arising at the front of the knee between the kneecap (patella) and the thigh bone (femur). These areas form a joint in the leg known as the patellofemoral joint.

It is estimated that as many as one in three adults will experience pain in this area at some point in their life with symptoms varying between from person to person.

What are the Symptoms of Patellofemoral Pain Syndrome?

Pain is the main symptom and it can be felt anywhere around the kneecap and in some rare occasions at the back of the knee.

There are a variety of other symptoms that people with patellofemoral pain syndrome experience, including:

- Clicking, clunking or grinding sensation
- Pain bending or straightening your knee
- Mild swelling
- A feeling like your knee might give way
- Pain when squatting
- Pain going up or downstairs
- Pain going up or down hills
- Pain on running
- Pain on jumping

What Causes Patellofemoral Pain Syndrome?

Patellofemoral Pain Syndrome most often occurs without an injury to the knee but can be the result of an injury such as a fall on to the knee.

If you have not injured your knee, it may be difficult to find one specific cause for your symptoms because it can be down to a combination of factors.

In many cases it is often associated with:

- The start of a new activity
- An increase in the intensity and/or frequency of an existing activity
- Or, following a period of reduced activity that leads to weakening of the muscles
- There are many contributing factors, that can vary from person to person
- Weakness in the buttock and thigh muscles
- Tightness at the back of your thigh muscles (hamstrings)
- Being overweight
- Poor footwear selection such as high heels or flat arched shoes
- Occupations that require kneeling

The first three factors are by far the most common.

Do I need a scan or x-ray?

The use of x-rays or scans are not routinely used to help diagnose patellofemoral pain syndrome because the history and examination of the knee giving a good indication of the condition.

On occasions an x-ray may be used to assess if your patellofemoral joint has osteoarthritis but even with an x-ray this will not change your management plan on how to help your symptoms. Similar can be said about the use of MRIs.

What will happen to the pain?

Fortunately most people will gain somewhere between 60% to 80% improvement with physiotherapy and the introduction of some lifestyle changes.

In some cases the symptoms will get better without any specific treatment.

There is no link between this type of knee pain and generalised knee joint arthritis later in life.

It is normal to experience a brief increase of symptoms when you first start the exercise programme. This is due to muscles working in an unaccustomed manner. These symptoms usually settle over a few weeks (over 12 weeks in some cases) and are not a sign that things are deteriorating.

In some cases a very mild discomfort and clicking can remain or appear from time-to-time.

Non traumatic knee pain: patellar tendinopathy

Patellar tendinopathy (also known as “Jumpers Knee”) is a fairly common soft tissue injury. It affects the tendon at the front of your knee, below your knee cap (patella). This tendon is known as the patella tendon. It is also sometimes called patellar tendinitis or tendinosis but these are the same as the modern term ‘tendinopathy’.

What causes patellar tendinopathy?

The cause of patellar tendinopathy is still not fully understood. Research suggests that it is an overuse injury that occurs when the tendon is unable to adjust to the level of strain that you have placed in this soft tissue. This leads to repeated small tears within the small tendon fibres and as the tendon tries to repair itself the area becomes painful and thickened.

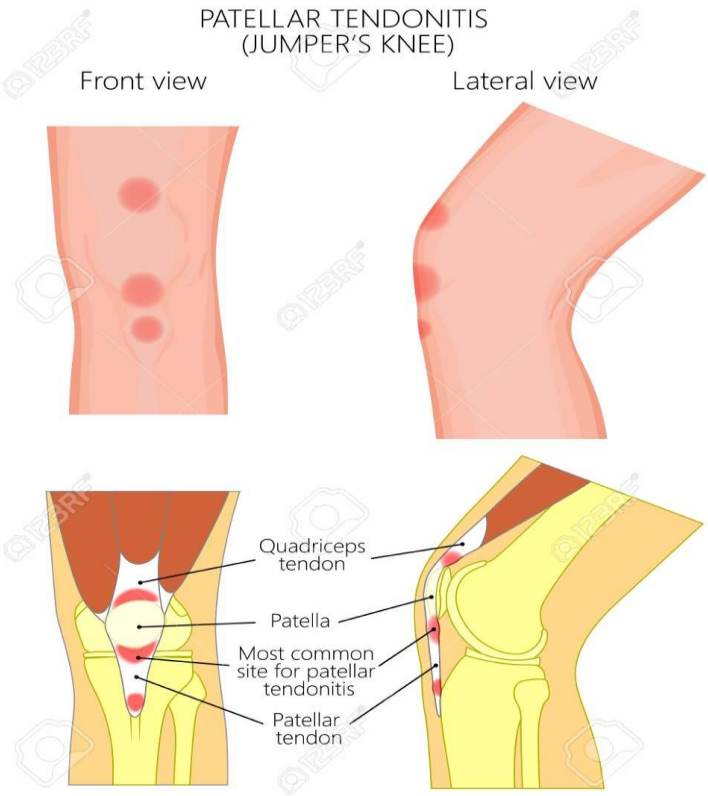


Diagram showing where patellar tendinopathy can occur

What are the risks factors for developing patellar tendinopathy?

Many factors affect the load being put through the tendon. It is not simply the result of exercising too much.

General risks

- **Age**: Most commonly from the age of 30 years and onwards
- **Gender**: More common in men
- **Weight**: People who are overweight are more likely to develop this condition
- **Reduced strength**: Reduced strength in the thigh, calf and buttock muscles
- **Flexibility**: Tight thigh muscles can increase risk

Certain aspects of exercise and training can increase your risk of developing symptoms. It is common in particular sports that involve jumping and running such as basketball, volleyball, tennis, football and badminton.

Common training errors

- Increasing running distances too soon
- Excessive jumping exercises (known as plyometrics)
- Too much weight training without adequate rest days
- Hill running
- Lack of variation in training
- Sudden increase in training, for example, taking up a new activity that your body is not use to or re-starting training after a rest period such as pre-season exercise

What are the symptoms of patellar tendinopathy?

The most common symptoms are:

- ***Pain or tenderness over the patellar tendon***

If the symptoms have been developing over a period of time the tendon may look thickened and can mistakenly suggested as swelling. However, if the tendon is gently squeezed pain will be created

- ***Morning stiffness***

Morning stiffness can be noticed around the tendon when you get up first thing in the morning and activities such as going downstairs may be painful. This stiffness usually eases after a few minutes of walking but can last longer in some cases.

- ***Variable pain***

Not each individual's pain is the same. Some people can experience high levels of pain doing the simplest of daily tasks whereas other may be able to exercise with no issues but are then after resting following this activity can cause pain.

How long will it take to get better?

Each person will be different but it can take over six months to improve and some people are left with a lasting pain that needs to be managed on daily basis to prevent sudden spikes in pain from occurring.

Do I need a scan?

Patellar tendinopathy usually doesn't need further investigation with the patients symptoms, history and findings on examination a clear indicator for the condition. In rare occasions an ultrasound scan may be used to understand the amount of small tears within the tendon but this would only be conducted following after compliance to all advice, exercises and time of healing to occur.

Traumatic injuries of the soft tissues of the knee

Acute meniscal tears

Some key features are:

- Usually associated with a twisting injury
- They cause a localised knee pain either inside(medial) or outside(lateral)
- Palpation of the joint line is tender
- “Locking” of the knee, where the knee gets stuck in a position and you are unable to release it from that position to fully straighten the knee.

Will I need surgery?

If there is a strong relationship between your injury mechanism and symptoms, for example, true ‘locking’ of the knee, and joint line tenderness following a twisting injury there may be an acute meniscal tear. Removal of the tissue (known as a menisectomy) may be indicated. The goal is to improve the function and range of movement of the knee.

Younger patients below the age of 40 with mechanical symptoms (catching and locking) experience greater improvements after surgery compared to younger patients without mechanical symptoms.(need to reinforce this can get better without surgery with time as well).

Ligament injuries

The medial ligament is the most frequent ligament of the knee which is injured. This occurs with stress across the inside part of the knee. An example could be someone getting kicked on the outside of the knee forcing the knee inward. Pain will present on the inside of the knee often with tenderness on palpation.

Anterior cruciate Ligament (ACL) is an injury often in the young, active sporting populace .An ACL injury/tear should be suspected if symptoms occur:

- After landing awkwardly after a jump
- Slowing down or speeding up suddenly with knee bent inward
- Can be after collision or contact during sport/activity
- Hearing or feeling ’pop’
- Swollen knee from zero to 12 hours post injury
- Instability/giving way

Management

Medial ligament injury’s can be effectively managed with what is called conservative measures (non surgical). At the acute/early stage using principles of POLICE (see the management of Acute injury section for further info) progressing to returning the knee to full range of movement and strength. When strength has returned to normal

and there is no feeling of instability a gradual return to sport can be attempted. Non surgical treatment has been shown to be effective in medial ligament injuries.

At the early stage using principles of P.R.I.C.E. progressing to returning the knee to full range of movement and strength. When strength has returned to normal and there is no feeling of instability a gradual return to sport can be attempted.

Braces for knee injuries are generally not indicated unless there is a feeling of gross instability.

Debate continues regarding whether non surgical or surgical treatment is the best option after ACL tear. Generally it is agreed that non surgical management should be tried first. However if after a period of rehabilitation the knee continues to have a feeling of instability then surgical management should be considered.

Acute knee injury

After an Acute knee injury the following Acronym

Will help you manage your symptoms POLICE

P- Protection (restrict movement for 1-3 days then gradually reload structures guided by pain)

O+L Optimal load (active approach that is progressive without exacerbating pain promotes repair)

I- Ice (may help with initial pain relief)

C- Compression (use of tape or bandages will help limit swelling)

E- Elevation (elevate limb higher than heart to reduce swelling)

What can I do for my knee pain?

- **Weight management**

  This is seen as the main long-term management approach for knee pain. The only person that can maintain a healthy weight is you! Researchers say that being overweight or obese can not only increase your risk of developing osteoarthritis, but will also make it more likely that your arthritis will get worse over time. Losing even a small amount of weight can make a big difference to the strain on your joints when walking, running, or going up and downstairs. There is no special diet shown to help osteoarthritis but you should follow a balanced, low calorie-diet combined with exercise (such as walking, swimming or cycling).

Painkillers

- A range of different medications may be available to help reduce your pain to allow you to move more comfortably. Do not exceed the daily allowance of these medicines even if your pain is high and always consult a health professional prior to taking any new medication. If you are unsure of what medication you can take,speak with your local pharmacist, practice nurse or GP for guidance.
- It is important that if you are prescribed medication that you take them regularly and at the recommended dose (see medication packet for details). All medicines can cause side-effects, particularly if they are not used as prescribed. Side-effects range from common to uncommon and vary from person to person. Information on possible side-effects are available on the leaflet inside the packaging of your medication. It is important to speak to your local pharmacist, practice nurse or GP who may be able to change the dose or the medication itself to something that is more suitable.
- You should try and use the prescribed medication regularly at the recommend dose as prescribed. Some medicines can take a number of weeks to have significant effect, however this is dependent on the person. It is best to speak again with your GP or pharmacist about what other options are available if you don’t feel your medicines are helping.

Heat/Ice

A hot water bottle or ice pack (such as a bag of ice cubes) can also be used regularly to help control pain after you have been overactive. If using ice, wrap the ice pack in a towel and apply to the painful area for 10 minutes

every two hours. If you are using heat, wrap the warm compress in a towel and place it on the painful area for 20 minutes every two hours. If you have any concerns about the sensation or feeling on the skin where you are placing any of the mentioned compresses, ask your family doctor (GP) to assess this before following this advice. If you have any concerns that an infection may be present in the area then speak with a local pharmacist or GP prior to carrying out this advice.

How long will it take to get better?

Each person will be different but it can take over six months to improve and some people are left with a lasting pain that needs to be managed on daily basis to prevent sudden spikes in pain from occurring.

Goal setting

Before starting rehabilitation for your knee, it is important to consider setting some goals. Setting meaningful activity goals can help with motivation during rehabilitation as often the process of recovery can be slow.

By setting activity goals (alongside your exercise targets) and tracking progress, this allows individuals to see improvements with rehabilitation. If you are struggling to achieve these goals then you can make the necessary changes to your rehabilitation programme as required.

There are a few things worth considering when setting goals.

They key is to set goals that are:

- Realistic
- Enjoyable
- Specific
- Timed

An example of a goal for knee pain is shown below:

'By the end of September, I would like to be able to walk around the local park with my family'

At set intervals you can review the activity to see if this is getting easier for you to perform.

If it is not, maybe consider if it is at too high a challenge for you at the moment? Remember back to it being a realistic target.

If you continue to see no progress, it might be time to discuss with a health care professional to see if they can help problem solve to allow you to get back on track with your goals.

Further information can be found on goal setting by clicking the link below:

https://www.nhsaaa.net/musculoskeletal-service-msk/

Managing daily activity

The longer we have pain the harder it can be to keep active. Our activity levels often change based on our pain and this often leads to a change in how we approach day to day activities.

You may find that on your good days, when pain is not too bad, you overdo it. This is common in patients with knee pain on tasks that involve bending the knee, stepping up and down and crouching/squatting. This can lead to increased pain, which means you then need to rest for either the rest of the day or for days later. This is often called over and under activity cycling or boom/bust cycling.

Over the long term this pattern of activity can result in you resting more for longer periods of time, which then reduces your motivation to be active, which leads to avoidance of overall activity. Unfortunately, in most cases this will lead to reduced strength, stamina and flexibility of the tissues in your shoulder. This can often lead to more pain from your tissues having to then work harder when trying to be active.

Successful management of activity

Remaining active with pain can be achieved by following some key themes from the example shown below of a patient with knee pain who wants to do some home improvements.

Plan	Plan the activity in advance and consider what your capabilities are at this time. Look at what options are available, such as equipment that could make it easier. Consider if there are options available to get help from a family member or friend.
Prioritise	Consider what else you have to do in that day or week in order to reduce the overall load within your knee. Prioritise what's most important at this time.
Pace	Try to spread the activity out over the course of the day or week even. Take small breaks on a regular basis and plan for these breaks before the point of pain.
Adjust and adapt	Mange your expectations of yourself from what you can do now over what you did in the past and make adjustments around this.

Further information can be found on managing activity by clicking the link below:
https://www.nhsaaa.net/musculoskeletal-service-msk/

Flare-up management

It is normal for you pain levels to go up and down, even as you are getting better. These are called flare ups". It can be helpful to have a **"flare up"** plan in place to help you stay in control of your pain, and get you through these times.

By having a flare up plan in place, you are giving yourself the best chance of controlling your symptoms.

You may have noticed that certain situations or activities which may result in a flare up of your pain, an example may be being over active, or it may be social activities or emotions such as stress or low mood. Sometimes these things cannot be avoided, however if we recognise the things that aggravate our symptoms, we can plan strategies to help manage this.

Flare up plan

By recognising the factors which aggravate your pain, you can plan in advance the tools and strategies to help you manage these. You may find it helpful to write these down.

Examples of strategies to help may include:

- Medication
- Managing activity (remember the fence example on the previous page)
- Short periods of rest
- Mediation/relaxation
- Ask for help (family, friends, work)

Further information can be found on self-management by clicking the link below:

https://www.nhsaaa.net/musculoskeletal-service-msk/

Exercise

It is very important that you keep moving. You will need to find the right balance between rest and exercise. It is common that being over active can increase your pain but too little can stiffen up the joint. Two types of exercise can help your symptoms: strengthening and aerobic.

Strengthening

Strengthening exercises will improve the strength and tone of the muscles that control the affected knee. Pain and swelling from the arthritis process can weaken your thigh muscle (known as your quadriceps) resulting in your knee taking more force. By regularly doing strengthening exercises this will help protect the joint and can be shown to reduce your pain and slow the osteoarthritis process.

Aerobic

Aerobic is any low to high impact physical exercise that makes you short of breath. This can help reduce pain by stimulating your pain relieving hormones called endorphins. There are a variety of different types of exercise that you can do such as swimming, cycling or walking. If you are not used to being physically active, it is best to speak with your GP to make sure your health allows you to undertake this type of self-management. If you are OK to participate in aerobic exercise you may need to take a painkiller before to avoid increased pain.

Stretching

Stretching can repeated over time improve joint flexibility.

It is important to keep your thigh and buttock muscles strong to avoid putting extra pressure through the kneecap. It may take at least 12 weeks of doing strengthening and stretching exercises several times per day before any muscle imbalance or weakness is noticeably improved but by doing this you can reduce your pain.

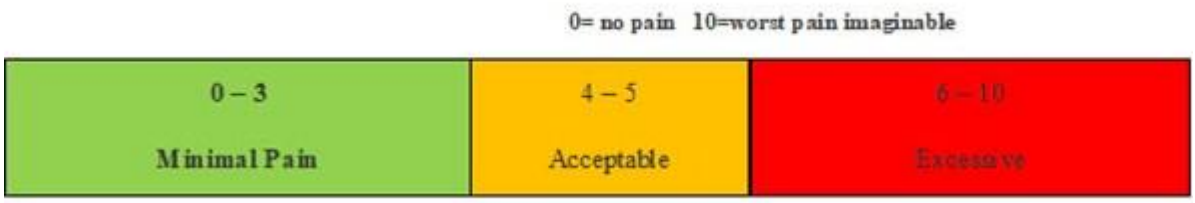
Section 4 of this booklet details what exercises can be done to help with your symptoms

It is important to keep your thigh and buttock muscles strong to avoid putting extra pressure through the kneecap. It may take at least 12 weeks of doing strengthening and stretching exercises several times per day before any muscle imbalance or weakness is noticeably improved but by doing this you can reduce your pain.

Local NHS Ayrshire & Arran physiotherapists have devised created an exercise programme from the recent available evidence to help you improve your symptoms.

Pain during exercise

Aim to stay in the green or amber boxes. If you are in the red area then you can modify the exercises by trying reducing the amount of movement during an exercise, the number of repetition, reducing the weights, reducing your speed or increasing rest time between sets.



Pain after exercise

Your pain or other symptoms should return to your pre exercise baseline within 30 minutes of exercising. You should not feel an increase in pain or stiffness that last longer than 60 minutes the next morning after your exercises.

Stretching

- **Exercise 1: quadriceps stretch**

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- The quadriceps stretch aims to improve the flexibility of the muscles at the front of your thigh which attach from the hip to the knee.

- To do this exercise rise into a standing position. Hold onto a chair or worktop surface to gain your balance. Gently bend the knee of the painful side and with your hand holding at the ankle slowly pull your foot towards your bottom until you feel a stretch down the front of your thigh. Hold the stretch for a slow 30 second count and repeat five times.

Exercise 2: hamstring stretch

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- The hamstring stretch aims to improve the flexibility of the muscles at the back of your thigh which run roughly from your bottom to just below your knee.
- To do this exercise lie on your back. Keep the leg of the painful side straight and lift until you feel a stretch down the back of your thigh. You may find that resting your feel on a wall may benefit you sustaining this position. Hold for 30 second count and repeat five times.

- **Exercise 3: gastrocnemius/soleus stretch**

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- This exercise focuses on stretching the muscles of the lower leg commonly known as the ‘calf’ muscles (the gastrocnemius and soleus).

- To do this exercise (part 1) place you hands on a wall for support and take a step back with the affected foot. It is important that the heel of the affected foot remains on the ground throughout this stretch. Keep the toes of both feet pointing towards the wall. Now begin to bend the knee of your front leg whilst moving your chest towards the wall. You should feel a stretch in the back of your lower leg, hold for 30 seconds.
- Repeat three times, four times per day.
- (Part 2) The second part of this exercise is aimed at stretching the soleus muscle. Adopt the same starting position as you did for the previous exercise. Slide the affected foot towards the front foot as demonstrated. This time when bending the front knee also bend the knee of the back leg until you feel a stretch deeper in the calf muscle. Hold this for 30 seconds
- Repeat three times four times per day.

Exercise 4: adductor stretch

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- To do this exercise sit on the floor and slowly move your legs far apart until your feel a stretch on the inner aspect of your thighs. Hold for 30 seconds and repeat three to four times per day.

  To increase the stretch slightly bend forwards.

Mobility

Exercise 1: knee flexion

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- To do this exercise lie in bed with your affected leg out straight in front of you. Use your heel on the bed to gently bend your knee up as far as you are able. Then straighten knee back to starting position. Repeat for 30 to 60 seconds. Aim for three sets daily.
- To help increase your movement further when bending knee upwards, use your hands to gently to pull your knee towards you to get a larger bend. Hold the knee bent for five seconds. Then slide heel back down bed to starting position.
- This exercise can feel uncomfortable initially. Overtime it will feel more comfortable to bend your knee and you will notice an improvement in the movement.

Exercise 2: ankle dorsiflexion and plantarflexion

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- It is also important for regularly mobilising your ankles as this will help with getting up from sitting and walking. This will also promote good circulation.
- To do this exercise lie or sit in bed with legs straight. Move your ankles forward and backwards together, or alternate legs.

- Repeat for 20 repetitions three times per day

- **Exercise 3: heel and toe raises (seated)**

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- To do this exercise, sit comfortably in a chair with feet flat on the floor. Lift both heels up from the floor then lower down to the starting position. Then pull your feet upwards to the ceiling and then back flat.
- Repeat for 20-30 repetitions 3 times per day

- **Exercise 4: Active Assisted Knee Flexion and Extension**

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- To do this exercise sit on a chair or lie down with a plastic bag under the foot of your affected leg. Slide your heel back to bend your knee as much as you can then slide your foot forwards to fully straighten the leg.
- An important component of your knees ability to function is the strength of the muscles of the knee.
- At first you may find some of the exercises uncomfortable however as you become stronger and fitter, they will feel easier to do.

It is important to aim for three sets of each exercise daily. Repeat for 30 to 60 seconds.

Strengthening

An important component of your knees ability to function is the strength of the muscles of the knee.

At first you may find some of the exercises uncomfortable however as you become stronger and fitter, they will feel easier to do.

It is important to aim for three sets of each exercise daily.

Level 1

- **Exercise 1: static quadriceps contraction**

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- To do this exercise - Start by either sitting or lying with your affected leg out straight in front of you. Tense your thigh muscle by pushing the back of your knee down into the bed. Hold for five seconds. Then relax.
- Repeat for 10 repetitions. Aim to do at least three sets per day.

- **Exercise 2: Inner Range Quadriceps Contraction**

- To do this exercise sit up in bed with a rolled-up towel under your knee. Straighten your knee keeping the back of your knee on the towel. You should

feel the front of your thigh muscles working as you hold your knee straight for five seconds. Then return to starting position.

- Repeat 10 repetitions. Aim to do at least three sets per day.

Exercise 3: static quad contraction with stool support

- To do this exercise sit on a chair with your affected lower leg resting on a stool. Try and then straighten your leg as much as possible as if pushing the back of your knee down towards the floor. Pull your foot up to your head. Hold for five seconds then relax.
- Repeat for 10 repetitions. Aim to do at least three sets per day

Exercise 4: straight leg raise

- To do this exercise - Sit or lie in bed with your affected leg straight out in front of you. Pull your foot upwards to point towards your head. Keep your leg straight and slowly raise your leg up off the bed by about 20cm. Hold this position for 10 seconds before lowering to the starting position. Repeat for 10 repetitions. Aim to do at least three sets per day your thigh muscle

by pushing the back of your knee down into the bed. Hold for five seconds. Then relax.

Repeat for 10 repetitions. Aim to do at least three sets per day. To do this exercise sit or lie in bed with your affected leg straight out in front of you. Pull your foot

upwards to point towards your head. Keep your leg straight and slowly raise your leg up off the bed by about 20cm. Hold this position for 10 seconds before lowering to the starting position. Repeat for 10 repetitions. Aim to do at least three sets per day

Exercise 5: seated knee extension

To do this exercise - Sit on a chair with your feet on the floor. Slowly straighten your affected leg, once it is fully straight, pull your foot towards your head and hold for five seconds. Then bend knee and return to the starting position.

Repeat for 10 repetitions. Aim to do at least three sets per day.

Level two

Bridging

This exercise is a very effective way of strengthening multiple muscle groups of the lower back and legs. Start at one set of 15 repetitions daily and slowly increase this to three sets of 15 repetitions as you become stronger and fitter.

Lunges

Lunges are lower body strengthening exercises that work several muscle groups at once. The targeted muscles groups include the gluteus maximus (bottom muscles or glutes), the hamstrings (the muscles of the back of your thigh), the quadriceps (the muscles down the front of your thigh) and your back muscles. Start at one set of 15 repetitions daily and slowly increase this to three sets of 15 repetitions as you become stronger and fitter.

Isometric knee extension with resistance band

To do this exercise sit with a resistance band wrapped round the ankle of the injured leg. Straighten the leg to 30 to 60 degrees of flexion. Hold this position for 45 seconds, relax for two minutes and repeat five times. Repeat this three times per day.

Knee extension with resistance band

To do this exercise tie the resistance band round the leg of a chair and the ankle of the injured leg. Slowly straighten your leg until it is completely straight. Hold for five seconds and then slowly return back to the starting position.

Do three sets of 15 repetitions.

Exercise 2: leg press (single) with resistance band

To do this exercise lie on the floor or bed with a resistance band wrapped under the heel of the injured leg. Bend the hip of the injured leg to a 90 degree bend. The other leg should remain straight and resting on the bed. Press your foot against the band until the leg straightens. Then slowly return to the 90 degree hip bend.

Do three sets of 15 repetitions

Level three

To do this exercise rise into a standing position. Rest your back against a wall or door. Position your feet shoulder width apart. Slowly bend your knees as far as you can tolerate. Then slowly return to starting position with legs straight but then tighten your bottom muscles.

Do three sets of 15 repetitions

Exercise 2: forward step up

The forward step-up is a strengthening exercise which targets the quadriceps (the muscles down the front of your thigh), the gluteus maximus (bottom muscles or glutes), the hamstrings (the muscles of the back of your thigh) and the core muscles (the muscles of your abdomen). Start at one set of 15 repetitions daily and slowly increase this to three sets of 15 repetitions as you become stronger and fitter.

Exercise 3: heel drop

The heel drop exercise is used to improve the strength of the gluteus maximus (bottom muscles or glutes), the quadriceps (the muscles down the front of your thigh), and the hamstrings (the muscles of the back of your thigh) and to improve your lower body control and balance. Start at one set of 15 repetitions daily and slowly increase this to three sets of 15 repetitions as you become stronger and fitter.

Exercise 4: pelvic dips

The pelvic drop exercise is used to strengthen the gluteus medius muscle (the muscle at the side of your bottom). Start at one set of 15 repetitions daily and slowly increase this to three sets of 15 repetitions as you become stronger and fitter.

Level Four

Exercise 1: sit-to-stand

The sit-to-stand strengthening exercise primarily targets the gluteus maximus (bottom muscles or glutes), the hamstrings (the muscles of the back of your thigh), the quadriceps (the muscles down the front of your thigh) and your back muscles. Start at one set of 15 repetitions daily and slowly increase this to three sets of 15 repetitions as you become stronger and fitter.

Exercise 2: split squat

To do this exercise get yourself in a starting position where the injured knee comes forwards and the health leg goes behind. Bend both knees slowly lowering towards the ground and then slowly return to starting position.

Do three sets of 15 repetitions and the switch legs and do a further three sets of 15 repetition.

Exercise 3: heel raises

To do this exercise rise to a standing position. Stand feet shoulder width apart. Hold the back of a chair or sturdy surface to assist with your balance. Rise both heels from the floor moving the weight onto the balls of each feet. And then slowly return to the starting position.

Do three sets of 15 repetitions.

Exercise 4: decline squat (single leg) eccentric loading

To do this exercise you will need a decline board, plate weight or sturdy support to raise your heels. In this vide we are using a decline board.

To start with, stand with both feet on the board with heels flat on the surface. Lift the health leg up to 90 degrees hip flexion. Slowly bend the sore knee for a count of four seconds. Once the knee is bent bring the non-painful leg back onto the surface. Then straighten both knees together to return to the starting position.

Do three sets of 15 repetitions. To make more challenging you can add hand weights but only do as pain allows2.

Useful website

NHS Fitness Exercise Videos
https://www.nhs.uk/conditions/nhs-fitness-studio/?fbclid=IwAR0Gzib-aPSrmn5iSGwEdmXJV8wSNXrpNWHNOyTSl444l6wIODGEDbQBHac&tabname=other-fitness-plans

MSK Website
https://www.nhsaaa.net/musculoskeletal-service-msk/

Pain Management
https://www.nhsaaa.net/pain-management-service/

MSK Website
https://www.nhsaaa.net/musculoskeletal-service-msk/

CSP conditions
https://www.csp.org.uk/conditions

ACL
habhttps://www.frankgilroyphysiotherapy.co.uk/knee/acl-reconstruction-rehabilitation-programme/

Use this section to make any notes for yourself or note down any questions that you would like to ask.

ACKNOWLEDGEMENTS

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- NHS Ayrshire & Arran Ayrshire MSK Website
- NHS Ayrshire & Arran Pain Management Web-site

NHS Ayrshire & Arran MSK

https://www.nhsaaa.net/musculoskeletal-service-msk/

Versus Arthritis

www.versusarthritis.org

The Sleep Council

www.sleepcouncil.org.uk

Quit your Way (Smoking advice and support) Tel*: 0800 783 9132*

https://www.nhsaaa.net/better-health/topics/smoking/

NHS Ayrshire & Arran Mental Health and Well being

https://www.nhsaaa.net/better-health/topics/mental-health-and-wellbeing/