Patellofemoral Pain (PFP)

What is patellofemoral pain (PFP)?

Patellofemoral pain (PFP) is a term used to describe pain felt mostly at the front of the knee, generally around, behind or below the kneecap (patella). It can also be known as anterior (at the front) knee pain, chondromalacia patellae or patellofemoral syndrome.

It is one of the most common knee problems and affects females more than males. It can occur in people with varying ages and activity levels. 22 in 100 of the general population experience it and 29 in 100 adolescents. Pain can be felt with simple daily activities such as walking, running, sitting, squatting or going up and down stairs.

What causes patellofemoral pain?

A combination of factors may lead to patellofemoral pain. The onset may occur when starting new activities or increasing the number of existing activities. In contrast, it may occur after a period of reduced activity because of weakening and tightening of muscles surrounding the knee and the hip – muscle imbalance. Muscle imbalance can lead to an altered movement pattern of the (kneecap) patella within its groove in the thigh bone (femur).

Patellofemoral pain (PFP) may also occur after a specific event such as a fall on to the knee.

Being overweight (increased Body Mass Index- BMI) can cause and/or aggravate the problem. This is related to loading on the area but also relates to more inflammation being present in the body.

What are the symptoms of patellofemoral pain?

- Pain, discomfort or aching may be present in one or both of your knees
- Symptoms are typically around or behind the kneecap but can also be at the back of the knee
- You may notice some clicking, grinding or grating sounds from your knee – this is called crepitus and is quite normal for this condition and does not mean that harm is being done when moving the knee, even if there is associated pain (there often isn't)
- A feeling of 'giving way' can sometimes occur with activity
- Pain is often activity related, and commonly with activities that involve bending your knee such as bending down, kneeling or stair activity
- Pain with sitting for long periods, especially with the knee bent, is often reported

What can be helpful for patellofemoral pain?

- Modify or reduce activities that cause pain
- Exercise is effective in improving both short- and long-term pain
- Take simple pain relief, if it helps manage your symptoms and allows you to exercise
- Being a healthy weight can reduce load and improve tissue health. For more support with weight loss visit-
    - One You East Sussex | Free Health & Wellbeing Service (https://oneyoueastsussex.org.uk)
- Foot orthoses (such as an insole in a shoe) if indicated (1)
- Patella taping or bracing (2)
- Gain understanding of what PFP is, what options you have and what modifications could be beneficial

Exercises and education about PFP have been shown to be more effective than resting or taking no action (3)

What are the alternatives?

The typical treatment for this condition is a course of physiotherapy exercises. X-rays and scans usually show normal structure and, in most cases, do not help to manage PFP.

Research does not support the use of corticosteroid injections for this condition and potentially injections could cause long term harm to your joint (4). Surgery is very rarely an option and often of little benefit.

What are the potential risks and side effects?

The exercises are likely to make your muscles and knee ache for the rest of the day and the next couple of days. This is known as delayed onset muscle soreness and is a normal reaction to exercise. There is also a small chance that exercise could aggravate your symptoms, especially when you first start completing them. Reducing the number or amount of the exercises will often help and over time your tolerance should improve allowing you to do more. If you continue to struggle you should contact your physiotherapy department or GP.

What are the expected benefits of treatment?

Research supports exercises to be the best treatment for reduction in symptoms from PFP.

How long will it take to get better?

- It varies between individuals and how long you have had the symptoms for
- On average, it can take at least 6-12 weeks to feel a noticeable difference.
- Exercises can be uncomfortable but should not significantly increase your symptoms.
- More than 50 in 100 people make a good recovery.
- 40 in 100 report ongoing episodes of pain after a year.
- 25 in 100 need to learn to manage ongoing symptoms in the long term. Fear and anxiety play a role in recovery and low mood has been shown to make symptoms worse. Please see the following link for further resources for managing persistent pain Home - Live Well with Pain. (https://livewellwithpain.co.uk/)

Can I try exercises on my own?

We have included some guidance and exercises to try below. These are based on the most recent evidence.

Do I need to see a physiotherapist?

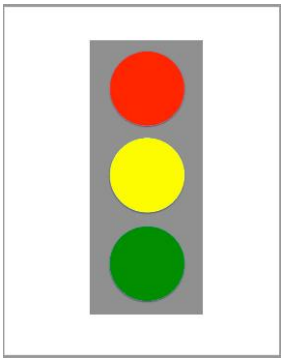
While it is safe to try exercises independently, if you are struggling a physiotherapist will provide further advice and education on how to best manage this condition. They will assess the knee as well as reviewing the strength and the length of the muscles around your lower limbs. A physiotherapist may then tailor a specific graded exercise programme to help get you back to your usual activity levels if the exercises below have not successfully helped your symptoms.

Why should I exercise?

Exercises will help strengthen and lengthen the lower limb muscles and improve their function. This in turn should reduce your symptoms. Exercises need to be progressed to a level that is appropriate to your activity goals.

How do I balance my exercise and day to day activities?

It is helpful to follow a so-called "**traffic light system"** to monitor symptoms and adjust both activity and exercise intensity accordingly. **A green light** means safe zone, free of, or with only very mild symptoms. An **amber light** means that the symptoms are present but acceptable during exercise, ease afterwards and do not result in increased pain levels that night or the next morning. A **red light** means symptoms are intense and not settling after exercise or activity and increase from day to day and week to week.



Intensity of exercise programmes combined with day-to-day activity should be symptom guided to enable staying in green or amber light. Start from light effort and progress towards hard. When the training becomes more intense you should give your tendons and muscles more time to adopt by switching training to alternate days.

A combination of day-to-day activity level and exercises can influence pain. For example, if you plan to have a busy day, choosing to exercise less intensely could avoid increasing your symptoms. Don't worry if you do aggravate your symptoms: reduce your activity and exercises to allow your pain to settle. Remember to build up again gently. Please contact your physiotherapist if you have any doubt or pain is not improving.

Exercises for PFP: Note: Do not attempt all exercises at once.

Strengthening Exercises:

- The following exercises are designed to build up your strength.
- Aim to complete 8-12 repetitions of an exercise (one set). Rest for 60-90 seconds and then repeat the set 2-3 times.
- Remember, as you improve you can gradually progress by increasing the number of sets you complete, increasing the load you use, reducing the rest time between sets or choosing one of the other options described in "Ways to make the exercise harder" for each exercise.
- Some exercises are divided into 3 levels of difficulty so you can find the best one for you. Most people should start with level 1 (easy), progress to level 2 (medium) and finally to level 3 (hard). Everyone will progress in different amounts of time. If one exercise is more painful it can be helpful to try a different exercise as this may suit you better.

1. a/ Static quadriceps – level 1 (EASY) Video: https://www.youtube.com/watch?v=JuxgB5hct7c	Sit or lie with your legs out straight. Tense the muscle in the front of your thigh (quadriceps) by thinking about pressing your knee down onto the bed. Ideally your heel should lift off slightly. Hold for a few seconds before relaxing. **Tip:** Place your hand on the thigh to feel the muscle tightening. Try doing both legs together if you are finding one leg difficult to work. Still struggling? Imagine drawing your kneecap up your thigh.
1. b/ Inner range quadriceps – level 2-3 (MODERATE – HARD with progression) Video: https://www.youtube.com/watch?v=ZPt0HPDgNDw&t=1s	Sit with your legs out straight and a rolled towel or folded pillow under your knee. Tighten your thigh muscle and press your knee down to lift your heel until your leg is straight. Slowly lower your heel. Repeat until you are tired. **Ways to make this exercise harder: (Level 3)** - Hold your leg straight for up to 10 seconds before lowering. - Add a weight to your ankle, make sure you can still fully straighten your leg. You can use a shopping bag with objects in to make an ankle weight!

1. c/ Sit to stand – Quadriceps level 1-3 (EASY – HARD with progression) Video: https://youtu.be/2rVOvOU_vmE **Test yourself** **How many can you do in a minute?** **Set a timer each week and see how you improve.**	**(Level 2)** Sit upright with good posture. Place your arms across your chest. Gently lean forwards and push through your legs to stand up. Once upright, stand up straight. When you feel comfortable, slowly sit back down, ideally with your arms across your chest. **Tip:** Start with your feet hip distance apart and do not let your knees touch during the movement. **Ways to make this exercise easier: (level 1)** - Use a higher chair - Use your hands to support **Ways to make this exercise harder: (level 3)** - Use a lower chair - Hold a weight - Put 1 leg forwards, the leg that is closer to you will have to work harder!
1. d/ Step up and downs – Quadriceps level 3 - HARD Video: https://youtu.be/FBaTE2EpdxQ	Stand upright in front of the bottom step of your staircase. Step up onto the first step with one leg and bring the other leg to the step to meet it. With control, lower this same foot back to the floor, followed by the other. Try to keep good posture and make sure your knees stay in line with your feet. **Ways to make this exercise easier:** - Hold a handrail or something similar for support. - Use a smaller step **Ways to make this exercise harder:** - Use a bigger step or try doing 2 steps in 1 - Hold a weight - Going faster will increase the cardiovascular effect of this exercise (how hard your heart and lungs are working)

1. e/ Lunge - Quadriceps level 3 HARD Video: https://youtu.be/w9rg59qn1UY	Take a step forwards and bend the front knee past the vertical. The back knee drops towards the floor. Always keep good alignment: your knee should stay over the 2nd toe of your foot and never let your knee drop inwards. Only go as far as feels comfortable. This is a lower limb strengthening exercise. **Ways to make this exercise harder:** - Increase the depth of your lunge – i.e. lower your back knee further towards the floor. - Try stepping backwards or to the side to challenge your muscles differently. - Hold a weight to increase the load. - Step onto a cushion to challenge your balance mechanisms. Make sure you have something to hold onto and keep your movements small while you get used to this. Check the cushion isn't going to slide.
2. Calf raises Video: http://youtu.be/cqDMYUaIXvw Video: http://youtu.be/Ovzq9hlKOSk	Stand upright and hold onto a wall/table for balance if required. Slowly raise up onto your toes, and control the movement back down, during the exercise keep your knees straight. This exercise will strengthen the calf muscles and ankle joints. **Tip:** Try to stop yourself from leaning forwards - think of yourself as a rocket taking off straight up into the air. **Ways to make this exercise harder:** - Don't use your hands for support or only use your fingertips very gently to help with balance. - Hold a weight. - Complete the exercise on 1 leg. **Harder still:** - Increase the range of movement your muscles are working through by doing the exercise on a step as shown in the second image. Remember you can combine these options to find the level that works best for you!

3. Hip abduction – Level 1

Video:
http://youtu.be/gNvzHTyPujs

Lie on your side and lift your leg upwards. Your bottom leg can be straight or bent for more support if needed. Once you lift your leg, you can hold this position or move your leg up and down. This exercise predominantly strengthens your outer hip and gluteal (buttock) muscles.

Tip: Make sure the leg doesn't drift forwards, focus on lifting from your bottom muscles not the front of your hip.

Ways to make this exercise harder:
- Use a resistance band round your ankles or ankle weight (level 2-3).

4. Bridge – Level 1-3

Video:
http://youtu.be/fK_xUE3OKIE

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Video: http://youtu.be/lDLlyM9nzj8

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Lie flat on your back, with your knees bent, squeeze your bottom muscles and lift your body upwards. Keep your arms by your side and use them to help you balance. Make sure you maintain good posture (do not over-arch your lower back) and contract the deep abdominal muscles by squeezing your tummy towards your spine. This exercise helps to strengthen the abdominal, lower back, gluteal and hamstring muscles.

Tip: This exercise can be done on a bed if you do not feel safe or able to get on and off the floor.

Ways to make the exercise harder:
1/ Cross your arms on your chest so they are not supporting you.
2/ Put 1 leg further away from your bottom so the leg closest to your bottom must work harder. Make it even harder by lifting 1 leg off the bed
3/ Hold a weight on your pelvis.

Bridge - level 3

Video:
https://youtu.be/UUg5tz4fROM

Harder still:
- Adding a resistance band around your thighs will mean you have to work your muscles harder – remember to keep your knees apart by using your muscles.

Balance Exercise

- ✓ The more often you challenge your balance the faster it is likely to improve
- ✓ It is normal to feel wobbly as this is a sign you are challenging your balance, make sure you are somewhere safe with something steady to hold onto like the kitchen worktop.
- ✓ Aim to hold each exercise for up to 60 seconds.
- ✓ Rest and then repeat the exercise 2-3 times.

Single leg balance 	Stand on one leg and try to keep your balance. Be careful and hold on to a wall or table for support when you first start this exercise, but as you feel more confident you can reduce contact and support from the wall or table. A single leg balance exercise such as this is an enormously valuable exercise, and its benefits including strengthening the muscles and ligaments around the ankles and knees and improving balance. Make sure you have a chair nearby and something to hold on to should you need it. **Tip:** Try to pull up tall and keep your hips level – it's useful to do this in front of a mirror - tighten your bottom muscles if your hip is dropping down on 1 side. **Ways to make this exercise harder:** - Try throwing and catching an object whilst balancing - Try writing the alphabet with your other foot or doing some arm movements / exercises. - Try standing on a softer surface such as a cushion. - Closing your eyes will make it much harder to balance.

Stretches

- ✓ These exercises are designed to improve your mobility and flexibility.
- ✓ Aim to hold each stretch for up to 45 seconds.
- ✓ Repeat several times so that the stretch is held for a total of 2 minutes

1. Calf stretch 	Stand facing a wall. Step one leg towards the wall keeping both feet pointing forwards and bot heels on the ground. Bend your front knee till you feel a pull in the rear calf. Please note you do not have to have your arms up in the air – they can rest forwards on to the wall. **Tip:** Make sure the toes on your back foot don't point out to the side!

2. Quadriceps stretch **ALTERNATIVE** 	Stand with a chair or stool behind you and something you can hold on to for support. Put 1 foot up on to the chair. Straighten your back; tuck your bottom underneath you and push your hips forwards whilst keeping your knees together. You should feel a stretch in the front of your thigh. **Tip:** This stretch is often painful to start off with but with repetition can often reduce knee pain. Start with holding for a short time and build it up gently. Alternatively, you can stretch the same area when lying on your tummy pulling your foot towards your bottom. **Tip:** If you can't reach your foot try using a band, belt, dressing gown cord, scarf or old pair of tights to loop over your ankle.
3. Hamstrings stretch **ALTERNATIVE** 	Standing up straight, place your foot on a chair or step (make sure that you are safe balancing and have something to grab hold of). Keep your leg straight and straighten your back. You should feel a stretch down the back of your thigh. To increase the stretch lean forwards reaching towards your toes – don't let your back round though! Alternatively, you can stretch the same muscle group in a sitting position with your legs out straight. Make sure you are keeping your back straight to get the best stretch – lots of people can't reach their toes – just go as far as you need to feel the stretch.

EXERCISE SUCCESS TIPS:

- ✓ Writing down how you are doing with your exercises in an exercise diary can help to measure your improvement. We have included an exercise diary for this purpose.
- ✓ It is useful to plan what days and times you will exercise – start each week by mapping this out on your diary.
- ✓ Often people find it is easier to remember their exercise by doing it at the same time. You can set a reminder on your phone to help you whilst you are getting used to it.

Example planner:

Week 1 planner and exercise diary Weight: 12 stone

Goal: To do my exercises 3 days this week and manage 5,000 steps every day

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Time:	9am		9am			9am	
Exc 2	1min		1min			1min	
Exc 5	30secs x 3		30secs x 3			30secs x 3	
Exc 8	No weight x 10 x 3		No weight x 10 x 2			No weight x 10 x 3	
Exc __							
Exc__							
Exc __							
Physical activity:	5200 steps	Cycled 10mins	5600 steps	Cycled 10mins	5250 steps	3020 steps	4500 steps

Week __ planner and exercise diary Weight:……

Goal:……

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Time:							
Exc __							
Exc __							
Exc __							
Exc __							
Exc __							
Exc __							
Physical activity:							

Consent

Although you consent for this treatment, you may at any time after that withdraw such consent. Please discuss this with your medical team.

Sources of information

1 Wallis J, Roddy L, Bottrell J, Parslow S and Taylor N, A systematic Review of Clinical Practice Guidelines for Physical Therapist Management of Patellofemoral Pain. Physical Therapy and Rehabilitation Journal 2021 Winters M, Holden S, Lura CB, et al, Comparative effectiveness of treatments for patellafemoral pain: a living systematic review with network meta-anylsis. Br J Sports Med 2020

2 Peterson W, Ellermann A, Rembitzki I V et al, Evaluating the potential synergistic benefit of a realignment brace on patients receiving exercise therapy for patellofemoral pain syndrome: a randomised clinical trial, Arch Orthop Trauma Surg 2016

3 Winters M, Holden S, Lura CB, et al, Comparative effectiveness of treatments for patellafemoral pain: a living systematic review with network meta-anylsis. Br J Sports Med 2020

4 Kamel S, Rosas H and Gorbachova T, Local and Systemic Side Effects of Corticosteroid Injections for Musculoskeletal Indications. American Journal of Roentgenology 2023

https://www.rehabmypatient.com/

Important information

The information in this leaflet is for guidance purposes only and is not provided to replace professional clinical advice from a qualified practitioner.

Your comments

We are always interested to hear your views about our leaflets. If you have any comments, please contact the patient experience team on 0300 131 4784 or esh-tr.patientexperience@nhs.net.

Hand hygiene

We are committed to maintaining a clean, safe environment. Hand hygiene is very important in controlling infection. Alcohol gel is widely available at the patient bedside for staff use and at the entrance of each clinical area for visitors to clean their hands before and after entering.

Other formats

If you require any of our leaflets in alternative formats, such as large print or alternative languages, please contact the Equality and Human Rights Department on 0300 131 4434 or esh-tr.AccessibleInformation@nhs.net

After reading this information are there any questions you would like to ask? Please list below and ask your nurse or doctor.

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Reference

The following clinicians have been consulted and agreed this patient information:
Caroline Hollands- Lower Limb Advanced Practitioner Physiotherapist
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The directorate group that has agreed this patient information leaflet:
CHIC Division Integrated Performance Review

Next review date: January 2028
Responsible clinician/author: Caroline Hollands- Advanced Practitioner Physiotherapist

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