

Patellofemoral pain: Treatment

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Important PFP resources

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Consensus statement



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2016 Patellofemoral pain consensus statement from the 4th International Patellofemoral Pain Research Retreat, Manchester. Part 2: recommended physical interventions (exercise, taping, bracing, foot orthoses and combined interventions)

Kay M Crossley,¹ Marienke van Middelkoop,² Michael J Callaghan,^{3,4}
Natalie J Collins,⁵ Michael Skovdal Rathleff,⁶ Christian J Barton¹

Methods

Evidence: Systematic review:

- 13 (5 moderate; 1 high quality) exercise therapy,
- 5 (3 moderate; 1 high quality) foot orthoses,
- 4 (2 moderate; 1 high quality) patellar taping & bracing,
- 2 (1 moderate quality) combined interventions,
- 7 (2 moderate quality) related to other adjunctive

Consensus

- Attendees at iFPF RR (clinicians/ researcher)

Not appropriate					Appropriate				
0	1	2	3	4	5	6	7	8	9

A pooled score provided a median appropriateness score for each intervention. A score of 0–3 was considered ‘inappropriate’, 4–6 ‘uncertain’ and 7–9 ‘appropriate’.

Exercise Therapy



Exercise-therapy

Exercise therapy:

1. Reduces pain in the short-term (<6 months)

Evidence: High quality [21] and moderate quality [39] systematic reviews including meta-analysis reported moderate-large pain reduction with exercise therapy compared to control and placebo interventions in the short term

2. Improves function and symptoms in the short-term (<6 months)

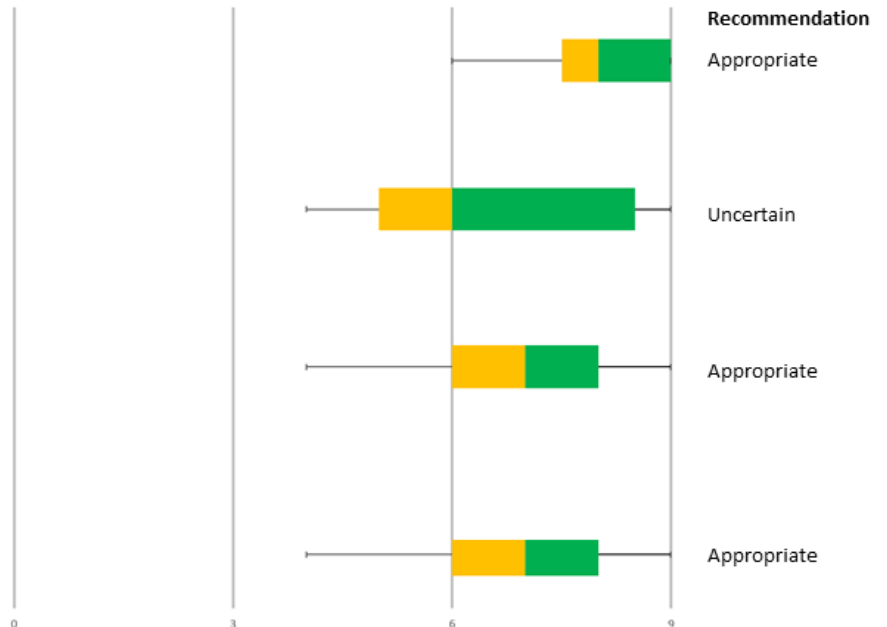
Evidence: High quality [21] and moderate quality [39] systematic reviews including meta-analysis reported moderate improvements to function with exercise therapy compared to control and placebo interventions in the short term

3. Reduces pain in the medium (6-12 months)- to long (>12 months)-term

Evidence: High quality [21] and moderate quality [39] systematic reviews including meta-analysis reported large pain reduction with exercise therapy compared to control and placebo interventions at 12 months

4. Improves function and symptoms in the medium (6-12 months)- to long (>12 months)-term

Evidence: High quality [21] and moderate quality [39] systematic reviews including meta-analysis reported large improvements to function and symptoms with exercise therapy compared to control and placebo interventions at 12 months



Recommendations

Exercise therapy reduces pain and symptoms, in the short-term

Exercise therapy reduces pain and symptoms, and improves function in the medium- and long-term

Exercise Therapy

What about hip strengthening??



Hip and knee targeted

Hip and knee targeted exercise therapy:

1. Reduces pain compared to knee targeted exercise therapy in the short- term

Evidence: High quality[21] and moderate quality [16] systematic reviews including meta-analysis reported small pain reduction when combining hip with knee exercises compared to knee exercises alone in the short term. One moderate quality randomised trial[32] reported earlier recovery with hip targeted compared to knee targeted exercise therapy.

2. Improves function compared to knee targeted exercise therapy in the short- term

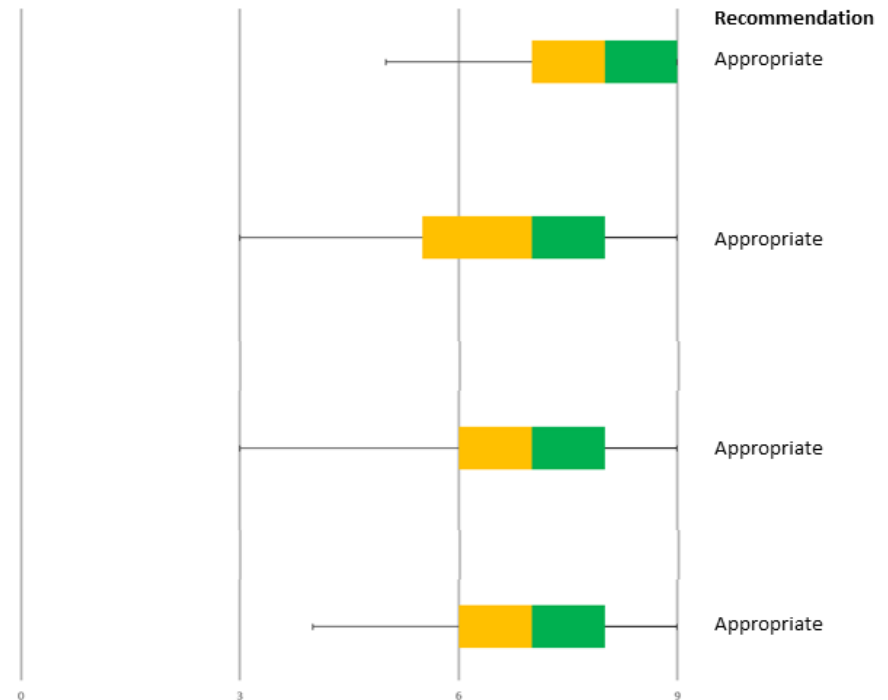
Evidence: When combining hip with knee exercises compared to knee exercises alone in the short term, one high quality[21] systematic review reports superior outcomes for single legged hopping but not patient reported function, whilst one moderate quality[16] systematic review reports superior outcomes for patient reported function, but not hopping.

3. Reduces pain compared to knee targeted exercise therapy in the medium- to long-term

Evidence: High quality[21] and moderate quality[16] systematic reviews reported small pain reduction when combining hip with knee exercises compared to knee exercises alone in the medium and long term

4. Improves function compared to knee targeted exercise therapy in the medium- to long-term

Evidence: When combining hip with knee exercises compared to knee exercises alone in the short term, one moderate quality[16] systematic review reports superior patient reported function outcomes in the medium and long term, whilst one high quality[21] systematic review reported no difference in the long term. High quality[21] and moderate quality[16] systematic reviews reported improvements in single legged hopping in the medium to long term.



Hip targeted

Hip targeted exercise therapy:

1. Reduces pain compared to knee targeted exercise therapy in the short-term

Evidence: High quality[21] and moderate quality[16] systematic reviews reported small pain reductions when comparing hip with knee exercises in the short term

2. Improves function compared to knee targeted exercise therapy in the short-term

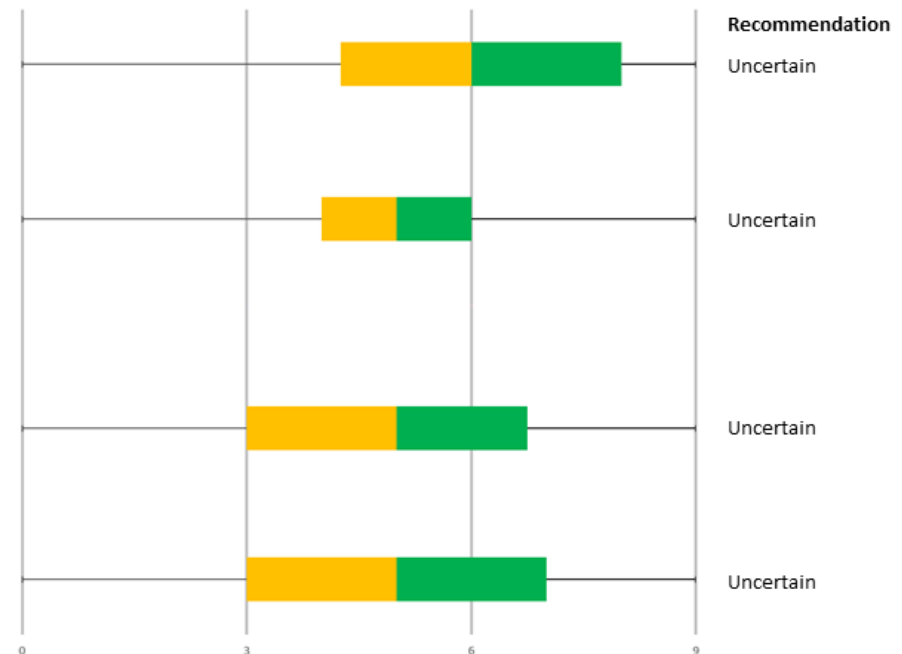
Evidence: When comparing hip with knee exercises, one high quality[21] systematic review reported improved patient reported function, whilst one moderate quality[16] systematic review reported no difference. One moderate quality[16] systematic review reported improved single legged hopping performance with hip exercise compared to knee exercise.

3. Reduces pain compared to knee targeted exercise therapy in the medium- to long-term

Evidence: High quality[21] and moderate quality[16] systematic reviews reported greater pain reductions when comparing hip with knee exercises in the long term

4. Improves function compared to knee targeted exercise therapy in the medium- to long-term

Evidence: High quality[21] and moderate quality[16] systematic reviews reported greater improvements in patient reported function when comparing hip with knee exercises in the long term



Recommendations

Hip targeted exercises, combined with knee targeted, are superior to knee focussed exercises alone to reduce pain in the short- and medium/long-term

Hip targeted exercises, combined with knee targeted, are superior to knee focussed exercises alone to improve function in the short- and medium/long-term



What do we
need to
consider?

Exercise therapy



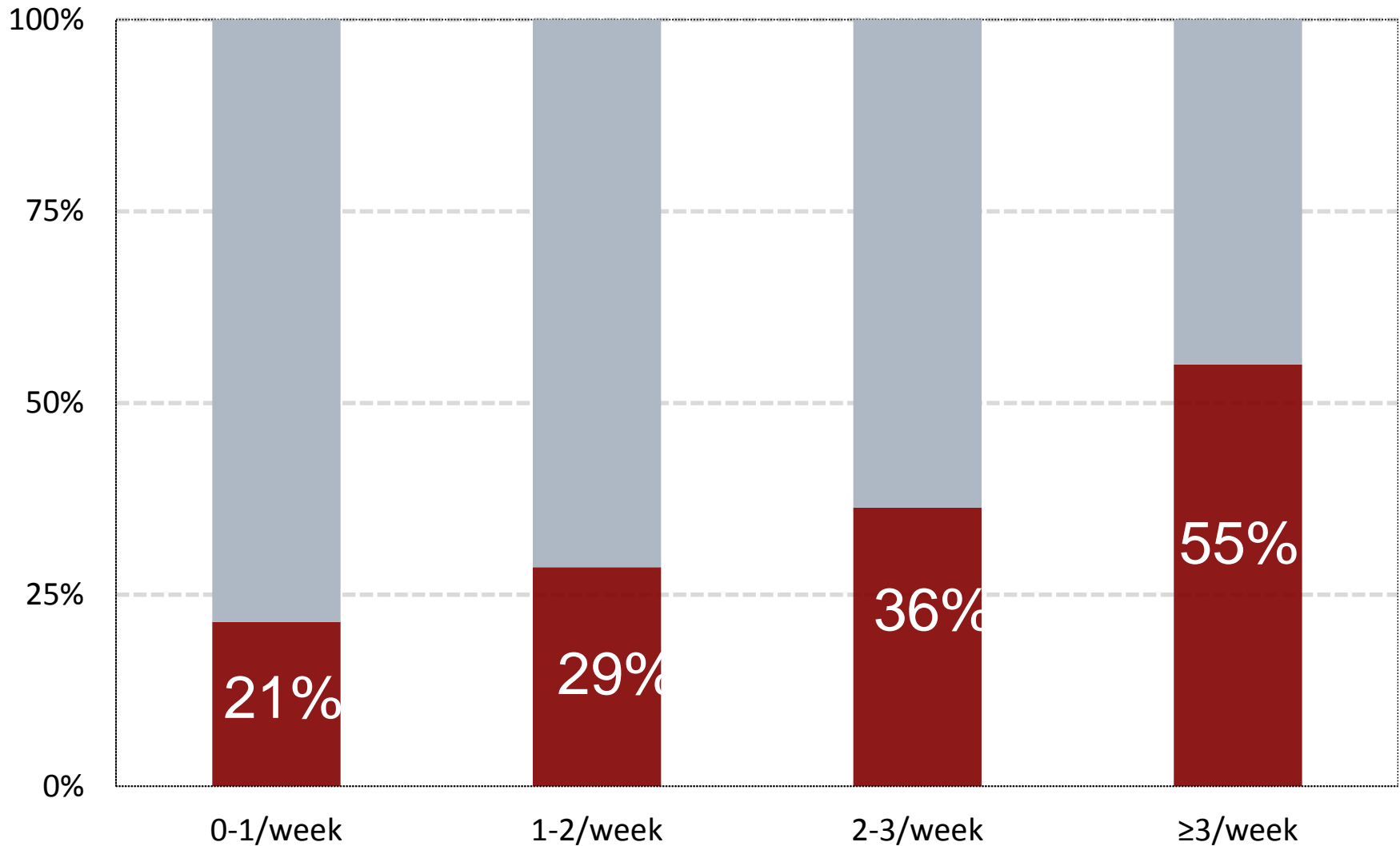
Mechanism of action

Types of exercise

Adherence

Exercise therapy

Exercise works for those who did it!



Patellar tape / bracing



Patellar taping

Patellar taping and bracing:

1. Tailored or untailored patellar taping to reduce pain immediately during functional tasks

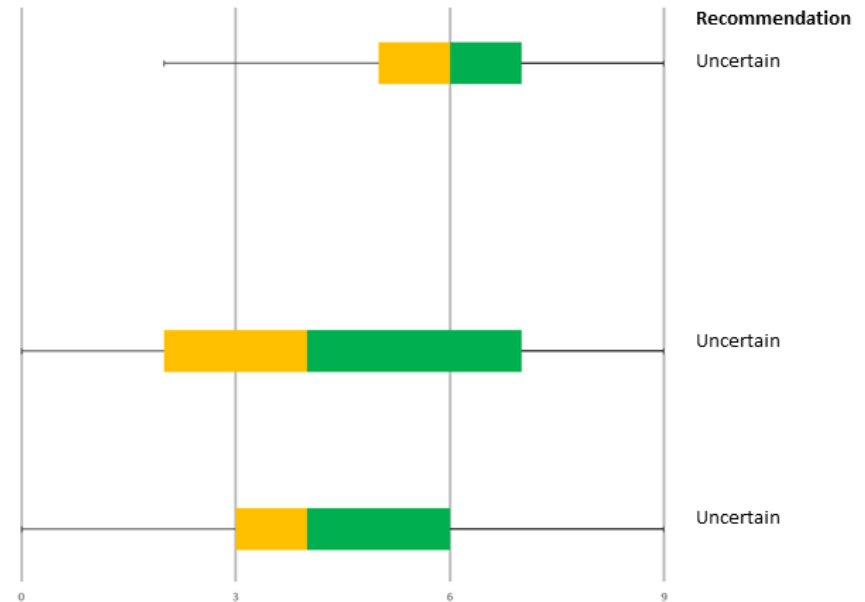
Evidence: One moderate quality systematic review[22] including meta-analysis reported immediate pain reduction of large effect with tailored (based on tilt, glide and rotation, with the aim of reducing pain by 50%) patellar taping, and small effect with untailored medially directed patellar taping. One contemporary moderate quality randomised cross-over trial[37] reported no difference in immediate pain outcomes between medially directed and Kinesiology Spider® taping.

2. Combine untailored patellar taping with exercise to further reduce pain in the long-term

Evidence: One high quality[26] and two moderate quality[22, 24] systematic reviews reported combining untailored medially directed patellar taping with exercise was no more effective than exercise in the long term.

3. Patellar bracing to reduce pain in short- and medium-term

Evidence: One moderate quality systematic review[24] reported no benefit of a knee brace combined with exercise compared to exercise alone, or a knee brace compared to a placebo brace in the short term.



Recommendations

Uncertain: regarding taping effects



What do we
need to
consider?

Patellar taping



Adjunctive to treatment?

Mechanism of action?

Types of taping?

Optimal use?

Patellar taping

Foot orthoses



Foot orthoses

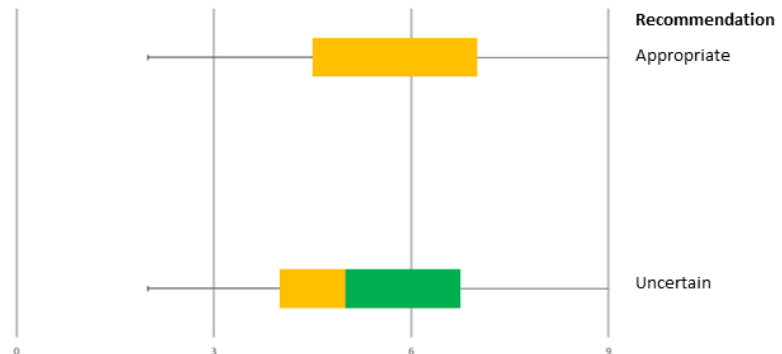
Prefabricated foot orthoses:

1. Reduces pain in the short-term

Evidence: High quality[23] and moderate quality[22] systematic reviews reported small pain reductions with prefabricated foot orthoses when compared with a placebo or control in the short term, and this has been further supported by an additional high quality randomised trial[36] comparing prefabricated foot orthoses to wait and see over 6 weeks. One additional contemporary moderate quality randomised trial[35] reported no significant difference in pain outcome between a 6mm medially and a 3 mm laterally wedged foot orthoses.

2. Improves function in the short-term

Evidence: High quality[23] and moderate quality[22] systematic reviews reported small improvements in function with prefabricated foot orthoses when compared with a placebo or control in the short term



Recommendations

Foot orthoses (pre-fabricated, heat moulded to comfort) are an effective short-term intervention for patellofemoral pain





What do we
need to
consider?

Foot Orthoses



Mechanism of action

Types of orthoses

Optimal use

Foot Orthoses

Combined interventions



Education



Manual PFJ
and soft
tissue
mobilisation



Patellar taping

Combined interventions?

Combined interventions

Combined interventions:

1. Reduces pain in the short term (<6 months)

Evidence: A moderate quality systematic review[39] including meta-analysis reported moderate pain reduction with multimodal treatment compared to control and placebo interventions at 6 and 12 weeks. Further supporting evidence from one contemporary moderate quality randomised trial[33] supports a combined approach including taping, strengthening and stretching compared to these interventions provided independently.

2. Reduces pain in the medium term (6-12 months)

Evidence: A moderate quality systematic review[39] including meta-analysis reported small-moderate pain reduction with multimodal treatment compared to control and placebo interventions at 12 months

3. Reduces pain in the long term (> 12 months) among adolescents with patellofemoral pain

Evidence: A high quality RCT[34] reported a greater chance of recovery with the addition of exercise therapy to patient education compared to patient education alone at 12 and 24 months



Recommendations

Combined interventions (exercise + taping/mobilisation/foot orthoses/education) are an effective short-term to medium-term intervention for reduction of pain

Emerging evidence (one RCT) indicates that combined interventions (exercise + education) is an effective short-term to long term intervention for reduction of pain in adolescents

Exercise during school hours when added to patient education improves outcome for 2 years in adolescent patellofemoral pain: a cluster randomised trial

M S Rathleff,^{1,2} E M Roos,³ J L Olesen,^{4,5,6} S Rasmussen^{1,2,6}

Methods

Physiotherapy treatment

Neuromuscular retraining (foot knee and hip)

Strength training

A home exercise program was prescribed daily



Education



Patellar taping



Manual PFJ and soft tissue mobilisation

Methods

Control

Pain management

Physical activity

Pacing



Load management

Knee alignment

Other info

Physiotherapy led education (online resource)

One session with adolescent and parents (30mins)

Results

121 participants with PFP

Baseline assessment

Blinded assessor

physiotherapy
N= 62

control
N=59

Randomisation

concealed allocation

N=48

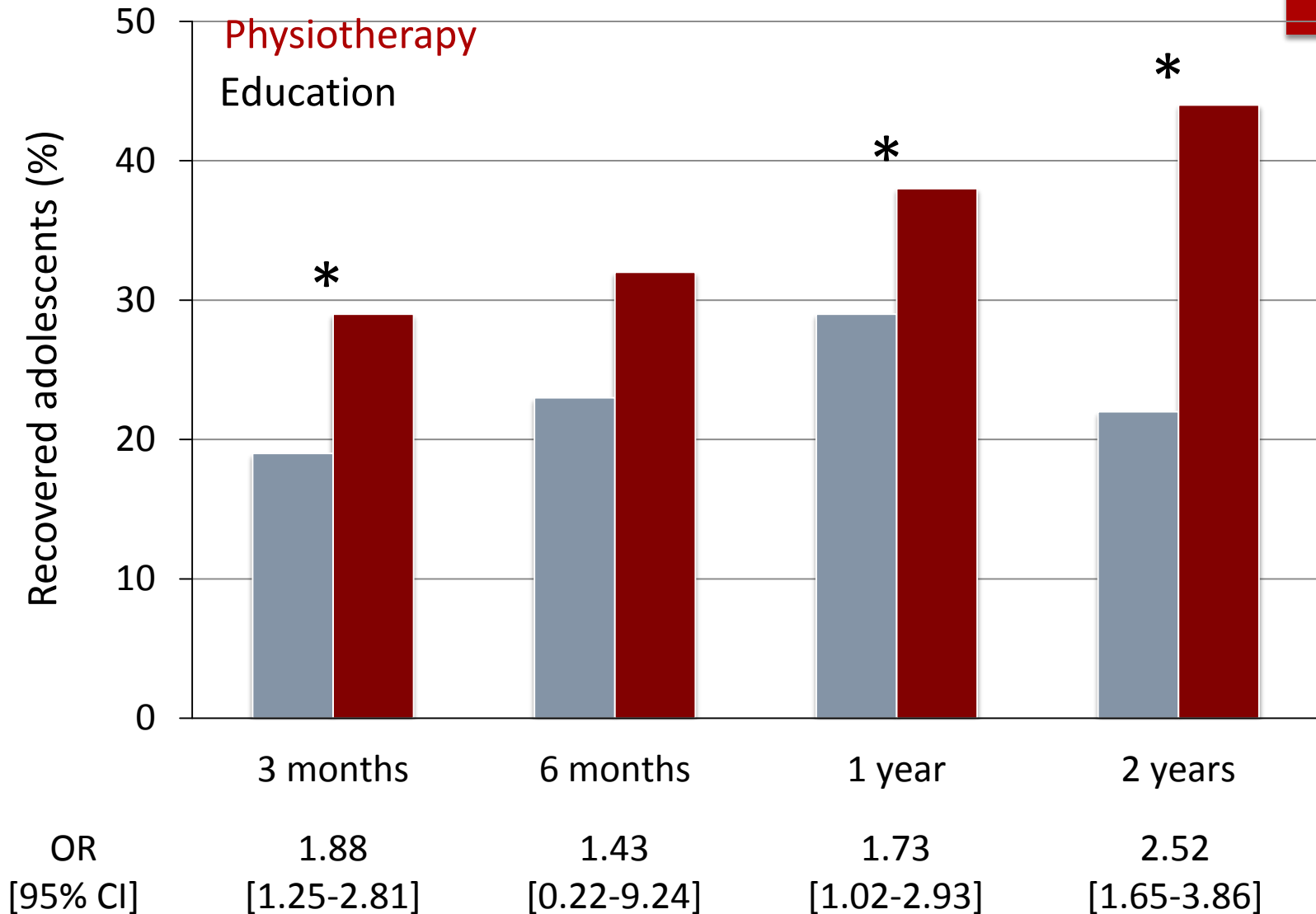
N=51

2 years

Final assessment

Blinded assessor

Multimodal physiotherapy: efficacy



What about PFJ OA?

Biomechanical link between PFJ pain and PFJ OA ?



- Patellar malalignment
- Quadriceps dysfunction
- Hip dysfunction
- Movement dysfunction

Osteoarthritis and Cartilage



Exercise, education, manual-therapy and taping compared to education for patellofemoral osteoarthritis: a blinded, randomised clinical trial



K.M. Crossley ^{† ‡ § *}, B. Vicenzino [†], J. Lentzos [‡], A.G. Schache [‡], M.G. Pandy [‡], H. Ozturk [‡], R.S. Hinman ^{||}

[†] Physiotherapy, School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, Queensland, Australia

Methods

Physiotherapy treatment



Manual PFJ
and soft
tissue
mobilisation



Patellar taping



Functional retraining (VMO and hip)

Strength training (quads and hip)

Education

A home exercise program was
prescribed 4 times per week

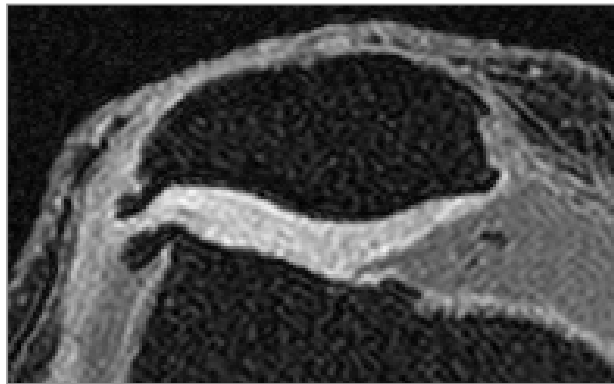
Methods

Control

Healthy eating

Physical activity

Dealing with pain



Medicines

Complementary
therapies

Emotions

Physiotherapy led education

Results

92 participants with PFJ OA

Baseline assessment

Blinded assessor

physiotherapy
N= 44

control
N=48

Randomisation

concealed allocation

N=39

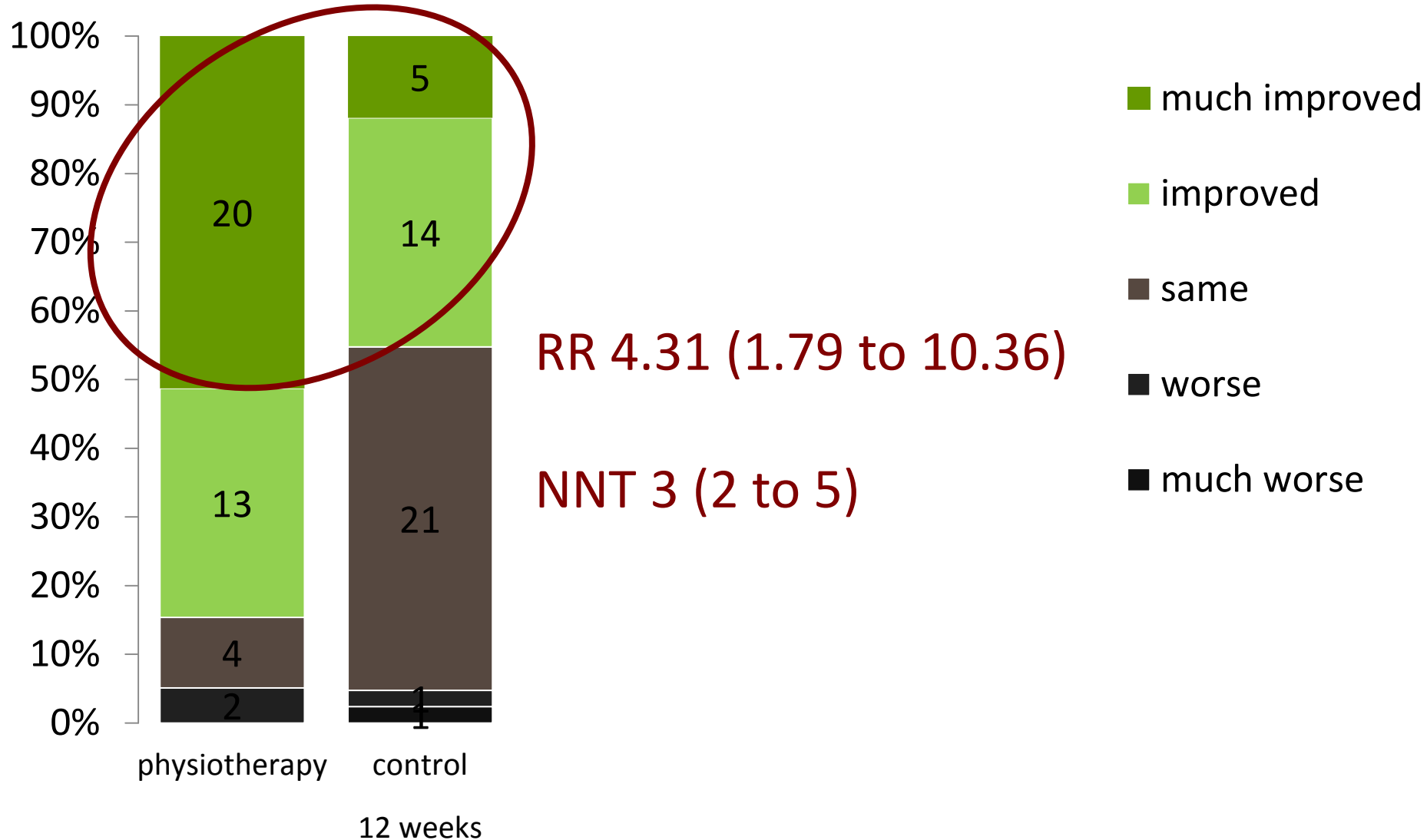
N=42

3 months

Final assessment

Blinded assessor

Global rating of change



Combined interventions

Combinations of exercise-therapy, with taping, mobilisation and education appears to be beneficial for adolescents with PFP (up to 2 years) and older people with PFJ OA (in the short-term)



What do we
need to
consider?

Interventions

Further considerations

Despite efficacious treatments, lack of recovery and persistent pain is problematic for 40-50% of adults and adolescents

- adherence to interventions (new technologies / patient education)
- individualisation of treatments to patient presentations (studies into responders)
- longer treatments (top up / check up)
- additional treatments (eg movement retraining may be required)
- Weight management vital
- consideration to pain processing and psychosocial factors are vital

Others / Adjunctives

Other adjunctive interventions:

1. Acupuncture reduces pain in the medium term

Evidence: One moderate quality systematic review [39] reported acupuncture to reduce pain more than a control at 5 months

2. PFJ and knee mobilisation improves pain or functional outcomes in the short term *

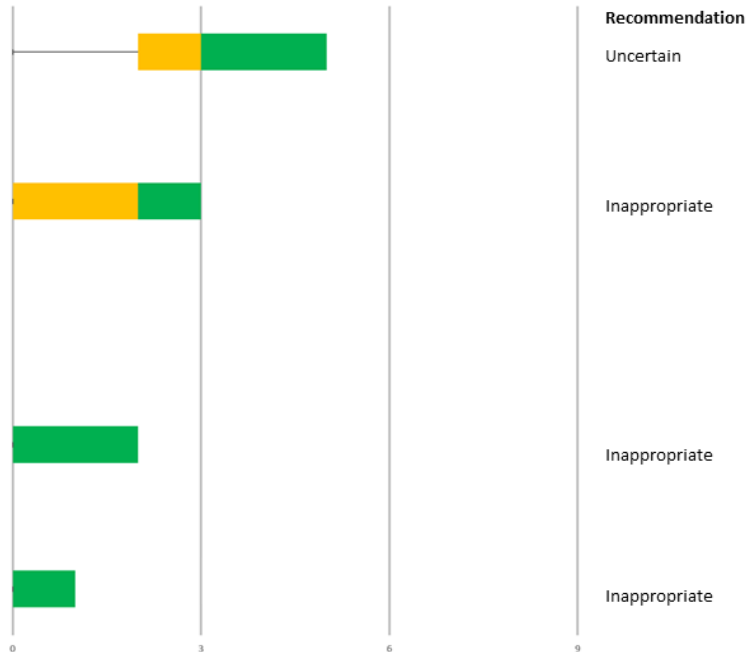
Evidence: One moderate quality systematic review[39] reported no improvements to pain following 2 weeks of PFJ mobilisations when compared to no intervention; and no added benefits for either knee manipulation or full lower limb kinetic chain manipulation when added to exercise and soft tissue treatment at 6 or 14 weeks. One high quality randomised trial[38] reported greater improvements in pain following 15 sessions of retro- and peripatellar ischemic pressure when compared to 15 sessions of ischemic pressure to the hip musculature, but no control group was included.

3. Lumbar mobilisation/manipulation improves pain or functional outcomes in the short term *

Evidence: One moderate quality systematic review [39] reported there was no significant effect when adding spinal manipulation to patellar mobilization over 4 weeks

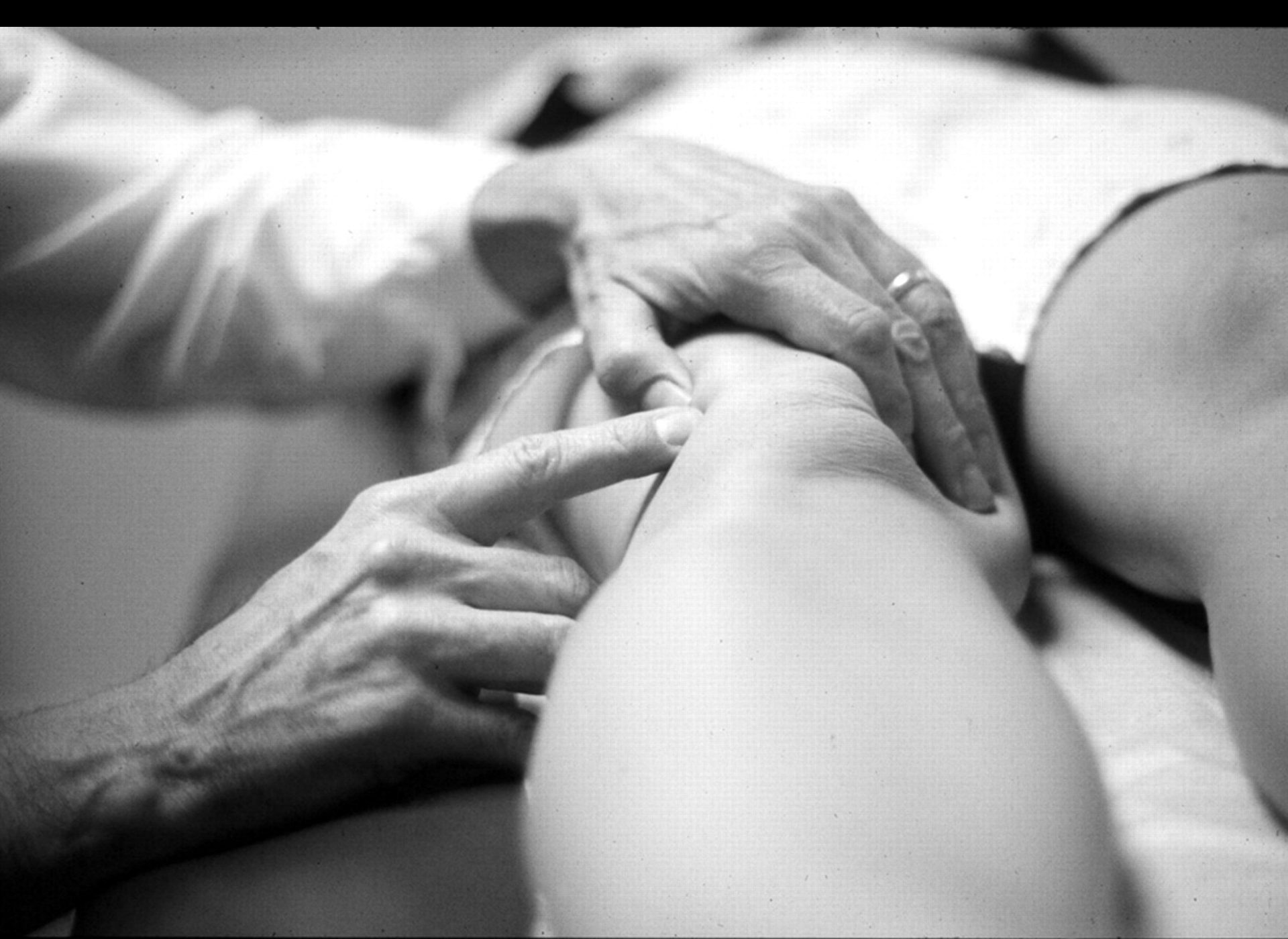
4. Electro-physical agents (e.g. ultrasound, phonophoresis, laser therapy, etc.) improves pain or functional outcomes in the short term *

Evidence: One low quality systematic review[30] reported no difference between laser and sham laser; or any evidence to support the use of ultrasound and ice massage, ice bags, phonophoresis, and iontophoresis modalities



6 Recommendations

1. Exercise-therapy is recommended to reduce pain in the short, medium and long term, and improve function in the medium and long term.
2. Combining hip and knee exercises is recommended to reduce pain and improve function in the short, medium and long term, and this combination should be used in preference to knee exercises alone.
3. Combined interventions are recommended to reduce pain in adults with patellofemoral pain in the short and medium term.
4. Foot orthoses are recommended to reduce pain in the short term.
5. Patellofemoral, knee and lumbar mobilisations are not recommended.
6. Electrophysical agents are not recommended



Mixed Methods Design

Original article

The 'Best Practice Guide to Conservative Management of Patellofemoral Pain': incorporating level 1 evidence with expert clinical reasoning

Christian John Barton,^{1,2,3,4} Simon Lack,¹ Steph Hemmings,¹ Saad Tufail,¹
Dylan Morrissey^{1,5}

Quantitative

- ▶ Summarise the findings from high quality reviews

Qualitative

- Semi-structured interviews with 17 international experts
- Explore clinical reasoning for the treatment of PFP

Italics indicates no evidence – expert opinion only

PASSIVE INTERVENTIONS

Pain reduction

1. Provide tailored patellar taping to reduce pain in the immediate term
2. Consider PFJ braces where taping is inappropriate (e.g. skin irritation)
3. Consider foot orthoses

Optimising biomechanics

1. *Consider foot orthoses based on assessment findings (i.e. presence of excessive dynamic pronation)*
2. *Consider massage and acupuncture/dry needling to improve the flexibility of tight muscle and fasciae structures, particularly laterally*
3. *Consider PFJ mobilisation but only in the presence of hypo-mobility*
4. *Consider mobilisation of the ankle and first ray in the presence of sagittal plane joint restriction*

ACTIVE REHABILITATION

Principles

- 1. Give preference to CKC exercises to replicate function*
- 2. Consider OKC exercises in early stages of rehabilitation to target specific strength deficits and movements*
- 3. Provide adequate supervision in the early stages to ensure correct exercise techniques, but progress to independence as soon as possible*
- 4. When independent, limit the number of exercises to 3 or 4 to aid compliance*
- 5. Use biofeedback such as mirrors and videos to improve exercise quality*

Specifics

- 1. Incorporate quadriceps and gluteal strengthening*
- 2. Target distal and core muscles where deficits exist*
- 3. Consider stretching, particularly of the calf and hamstrings, based on assessment findings*
- 4. Incorporate movement pattern retraining, particularly of the hip*

EDUCATION

- 1. Ensure patients understand potential contributing factors to their condition and treatment options*
- 2. Advise about appropriate activity modification*
- 3. Manage patients expectations regarding rehabilitation*
- 4. Encourage and emphasise the importance of participation in active rehabilitation*



health care professional to guide your treatment further. tely qualified

<http://patellofemoral.completesportscare.com.au/patient-resources>

WHAT MIGHT CAUSE MY KNEE PAIN?

Excessive loading or varied and rapid increases to physical activity which your knee cannot cope with (**Figure 1**) are thought to contribute to pain development. Poor biomechanics (movement) can also contribute, with the knee cap thought to move toward the outside of the knee (**Figure 2**), stopping it from tracking normally in its groove. A number of factors can lead to this poor tracking (**Figure 3**). There are numerous other contributing factors to patellofemoral pain including the structure of your knee, trauma, surgery and systemic disease, which you may wish to speak to your therapist about.

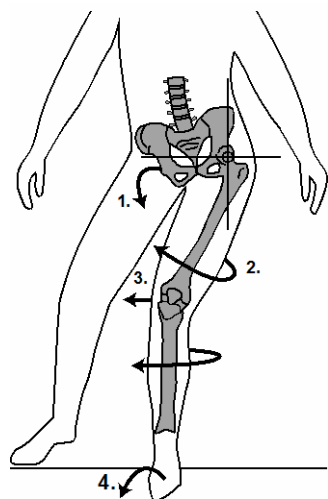


Figure 3 Movement factors contributing to abnormal tracking of the knee cap



Figure 1 Varied and rapid increases to physical activity levels which can lead to patellofemoral pain

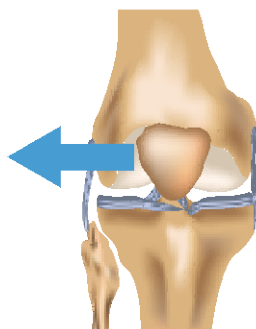


Figure 2 Illustrates abnormal tracking of the knee cap

1. **Pelvis** drops on opposite side, placing increased tension on the outside of the leg and pulling the knee cap outward.
2. **Hip** collapses inward and rolls under the knee cap due to poor function and weakness of the hip muscles.
3. **Thigh** muscles are weak or function poorly, meaning there is inadequate support for the knee and knee cap.
4. **Foot** rolls in too much, causing the shin and knee to collapse inward under the knee cap.

TREATMENT OPTIONS

(Good quality exercise rehabilitation is the key)

Exercise

WHAT EXERCISE PRINCIPLES ARE IMPORTANT?

1. Your therapist may suggest a period of rest before starting exercise again.
2. Exercises in sitting or lying at the beginning may help to get your hip and thigh muscles functioning without pain.
3. As soon as pain allows, exercises should be performed in standing postures which mimic everyday activities.
4. Your therapist should supervise you with any new exercises to ensure correct techniques.
5. Using mirrors and video recordings may help you to complete correct exercise techniques at home.
6. Exercises will not help unless you perform them with the correct technique and on a regular basis.

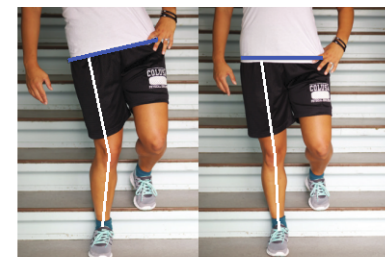
WHAT EXERCISES SHOULD I BE COMPLETING?

1. Weakness and poor function of the hip and thigh is common, so you will most likely need exercises to improve this.
2. Sometimes exercises for the foot or back are also required.
3. You may need to stretch your calf, hamstring or thighs.
4. Exercises should be progressed to activities you previously had pain with (squatting, stairs, running, etc.), ensuring good movement patterns during their completion. (**Figure 4 - example**)

Additional treatments

PAIN REDUCTION

1. Taping or strapping can relieve pain in the short term – your therapist can apply this or teach you how to do this.
2. Braces can also help relieve pain.
3. Foot orthotics sometimes reduce pain – your therapist will help you decide if they are appropriate, or refer you to someone who can.



4a. Poor control of hip and pelvis. **4b.** Improved control of hip and pelvis.

Figure 4 Walking down stairs

HOW ELSE CAN MY THERAPIST HELP?

1. Guide you on your most appropriate exercises and other helpful treatments.
2. Answer questions related to your knee pain, and explain in greater detail the contents of this information leaflet where necessary.
3. Help you understand why you have knee pain, what factors have most likely caused your pain and how to modify your activity to improve your pain and recovery.
4. Provide manual therapy which may be important to improve pain and flexibility.

KEY FACTORS AND TREATMENT OPTIONS

(See inside for greater details)

KEY BIOMECHANICAL FACTORS TO ADDRESS

1. Poor function and weakness of hip muscles
2. Poor function and weakness of thigh muscles
3. Too much foot roll (pronation)



KEY TREATMENT OPTIONS

1. Exercises to improve strength and function of the hip and thigh muscles
2. Taping of the knee cap to reduce pain in the short term
3. Foot orthotics if you have too much foot roll (pronation)

PRIORITIES TO MANAGE YOUR PATELLOFEMORAL PAIN

1. If you think you have patellofemoral pain, you should seek help as early as possible – this will improve your chances of a successful recovery.
2. There are many effective treatment options which you should discuss with your treating therapist.

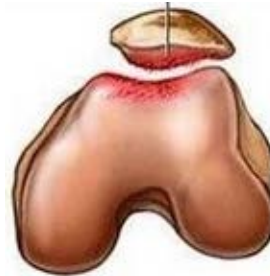
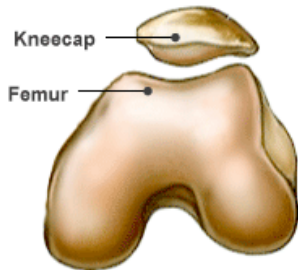
u slowly and safely
build up your physical activity
levels (Figure 5).

PFP across the lifespan: treatments

asymptomatic

PFP

PFJ OA



continuum of PFJ disease

adolescents

young adults

older adults

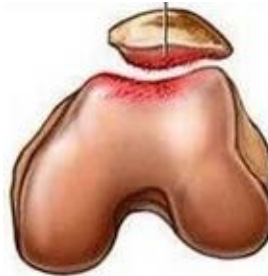
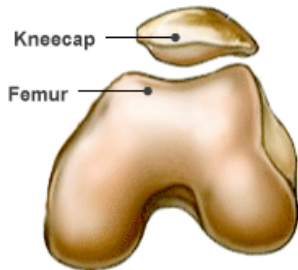
PFP is important to identify and manage early on using conservative interventions with known efficacy
... may optimise prognosis, especially with respect to PFJ OA

PFP across the lifespan: treatments

asymptomatic

PFP

PFJ OA



continuum of PFJ disease

adolescents

young adults

older adults

PFP is multifactorial & heterogeneous

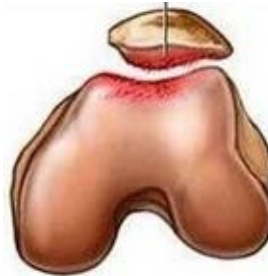
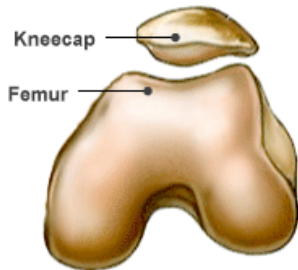
... need to consider each potential contributor in each individual patient

PFP across the lifespan: treatments

asymptomatic

PFP

PFJ OA



continuum of PFJ disease

adolescents

young adults

older adults

Good evidence for physiotherapy interventions

...no recipe approach! select interventions based on contributors
... involve the patient in clinical decision making



5th International Patellofemoral Pain Research Retreat

Gold Coast, 18–20 July 2017



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Clinical Symposium

Brisbane, 22 July 2017



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