



Healthier
Pennine Lancashire



East Lancashire Hospitals

NHS Trust

A University Teaching Trust

Paediatric Knee Strengthening Booklet

East Lancashire NHS Trust
Paediatric Physiotherapy Service

Safe | Personal | Effective

Targeted strengthening exercises help to build stronger and healthier muscles and bones, which can contribute to alleviating symptoms of pain (Smith et al., 2014, CSP, 2024).

Often when we exercise or engage in activity, we experience associated aching and soreness. This is completely normal and is to be expected. During the process of strengthening, our muscles are required to work harder than normal or in a way that they are not accustomed to doing so. These symptoms are normally short lived and are reassuringly often a sign of improving strength and fitness.

As per the National Health Service recommendations on daily exercise, children aged 5-18 should:

- Do two types of physical activity each week – aerobic and strengthening exercises.
- Engage in 60 minutes of moderate* to vigorous exercise a day.
- Participate in a variety of types and intensities of physical activity to aid in development of muscles, bones, and other movement skills.
- Reduce the time spent sitting or lying down and regularly separate periods of inactivity with movement and activity.

***Please go to www.nhs.uk/live-well/exercise/physical-activity-guidelines-children-and-young-people/ for further guidance.**

Useful Resources:

- www.csp.org.uk/public-patient/keeping-active-healthy/keeping-children-active-healthy
- www.nhs.uk/live-well/exercise/physical-activity-guidelines-children-and-young-people/
- <https://www.gov.uk/government/publications/physical-activity-guidelines-children-and-young-people-5-to-18-years>

Knee Range of Motion Exercises:



Active Knee Flexion → Extension:

Whilst lying down, slide your heel towards your bottom. Slide your heel forwards and backwards within a comfortable range. Try and bend and straighten your knee as much as possible. Repeat 15-20 times.

Knee Flexion → Extension (Prone):

Whilst lying face down with your knee in a bent position, gently straighten your leg as much as possible in a controlled manner. Continue to bend and straighten your leg, moving through a comfortable range. To make it easier can hook the opposite leg to help assist flexion. Hold at end range (bent position) for as long as tolerated.



Passive Knee Flexion:

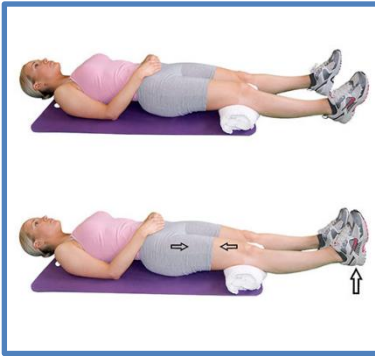
Whilst sitting on a chair, use one leg to help increase the bend in the other knee as demonstrated in the picture. Hold at a comfortable position, ease off and repeat this exercise. Repeat 15-20 times.

Gravity-Assisted Knee Extension:

Lie down on a bed with your knees off the end so that the lower half of your leg is unsupported. Gravity will assist in helping to straighten your legs. Ensure that your hips remain pressed into the bed throughout. Hold position for 5-10 mins as tolerable.



Level 1 Strengthening Exercises:



Inner Range Quadriceps Contraction:

Place a rolled-up towel underneath your knee whilst lying down. Press your knee down into the towel so that your heel lifts off the floor. Aim to hold this contraction for 5 seconds and then slowly lower your heel down to the starting position. Repeat 10-15 times.

Single Leg Stand:

Stand on one leg for as long as possible with your knee slightly bent. Use a stable surface to support you if required to maintain balance. This exercise focuses on strengthening throughout the lower limb. Repeat 5 times.

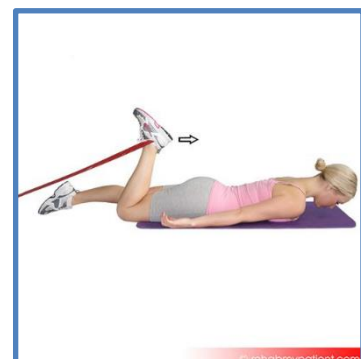


Seated Knee Extension:

Sit on a chair in an upright position. Straighten your leg out in-front of you and hold this position for 3-5 Seconds. You should feel the muscles at the front of your thigh contracting. Repeat 10-15 times.

Resisted Hamstring Curl:

Tie a resistance band around your ankle and attach the other end to a secure fixed object. Whilst lying face down, bend your knee to create resistance within the band. Slowly return to the start position. Repeat 15 times.



Level 2 Strengthening Exercises:



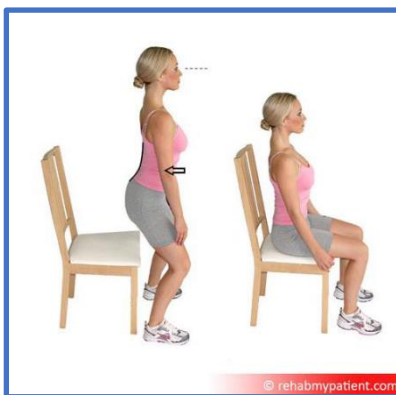
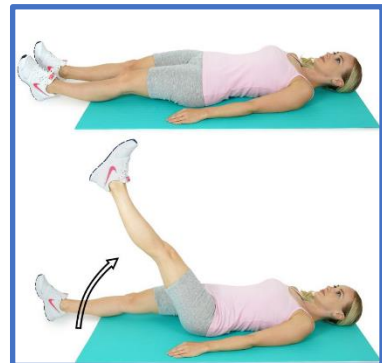
1/2 Wall Squat:

Stand upright with your back against the wall and feet a shoulders width apart. Bend your knees and slide your back down the wall to the 1/2 squat position. Hold this position for 2-3 seconds and slowly return to the starting position by straightening your knees. Perform slowly and with control.

Repeat 10-15 times.

Straight Leg Raise:

Whilst lying down on your back, lift your leg off the floor ensuring it remains straight. Do not let your knee bend. Perform this exercise slowly and with control. Repeat 10-15 times.



Sit to Stand:

Start this exercise sat down on a chair with your feet a shoulders width apart. Transition from sitting to standing by leaning forward and pushing up through your legs to obtain an upright standing posture. Do not use your hands to push up from the chair. Once in standing, slowly lower yourself back onto the chair without use of your arms. Repeat 10-15 times.

Bridge:

Lie flat on your back with your arms out to the sides. Lift your hips upwards and aim to maintain a level position for 5 seconds. Slowly lower your bottom down to the starting position. Perform this exercise slowly and with control. Repeat 10-15 times.



Level 3 Strengthening Exercises:



Step-Ups:

Step up onto a box or step in-front of you, placing both feet on the step before stepping down. Lead with the same leg each time you step up and down.

Repeat for 1 minute. Change over to lead with your other leg and repeat for a further 1 minute. Increase the speed of repetitions as you become more confident.

Lateral Step-Ups:

Step up onto a box or step beside you, placing both feet on the step before stepping down. Lead with the same leg each time you step up and down.

Repeat for 1 minute. Change over to lead with your other leg and repeat for a further 1 minute. Increase the speed of repetitions as you become more confident.



Wall Squat:

Stand upright with your back against the wall and feet a shoulders width apart. Bend your knees and slide your back down the wall into a full squat position. Hold this position for 2-3 seconds and slowly return to the starting position by straightening your knees. Perform slowly and with control.

Repeat 10-15 times.

Stand upright with your back against the wall and feet a shoulders width apart. Bend your knees and slide your back down the wall to the ½ squat position. Hold this position for 2-3 seconds and slowly return to the starting position by straightening your knees. Perform slowly and with control.

Side-Lying Hip Abduction:

Lie down on your side in a straight position. Lift your leg upwards and hold this position for 2-3 seconds. Ensure your leg remains straight throughout. Slowly lower your leg down to the starting position.

Repeat 10-15 times on both legs.



Level 4 Strengthening Exercises:



Squats:

Stand with your feet slightly wider than a shoulders width apart and bend your knees to the full squat (90 degrees) position and then return to the standing position. Aim to maintain an upright trunk and head position throughout. Perform this exercise slowly and with control. Repeat 10-15 times.

Single-Leg Bridge:

Lie flat on your back with your arms across your chest and both knees bent. Lift your hips upwards and then straighten one leg out in front of you. Hold momentarily and then bend your knee. Gently lower hips down to the starting position. Do not let your hips drop down during this exercise. Perform slowly and with control. Repeat 10-15 times with each leg.



Lunge:

Take a step forward, bend the front knee and lower the back knee towards the ground. Straighten both knees to stand back up into an upright position. Hold onto a stable surface for support if required. Ensure that your knee stays in a straight line and does not move inwards. Repeat 10-15 times.

Single-Leg Step-Downs:

Stand on the bottom step of the staircase. Move one leg backwards and slowly bend the leg on the step into a squat position. Touch the heel of the back leg on the floor very briefly and then straighten your front leg. As your back leg touches the floor, do not take any weight through it. Repeat 10-15 times on each leg.



Level 5 Strengthening Exercises:



Single-Leg Squat Jump:

Place your back foot on a chair or bench behind you, with the front foot flat on the floor. Bend your front knee so you go down into a squat position. Straighten your knee and jump up slightly on your front foot. Aim to land on your toes and control the landing as lowering your foot flat onto the floor.

Crab Walks:

Squat down into starting position and maintain this squat position throughout the exercise. Take several steps in one direction and then step back in the other direction. Aim to continue this exercise for 30 seconds and repeat 3-4x. Apply a resistance band just above your knees to increase the difficulty of this exercise.

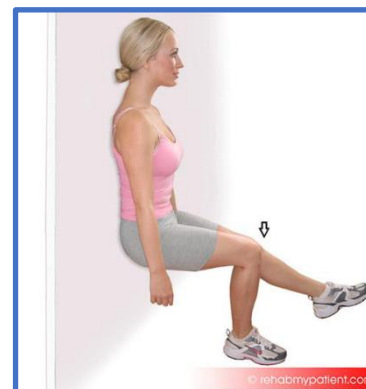


Box Jumps:

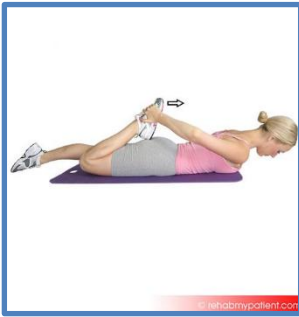
Jump up onto a step or box, ensuring that you land with your knees bent and in a squat position. Use the same technique to jump down from the box. Aim to keep your head up and facing forward throughout. Repeat 10-15 times.

Single-Leg Wall Squat:

With your back against the wall, lift one leg out in front of you. Bend your standing leg to between 45-90 degrees as able. Aim to keep your knee over your toes and do not let your knee drift to one side. Push back up to the starting position. Ensure that your heel maintains contact with the floor throughout. You will feel muscles throughout your leg working hard to perform this. Repeat 10-15 times.



Stretching Exercises:



Quadriceps Stretch:

Lie face down and bend your knee so you heel is as close to your bottom as possible. Reach around with your hands to hold your shoe and apply pressure towards your bottom. You should feel a stretch at the front of your thigh. Hold for 30 seconds. Repeat on both legs.

Hamstring Stretch:

Sit on the floor with your legs out in front of you. Reach forward to try and touch your toes. You will feel a stretch at the back of your thighs, in the hamstring region. Hold for 30 seconds. Repeat on both legs.

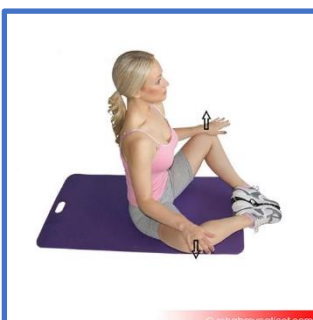
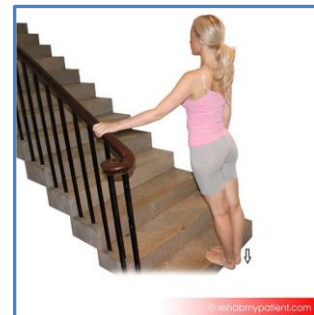


Gluteal Stretch:

Sit on the floor with one leg stretched out in front. Bend the other leg and cross it over the straight leg. Apply pressure with your arm to the outside of your knee to create a stretch in the gluteal region. Hold for 30 seconds. Repeat on both sides.

Calf Stretch:

Stand upright facing the wall. Move one leg forward and gently bend your knee. Step the other leg backwards and keep it straight. Ensure your heel remains in contact with the floor. You should feel a stretch at the back of your lower leg. Hold for 30 seconds.



Adductor Stretch:

Sit on the floor, bend your knees, and drop them outwards. Use your hands to apply pressure on the inside of your knees to create a stretch through the muscles on the inside of your legs. Hold for 30 seconds.

References:

Images to demonstrate exercises have been taken from www.rehabmypatient.com, an online exercise software programme for therapists.
<https://www.nhs.uk/live-well/exercise/physical-activity-guidelines-children-and-young-people/>
Smith, J.J., Eather, N., Morgan, P.J. *et al.* The Health Benefits of Muscular Fitness for Children and Adolescents: A Systematic Review and Meta-Analysis. *Sports Med* **44**, 1209–1223 (2014).
<https://doi.org/10.1007/s40279-014-0196-4>
<https://www.csp.org.uk/campaigns-influencing/campaigns/stronger-my-way/i-want-feel-stronger/what-strengthening>

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Polish

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Punjabi

ਜੇ ਤੁਸੀਂ ਇਸ ਦਸਤਾਵੇਜ਼ ਨੂੰ ਕਿਸੇ ਵਿਕਲਪਿਕ ਫਾਰਮੈਟ ਜਾਂ ਭਾਸ਼ਾ ਵਿੱਚ ਲੋੜੀਂਦੇ ਹੋ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ ਸੰਪਰਕ ਕਰੋ

Urdu

اگر آپ کو اس دستاویز کی ایک متبادل شکل (فارمیٹ) یا زبان میں ضرورت ہے تو براہ مہربانی رابطہ کریں

Bengali

আপনি যদি এই **প্রচারপত্রটি** অন্য কোন আকারে বা অন্য ভাষায় চান, তাহলে যোগাযোগ করবেন

Romanian

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Lithuanian

Norint gauti šį **dokumentą** kitu formatu ar kita kalba, prašome susisiekti su mumis

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