ACR OA Guidelines
Non-pharmacological - Knee and Hip
September 2009

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1. EXERCISE

1.1 Balance exercises

1.1.1 Home-based balance exercises versus home-based strengthening exercises for knee OA

Are balance exercises effective in reducing pain and improving function in patients with symptomatic knee OA compared to strengthening exercises?

Step 1: Search Results

There were no SRs which reported the efficacy of balance exercises specifically in patients with OA (Orr, 2008, assessed the efficacy of progressive resistive training which is a different treatment and Howe, 2007 did not report any study with OA patients). There was one RCT which assessed the efficacy of balance exercises versus strengthening exercises in OA patients: Chaipinyo, 2009.

Intervention description: Participants in the balance group performed 30 repetitions of stepping forward and backward then sideways for each leg, 5 days a week for 4 weeks. They also performed 30 repetitions of a bilateral mini squat within pain free range (i.e., 15-30 degrees of knee flexion) in order to strengthen the quadriceps muscle in standing. The sequence of the exercises was as follows: stepping forward and backward with left leg 30 times, bilateral mini squat 10 times, stepping forward and backward with right leg 30 times, bilateral mini squat 10 times, stepping sideward to the left 30 times, bilateral mini squat 10 times, stepping sideward to the right 30 times. Exercises were performed at home.

Step 2: GRADE Summary of findings

*This study has a small sample size (n=42), which could undermine its validity.
*Participants in the strength group performed 30 repetitions of isometric knee extension in sitting for each leg, 5 days a week.

Home-based balance training compared to home-based strength training for knee OA

Patient or population: patients with knee OA
Intervention: home-based balance training
Comparison: home-based strength training

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **strength training**	Corresponding risk **Balance training**					
Benefits							
Pain Knee injury and Osteoarthritis Outcome Score (KOOS). Scale from: 0 to 100. Follow-up: 4 weeks	30%	22% (8% to 44%)[1]	-8%	0.73	42 (1 study)	⊕⊕OO low[2,3,4]	Not statistically significant *Balance training shows less improvement in pain than strength training.
function in daily living Knee injury and Osteoarthritis Outcome Score (KOOS). Scale from: 0 to 100. Follow-up: 4 weeks	28%	15% (5% to 34%)[1]	-13%	0.54	42 (1 study)	⊕⊕OO low[2,3,4]	Not statistically significant *Balance training shows less improvement in function than strength training.
Harms							
Adherence (average number of days of exercise performed by participants) Maximum number of days:28. Follow-up: 4 weeks	Mean (SD) 19 (3)	Mean (SD) 21 (6)	MD 2 (-0.77 to 4.77)	-	42 (1 study)	⊕⊕OO low[2,3,4]	Not statistically significant *Balance training shows better adherence than strength training.
Withdrawals (patients who withdrew from the study after randomization) Follow-up: 4 weeks	25%	2% (0% to 32%)[5]	-23%	0.08 (0.00 to 1.29)	48 (1 study)	⊕⊕OO low[2,3,4]	Not statistically significant *Balance training shows less withdrawals than strength training.
Safety				Not reported			

[1] The authors report the mean difference over time between groups but it does not coincide with our results using Rev Man 5 because the authors did not report the level of accuracy needed (no decimals reported). We calculated the SMD using Rev Man 5.
[2] The physiotherapists prescribing the exercises were not blinded to group allocation. We did not downgrade the quality assessment score for this. However, the number of patients in this trial is small (n=42), which could undermine its validity.
[3] Participants were volunteers from the community 50 years and older. We did not downgrade the quality assessment score for this.
[4] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[5] Withdrawals were due to other illnesses, personal reasons or impossibility to reach patients.

Visual Summary of findings figure:
Home-based balance training compared to home-based strength training for knee OA

Chance: Improving pain after 4 weeks		
NNT: n/a		**Not statistically significant**
😐	70 people out of 100 don't improve with either type of training.	
🙂	22 people out of 100 improve with either type of training.	
😐	**8 FEWER people** out of 100 improve with balance training at home.	
Chance: Improving function after 4 weeks		
NNT: n/a		**Not statistically significant**
😐	72 people out of 100 don't improve with either type of training.	
🙂	15 people out of 100 improve with either type of training.	
😐	**13 FEWER people** out of 100 improve with balance training at home.	
Chance: Adherence after 4 weeks		
NNH: n/a		**Not statistically significant**
😐	On average, people performed the exercises for 19 days with either type of training	
☹	On average, people did not perform the exercises for 7 days (out of maximum possible of 28 days) with either type of training	
☹	On average, people performed exercises for **2 less** days with strengthening than balance training at home.	
Chance: Withrawals from the trials after 4 weeks		
NNH: n/a		**Not statistically significant**
😐	75 people out of 100 did not drop out of either type of training.	
☹	2 people out of 100 dropped out of either type of training..	
🙂	**23 fewer people** out of 100 dropped out of balance training at home.	

Step 3: GRADE Evidence profile
See Table 1 a: Home-based balance exercises versus home-based strengthening exercises

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	We recommend patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises. Range of motion/flexibility exercises are an option for patients with symptomatic OA of the knee. We suggest quadriceps strengthening for patients with symptomatic OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, *insoles*, knee bracing) and weight reduction.
OARSI	Patients with hip and knee OA should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises.

Step 5: GRADE Recommendation

References

Chaipinyo K, Karoonsupcharoen O. No difference between home-based strength training and home-based balance training on pain in patients with knee osteoarthritis: a randomised trial. Aust J Physiother 2009;55(1):25-30.

1.1.2 Balance exercises in addition to strengthening exercises versus strengthening exercises alone for knee OA

Are balance exercises in addition to strengthening exercises effective in reducing pain and improving function in patients with symptomatic OA compared to strengthening exercises alone?

Step 1: Search Results

There were no SRs which reported the efficacy of balance exercises specifically in patients with OA (Orr, 2008 assessed the efficacy of progressive resistive training which is a different treatment and Howe, 2007 did not report any study with OA patients). There was one RCT which assessed the efficacy of balance exercises in addition to strengthening exercises vs. strengthening exercises alone (Diracoglu, 2005).

Intervention description: The first group (kinesthesia group) received kinesthesia, balance, and strengthening exercises and the second group (strengthening group) received only strengthening exercises. Patients in both groups were informed about knee OA and protective recommendations for the knee were made. The exercises were done 3 days a week in groups of 5 people in a clinical setting under the supervision of a physiotherapist. The total duration of the exercises was determined as 8 weeks. Isometric exercises were applied with 6-second contractions with 8 repetitions and a rest period of 2 seconds. Isotonic exercises were started from the third week and the maximum weight that can be lifted 10 times (10-repetition maximum = 10 RM) was determined. The exercises were applied as 10 repetitions with half of this weight, 10 repetitions with three fourths of this weight, and 10 repetitions with the whole 10 RM.10 RM was determined again every week.

Step 2: GRADE Summary of findings

kinesthesia and balance exercises in addition to strengthening exercises compared to strengthening exercises for knee OA

Patient or population: patients with knee OA
Intervention: kinesthesia and balance exercises in addition to strengthening exercises
Comparison: strengthening exercises

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk	Corresponding risk					
	strengthening exercises	kinesthesia and balance exercises in addition to strengthening exercises					
Benefits							

Physical function WOMAC. Scale from: 0 to 10. Follow-up: 8 weeks	31%	48% (29% to 68%)[1]	17%	1.55	60 (1 study)	⊕⊕OO low[2,3,4]	Not statistically significant
Pain	No evidence available[5]						
Harms							
Adverse effects number of patients with event Follow-up: 8 weeks	0%	0%	0%	1	60 (1 study)	⊕⊕⊕O moderate[2,3]	Not statistically significant
Adherence mean number of missed visits Maximum number of visits:24 Follow-up: 8 weeks	Mean 6	Mean 4	MD -2	-	48 (1 study)	⊕⊕⊕O moderate[2,3]	Not statistically significant
Withdrawals number of patients who withdrew after randomization Follow-up: 8 weeks	9%	9% (2% to 42%)[6]	0%	1 (0.22 to 4.6)	66 (1 study)	⊕⊕⊕O moderate[2,3]	Not statistically significant

[1] The authors reported the end of study results in both groups, which showed a statistically significant difference. However, their results did not coincide with our results from Rev Man 5 because the authors did not report the level of accuracy needed.
[2] The randomization method used is the "one-to-one" method which allocates one patient to the study group and the other patient to the control group one by one according to their order of application to the outpatient clinic. This method could lead to biases. Furthermore, blinding was not reported and intention to treat analyses were not performed.
[3] All patients included in the study were women 35 to 65 years old. We did not downgrade the quality of the study because of this.
[4] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[5] Pain was not measured in the RCT. However, the use of paracetamol was reported, which could represent a proxy measure for pain to some extent. The authors report that 5 patients used paracetamol during the study in a dosage of less than 500 mg daily. The 2 groups were not significantly different from each other regarding paracetamol use ($P > 0.05$).
[6] Patients withdrew because of the difficulty to come to the clinic for exercises.

Visual Summary of findings figure:
Kinesthesia and balance exercises in addition to strengthening exercises compared to strengthening exercises for knee OA

<table>
<tr><td colspan="2">Chance: Improving function after 8 weeks</td></tr>
<tr><td colspan="2">NNT: n/a</td><td rowspan="4">Not statistically significant</td></tr>
<tr><td>😐</td><td>52 people out of 100 don’t improve with either type of training.</td></tr>
<tr><td>☺</td><td>31 people out of 100 improve with either type of training.</td></tr>
<tr><td>☺</td><td>17 more people out of 100 improve with kinesthesia and balance exercises in addition to strengthening exercises.</td></tr>
<tr><td colspan="2">Chance: Improving pain after 8 weeks</td></tr>
<tr><td colspan="2">NNT: n/a</td><td></td></tr>
<tr><td colspan="3">Pain was not measured in this study, but there may be no difference in pain. People used the same amount of paracetomol (a pain reliever) whether they did kinesthesia and balance exercises in addition to strengthening exercises or just strengthening exercises</td></tr>
<tr><td colspan="2">Chance: Adverse events after 8 weeks</td></tr>
<tr><td colspan="2">NNH: n/a</td><td rowspan="2">Not statistically significant</td></tr>
<tr><td colspan="2">0 People out of 100 experienced adverse events.</td></tr>
<tr><td colspan="2">Chance: Adherence after 8 weeks</td></tr>
<tr><td colspan="2">NNH: n/a</td><td rowspan="3">Not statistically significant</td></tr>
<tr><td>😐</td><td>On average, people attended 18 visits with either type of training</td></tr>
<tr><td>☹</td><td>On average, people missed 4 visits with either type of training (out of maximum possible of 24 visits)</td></tr>
<tr><td colspan="2">Chance: Withdrawals from the trials after 8 weeks</td></tr>
<tr><td colspan="2">NNH: n/a</td><td rowspan="2">Not statistically significant</td></tr>
<tr><td>😐</td><td>91 people out of 100 did not drop out of either type of exercise.</td></tr>
</table>

☹	9 people out of 100 dropped out of either type of exercise.	
☹	**There was no difference in the number of people** out of 100 who dropped out of kinesthesia and balance exercises in addition to strengthening exercises.	

Step 3: GRADE Evidence profile
See Table 1b: Balance exercises in addition to strengthening exercises versus strengthening exercises alone

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	We recommend patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises. Range of motion/flexibility exercises are an option for patients with symptomatic OA of the knee. We suggest quadriceps strengthening for patients with symptomatic OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, *insoles*, knee bracing) and weight reduction.
OARSI	Patients with hip and knee OA should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises.

Step 5: GRADE Recommendation

References

Diracoglu D, Aydin R, Baskent A, Celik A. Effects of kinesthesia and balance exercises in knee osteoarthritis. J Clin Rheumatol 2005;11(6):303-10.

1.2 Land-based exercise

1.2.1 Cardiovascular land-based exercise versus usual care for knee OA

Is cardiovascular land exercise effective in reducing pain and improving function in patients with symptomatic knee osteoarthritis (OA) compared to usual care?

Step 1: Search Results

Three systematic reviews (SR) were found. Pisters (2007), was excluded from this comparison because it did not provide a description of the exercises used (combination of land, water, balance) and it did not report adherence. The second, Hart (2008), was excluded because it did not focus on osteoarthritis patients. Therefore, Fransen (2008) was chosen as the best available evidence. One overview of SRs on therapeutic exercise was found (Taylor, 2007) and its overall conclusions followed those of the chosen SR. Four randomized controlled trials published after the chosen SR were also found (Chua, 2008; Lund, 2008; Dincer, 2008; Olejarova, 2008). Their results were largely similar to those of the chosen SR. Evidence for withdrawals were extracted from the best RCT from Fransen, 2008: Ettinger, 1997.

Interventions description: non-perioperative walking program

Step 2: GRADE Summary of findings

	cardiovascular land exercise compared to no exercise for osteoarthritis of the knee						
	Patient or population: patients with osteoarthritis of the knee **Settings:** **Intervention:** cardiovascular land exercise **Comparison:** no exercise						
Outcomes	**Illustrative comparative risks* (95% CI)** Assumed risk **no exercise**	Corresponding risk **cardiovascular land exercise**	**Absolute difference**	**Relative effect (95% CI)**	**No of Participants (studies)**	**Quality of the evidence (GRADE)**	**NNT**
Benefits							
pain pooled studies with different scales including WOMAC and VAS amongst others	24%	41% of those cardiovascular exercise group experienced a decrease in pain (31% to 55%)	17%	1.71	351 (4[3])	⊕⊕⊕⊕ **high**[1]	5 (3 to 12)

function pooled studies with different scales including WOMAC and VAS amongst others	22%	34% of those cardiovascular exercise group experienced a decrease in pain (26% to 43%)	12%	1.55	317 (3[4])	⊕⊕⊕⊕ **high**[1]	7 (4 to 20)
Harms							
withdrawals number of (follow-up: mean 18 months)	**15%**	**19%** (11% to 31%)	**4%**	**RR 1.27** (0.76 to 2.12)	293 (1[5])	⊕⊕⊕O **moderate**	Not statistically significant
Safety (falls while walking)	1.4% of intervention group fell during walking (2/144)			**RR 5.17** (0.25 to 106.82)	293 (1[5])	⊕⊕⊕O **moderate**	Not statistically significant
Adherence	**95%**	**68%** (60% to 76%)	**27%**	**RR 0.71** (0.63 to 0.80)	293 (1[5])	⊕⊕⊕⊕ **high**	5 (4 to 7)

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; RR: Risk ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Evidence mostly included participants with early or mild symptomatic disease.
[3] Minor 1989, Ettinger 1997, Bautch 1997, Talbot 2003
[4] Minor 1989, Ettinger 1997, Bautch 1997
[5] Is imprecise; includes no effect and significant benefit (0.76, 2.12)
[6] Ettinger 1997

Visual Summary of Findings Table
Cardiovascular land exercise compared to no exercise for osteoarthritis of the knee

Chance: Improving pain

NNT: 5

59 people out of 100 don't improve whether or not they exercise.

24 people out of 100 improve whether or not they exercise.

17 more people out of 100 improve with cardiovascular land-based exercise.

Chance: Improving function

NNT: 7		
😐	66 people out of 100 don't improve whether or not they exercise.	
🙂	22 people out of 100 improve whether or not they exercise.	
🙂	**12 more people** out of 100 improve with land-based cardiovascular exercise	
Chance: Withdrawls after 18 months		
NNH: n/a		**Not statistically significant**
😐	85 people out of 100 did not leave the study whether they exercised or not.	
☹	9 people out of 100 left the study whether they exercised or not.	
☹	**4 more** people out of 100 left the study when they did land-based exercise.	
Chance: Safety		
1 person out 100 fell while walking		
Chance: Adherence*		
NNH: 5		
😐	68 people out of 100 adhered to either exercise or their normal activities	
☹	5 people out of 100 did not adhere to either exercise or their normal activities.	
☹	**27 more** people out of 100 did not adhere to the exercise.	

*does not add up to 100 due to rounding.

Step 3: GRADE Evidence profile

See Table 1 c: Cardiovascular land-based exercise versus usual care

Step 4: Other recommendations

Group	Recommendation
EULAR	Non-pharmacological treatment of knee OA should include education, *exercise*, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	Patients with hip and knee OA should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises. For patients with systematic hip OA, exercises in the water can be effective.
AAOS (knee only)	We recommend patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises. Range of motion/flexibility exercises are an option for patients with symptomatic OA of the knee. We suggest quadriceps strengthening for patients with symptomatic OA of the knee.

Step 5: GRADE Recommendation

References

Bautch JC, Malone DG, Vailas AC. Effects of exercise on knee joints with osteoarthritis: a pilot study of biologic markers. Arthritis Care Res 1997;10(1):48-55.

Ettinger WH, Burns R, Messier SP, Applegate W, Rejeski WJ, Morgan T, et al. A randomized trial comparing aerobic exercise and resistance exercise with a health education program in older adults with knee osteoarthritis. The Fitness Arthritis and Seniors Trial (FAST). JAMA 1997;277(1):25-31.

Fransen M, McConnell S. Exercise for osteoarthritis of the knee. Cochrane Database of Syst Rev 2008;(4):CD004376.

Minor MA, Hewett JE, Webel RR, Anderson SK, Kay DR. Efficacy of physical conditioning exercise in patients with rheumatoid arthritis and osteoarthritis. Arthritis Rheum 1989;32(11):1396-405.

Talbot LA, Gaines JM, Huynh TN, Metter EJ. A home-based pedometer-driven walking program to increase physical activity in older adults with osteoarthritis of the knee: a preliminary study. J Am Geriatr Soc 2003;51(3):387-92.

1.2.2 Resistance land-based exercise versus usual care for knee OA

Is resistance land exercise effective in reducing pain and improving function in patients with symptomatic knee OA compared to usual care?

Step 1: Search Results

Three systematic reviews (SR) were found. One, Pisters (2007), was excluded from this comparison because it did not provide a description of the exercises used (combination of land, water, balance) and it did not report adherence. The second, Hart (2008), was excluded because it did not focus on osteoarthritis patients. Therefore, Fransen (2008) was chosen as best available evidence. One overview of SR on therapeutic exercise was found (Taylor, 2007) and its overall conclusions followed those of the chosen SR. Four randomized controlled trials published after the chosen SR were also found (Chua, 2008; Lund, 2008; Dincer, 2008; Olejarova, 2008). Their results were largely similar to those of the chosen evidence. Safety, adherence, and withdrawals were not included in the best RCT included in Fransen, 2008 (Huang, 2005).

Intervention description: non-perioperative lower limb muscle strengthening

Step 2: GRADE Summary of findings

	resistance land exercise compared to no exercise for knee OA						
	Patient or population: patients with osteoarthritis of the knee **Settings:** **Intervention:** resistance land exercise **Comparison:** no exercise						
Outcomes	**Illustrative comparative risks* (95% CI)** Assumed risk **no exercise**	 Corresponding risk **resistance land exercise**	**Absolute difference**	**Relative effect (95% CI)**	**No of Participants (studies)**	**Quality of the evidence (GRADE)**	**NNT**
Benefits							
Pain pooled studies with different scales including WOMAC and VAS amongst others	32%	53% of those in strengthening exercise group experienced a decrease in pain (43% to 63%)	21%	1.66	1383 (9[3])	⊕⊕⊕O **moderate**[1,2]	4 (3 to 8)
Function pooled studies with different scales including	10%	25% of those in strengthening exercise group experienced a decrease in pain	15%	2.5	1383 (9[3])	⊕⊕⊕O **moderate**[1,2]	6 (4 to 22)

WOMAC and VAS amongst others		(35% to 69%)					
Harms							
Safety	14% patients in exercise group stopped due to intolerable pain during exercise.						
Adherence	Not reported						
Withdrawals	**9%**	**14%** (4 to 56%)	**5%**	**RR 1.67** (0.43 to 6.45)	70 (1[4])	⊕⊕⊕⊕ **high**	Not statistically significant

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Evidence mostly included participants with early or mild symptomatic disease.
[2] Large confidence interval ranging from small to large effect
[3] Schilke 2006, Ettinger 1997, Baker 2001, Thomas 2002, Gur 2002, Huang 2003, Huang 2005, Thorstensson 2005, Mikesky 2006
[4] Huang 2005

Visual Summary of Findings Table
Resistance land exercise compared to no exercise for osteoarthritis of the knee

Chance: Improving pain

NNT: 4

47 people out of 100 don't improve whether or not they exercise.

32 people out of 100 improve whether or not they exercise.

21 more people out of 100 improve with exercise.

Chance: Improving function

NNT: 6

75 people out of 100 don't improve whether or not they exercise.

☺	10 people out of 100 improve whether or not they exercise.	
☺	**15 more people** out of 100 improve with exercise	
Chance: Withdrawals		
NNH: n/a		**Not statistically significant**
😐	86 people out of 100 did not leave the study whether they exercised or not.	
☹	9 people out of 100 left the study whether they exercised or not.	
☹	**5 more** people out of 100 left the study in the lower limb exercise group.	
Chance: Safety		
14% patients in exercise group stopped due to intolerable pain during exercise.		
Chance: Adherence		
The number of people who adhered to resistance exercise was not reported.		

Step 3: GRADE Evidence profile
See Table 1 d: Resistance land-based exercise versus usual care

Step 4: Other recommendations

Group	Recommendation
AAOS (knee only)	We recommend patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises. Range of motion/flexibility exercises are an option for patients with symptomatic OA of the knee. We suggest quadriceps strengthening for patients with symptomatic OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, *exercise*, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	Patients with hip and knee OA should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises. For patients with systematic hip OA, exercises in the water can be effective.

Step 5: GRADE Recommendation

References
Fransen M, McConnell S. Exercise for osteoarthritis of the knee. Cochrane Database of Syst Rev 2008;(4):CD004376.

Huang MH, Lin YH, Lee CL, Yang RC. Use of ultrasound to increase effectiveness of idokinetic exercise for knee osteoarthritis. Arch Phys Med Rehabil 2005;86(8):1545-51.

1.3 Aquatic exercises

1.3.1 Aquatic exercise versus no exercise for OA of hip or knee

Is aquatic exercise effective in reducing pain and improving function in patients with symptomatic knee and hip OA compared to usual care?
Interventions description: All types of exercises developed in the therapeutic/heated indoor pool (range of motion, dynamics, aerobics, etc.).

Step 1: Search Results
Only one meta-analysis was found that assessed aquatic exercise for knee osteoarthritis (Bartels, 2007). Two more recent randomized controlled trials were also found (Lund, 2008; Gill, 2009). Although Lund (2008) found no improvement following aquatic exercise, Gill (2009) found similar results to those reported below whereby pain was decreased.

**** NOTE:** This evidence is the same as that found in the hip exercise summary of findings because data from both joints were pooled****

Step 2: GRADE Summary of findings

	aquatic exercise compared to no exercise for osteoarthritis of hip or knee						
	Patient or population: patients with osteoarthritis of hip or knee **Settings:** **Intervention:** aquatic exercise **Comparison:** no exercise						
Outcomes	**Illustrative comparative risks* (95% CI)** Assumed risk **no exercise**	Corresponding risk **aquatic exercise**	**Relative effect (95% CI)**	**Absolute difference**	**No of Participants (studies)**	**Quality of the evidence (GRADE)**	**NNT**
Benefits							

Pain after intervention Pooled different scales[1]	34%	41% of those in aquatic exercise group experienced a decrease in pain (35% to 48%)	1.2	7%	638 (4[3])	⊕⊕⊕⊕ **high**[2]	11 (6 to 52)
Pain follow up WOMAC pain . Scale from: 0 to 20. (follow-up: mean 6 months)	34%	39%[4] (30% to 47%)	1.1	4%	310 (1[5])	⊕⊕⊕⊕ **high**[2]	Not statistically significant
Function after intervention Pooled different scales[1]	36%	46% (40% to 52%)	1.3	10%	648 (4[3])	⊕⊕⊕⊕ **high**[2]	8 (5 to 19)
Function follow up WOMAC physical function. Scale from: 0 to 68. (follow-up: mean 6 months)	36%	39% (31% to 48%)	1.1	4%	306 (1[5])	⊕⊕⊕⊕ **high**[2]	Not statistically significant
Harms							
Withdrawals follow up total withdrawals (follow-up: mean 18 months)	29%	35% (25 to 48%)	**RR 1.2** (0.86 to 1.66)	6%	312 (1[5])	⊕⊕⊕⊕ **high**[2]	Not statistically significant
Adherence	Found 59% adherence to aquatic exercise intervention[5].						
Safety	Not reported						

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; RR: Risk ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Pooled different scales including WOMAC, VAS, HAQ
[2] Patients not blinded to treatment as it is impossible to do so, therefore we did not downgrade
[3] Cochrane 2005, Foley 2003, Wang 2004, Patrick 2001
[4] This RCT had a significant SMD immediately after intervention
[5] Cochrane 2005

Visual Summary of Findings Table

Aquatic exercise compared to no exercise for osteoarthritis of hip or knee Chance: Improving pain immediately after aquatic exercise	
NNT: 11	
😐 59 people out of 100 don't improve whether or not they did aquatic exercise	
☺ 34 people out of 100 improve whether or not they did aquatic exercise	
☺ **7 more people** out of 100 improve with aquatic exercise	
Chance: Improving pain after 6 months	
NNT: n/a	**Not statistically significant**
😐 61 people out of 100 don't improve whether or not they did aquatic exercise	
☺ 34 people out of 100 improve whether or not they did aquatic exercise	
☺ **5 more people** out of 100 improve with aquatic exercise	
Chance: Improving function immediately after aquatic exercise	
NNT: 8	
😐 54 people out of 100 don't improve whether or not they did aquatic exercise	
☺ 36 people out of 100 improve whether or not they did aquatic exercise	
☺ **10 more people** out of 100 improve with aquatic exercise	
Chance: Improving function after 6 months	
NNT: n/a	**Not statistically significant**
😐 61 people out of 100 don't improve whether or not they did aquatic exercise	
☺ 36 people out of 100 improve whether or not they did aquatic exercise	
☺ **3 more people** out of 100 improve with aquatic exercise	

Chance: Withdrawals		
NNH: n/a		**Not statistically significant**
😐	65 people out of 100 did not leave the study whether or not they did aquatic exercise.	
☹	29 people out of 100 left the study whether or not they did aquatic exercise.	
☹	**6 more** people out of 100 left the study when they did aquatic exercise.	
Chance: Safety		
Safety of aquatic exercise was not reported.		
Chance: Adherence		
41 people out of 100 did not adhere to aquatic exercise.		

Step 3: GRADE Evidence profile
See Table 1 e: Aquatic exercise versus no exercise for OA of hip or knee

Step 4: Other recommendations

Group	Recommendation
AAOS (knee only)	We recommend patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises. Range of motion/flexibility exercises are an option for patients with symptomatic OA of the knee. We suggest quadriceps strengthening for patients with symptomatic OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, *exercise*, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	Patients with hip and knee OA should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises. For patients with systematic hip OA, exercises in the water can be effective.

Step 5: GRADE Recommendation

References

Bartels ME, Lund H, Hagen KB, Dagfinrud H, Christensen R, Danneskiold-Samsoe B. Aquatic exercise for the treatment of knee and hip osteoarthritis. Cochrane Database of Syst Rev 2007(4):CD005523.

Cochrane T, Davey RC, Matthes Edwards SM. Randomised controlled trial of the cost-effectiveness of water-based therapy for lower limb osteoarthritis. Health Technol Assess 2005;9(31):iii-xi, ix-xi, 1-114.

Wyatt FB, Milam S, Manske RC, Deere R. The effects of aquatic and traditional exercise programs on programs on persons with knee osteoarthritis. J Strength Cond Res 2001;15(3):337-40.

1.3.2 Aquatic exercise versus land-based exercise of knee OA

Is aquatic exercise effective in reducing pain and improving function in patients with symptomatic knee OA compared to land-based exercise?

Step 1: Search Results

Only one SR was found considering aquatic exercise for knee osteoarthritis (Bartels, 2007). This SR included only one RCT analyzing aquatic exercise vs. land-based exercise for knee OA (Wyatt, 2001).

Interventions description: All types of exercises developed in the therapeutic/heated indoor pool (range of motion, dynamics, aerobics, etc.).

Step 2: GRADE Summary of findings

	aquatic exercise compared to land exercise for osteoarthritis of the knee						
	Patient or population: patients with osteoarthritis of the knee **Settings:** **Intervention:** aquatic exercise **Comparison:** land exercise						
Outcomes	**Illustrative comparative risks* (95% CI)**		**Relative effect (95% CI)**	**Absolute difference**	**No of Participants (studies)**	**Quality of the evidence (GRADE)**	**NNT**
	Assumed risk **land exercise**	Corresponding risk **aquatic exercise**					
Benefits							

pain VAS. Scale from: 0 to 10. (follow-up: mean 6 weeks)	32%	65% of those in aquatic exercise group experienced a decrease in pain (41% to 84%)	2.0	33%	46 (1[4])	⊕OOO **very low**[1,2,3]	3 (2 to 9)
function - walking ability timed 1-mile walk. Scale from 0 to 25 min (follow-up: mean 6 weeks)	15%	28% (12% to 50%)	1.9	13%	46 (1[4])	⊕OOO **very low**[1,2,3]	Not statistically significant
Harms							
Withdrawals	4 out of 46 subjects withdrew due to illness[5]						
Adherence	Not reported						
Safety	Not reported						

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Concealment of allocation was unclear
[2] no comparision to placebo
[3] Only end-of-study data could be reported here and N is low (n=42) and large CI
[4] Wyatt 2001
[5] RCT does not specify to which group they pertained

Visual Summary of Findings Table
Aquatic exercise compared to land exercise for osteoarthritis of the knee

Chance: Improving pain after 6 weeks	
NNT: 3	
😐 35 people out of 100 don't improve with either type of exercise	
☺ 32 people out of 100 improve with either type of exercise	
☺ **33 more people** out of 100 improve with aquatic exercise.	
Chance: Improving function (ability to walk) after 6 weeks	
NNT: n/a	**Not statistically significant**
😐 72 people out of 100 don't improve with either type of exercise	
☺ 15 people out of 100 improve with either type of exercise	
☺ **13 more people** out of 100 improve with aquatic exercise	
Chance: Withdrawls	
4 out of 46 people withdrew due to illness.	
Chance: Safety	
Safety was not reported.	
Chance: Adherence	
The number of people who adhered to the exercise programs was not reported.	

Step 3: GRADE Evidence profile
See Table 1 f: Aquatic exercise versus land-based exercise for knee OA

Step 4: Other recommendations

Group	Recommendation
AAOS (knee only)	We recommend patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises. Range of motion/flexibility exercises are an option for patients with symptomatic OA of the knee. We suggest quadriceps strengthening for patients with symptomatic OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, *exercise*, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	Patients with hip and knee OA should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises. For patients with systematic hip OA, exercises in the water can be effective.

Step 5: GRADE Recommendation

References

Bartels ME, Lund H, Hagen KB, Dagfinrud H, Christensen R, Danneskiold-Samsoe B. Aquatic exercise for the treatment of knee and hip osteoarthritis. Cochrane Database of Syst Rev 2007(4):CD005523.

Wyatt FB, Milam S, Manske RC, Deere R. The effects of aquatic and traditional exercise programs on programs on persons with knee osteoarthritis. J Strength Cond Res 2001;15(3):337-40.

1.4 Tai chi

Is tai chi effective in reducing pain and improving function in patients with symptomatic knee OA compared to usual care?

Step 1: Search Results
One systematic review (Lee 2008) assessed the effect of tai chi in patients with both hip and knee OA. However, results of the 5 included RCTs and 7 non-randomized studies were not pooled due to high heterogeneity. Therefore, we chose the RCT from this systematic review which most closely matched our PICO question by having an appropriate control group and with the largest sample size. The RCT by Brismee, 2007 was the closest match to having a control group (defined as "attention control in Brismee 2007) since the other studies had control groups of hydrotherapy, routine care and bingo.

Intervention description: Simplified Yang-style tai chi with instructor three times a week for six weeks followed by six weeks with home video.

Note: the study included has a sample size of 31 people, and 24% of the participants were lost to follow-up.

Step 2: GRADE Summary of findings

	Tai chi compared to no exercise (education on OA) for knee OA						
	Patient or population: patients with osteoarthritis of the knee **Settings:** **Intervention:** tai chi **Comparison:** no exercise (education on OA)						
Outcomes	**Illustrative comparative risks* (95% CI)**		**Relative effect (95% CI)**	**Absolute difference**	**No of Participants (studies)**	**Quality of the evidence (GRADE)**	**NNT**
	Assumed risk **no exercise (education on OA)**	Corresponding risk **Tai chi**					
Benefit							
Pain WOMAC . Scale from: 0 to 35. (follow-up: mean 12 weeks)	33%	35% of those in tai chi group experienced a decrease in pain (11% to 58%)	2%	1.1	31 (1[2])	⊕⊕OO **low**[1]	Not statistically significant

Function WOMAC. Scale from: 0 to 85. (follow-up: mean 12 weeks)	33%	35% (11% to 58%)	2%	1.1	31 (1[2])	⊕⊕OO **low**[1]	Not statistically significant
Harms							
Withdrawals Number of drop-outs (follow-up: mean 12 weeks)	**32%**	**18%** (6 to 55%)	**RR 0.58** (0.19 to 1.74)	13%	41 (1[2])	⊕⊕⊕O **moderate**[1]	Not statistically significant **(Note: more people in the control group withdrew from the study)**
Adherence	90% adherence in tai chi group						
Safety	Not reported						

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; RR: Risk ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Large CI and small N=35
[2] Brismee, 2007

Visual Summary of Findings Table

Tai chi compared to no exercise (education on OA) for osteoarthritis of the knee

Chance: Improving pain		
NNT: n/a		**Not statistically significant**
😐	65 people out of 100 don't improve with either treatment.	
🙂	33 people out of 100 improve with either treatment.	
🙂	**2 more people** out of 100 improve with tai chi.	
Chance: Improving function		
NNT: n/a		**Not statistically significant**
😐	65 people out of 100 don't improve with either treatment.	
🙂	33 people out of 100 improve with either treatment.	
🙂	**2 more people** out of 100 improve with tai chi.	
Chance: Withdrawals*		
NNH: n/a		**Not statistically significant (Note: more people in the control group withdrew from the study)**
😐	68 people out of 100 did not leave the study with either treatment.	
☹	18 people out of 100 left the study with either treatment.	
☹	**13 more** people out of 100 left the study in the control group than the tai chi.	
Chance: Safety		
Safety of tai chi was not reported.		
Chance: Adherence		
90% of people in the tai chi group adhered to the program.		

*does not add up to 100 due to rounding

Step 3: GRADE Evidence profile

See Table 1 g: Tai Chi compared to no exercise (education on OA) for knee OA

Step 4: Other recommendations

Group	Recommendation
AAOS (knee only)	We recommend patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises. Range of motion/flexibility exercises are an option for patients with symptomatic OA of the knee. We suggest quadriceps strengthening for patients with symptomatic OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, *exercise*, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	Patients with hip and knee OA should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises. For patients with systematic hip OA, exercises in the water can be effective.

Step 5: GRADE Recommendation

References

Brismee JM, Paige RL, Chyu MC, Boatright JD, Hagar JM, McCaleb JA, Quintela MM, Feng D, Xu KT, Shen CL. Group and home-based tai chi in elderly subjects with knee osteoarthritis: a randomized controlled trial. Clin Rehabil 2007;21:99-111.

Lee MS, Pittler MH, Ernst E. Tai chi for osteoarthritis: a systematic review. Clin Rheumatol 2008;27(2):211-8.

1.5 General hip exercise

Is exercise effective in reducing pain and improving function in patients with symptomatic hip osteoarthritis (OA) compared to usual care?

Step 1: Search Results
One meta-analysis (Hernandez-Molina, 2008) was found which pooled land-based, aquatic, and tai chi exercises. The remaining RCTs found which were not included in the meta-analysis did not follow the guideline's inclusion criteria since they were post-operative interventions.

Intervention description: For the pain outcome, the systematic review (SR) included any exercise program of at least 4 weeks duration (Hernandez-Molina, 2008). For the function outcome, "The exercise group performed water and land-based exercise 3 times weekly over a 6-week period immediately prior to surgery. During the first 3 weeks, participants performed 1–2 sets of 8–12 repetitions of single-joint movements while standing in chest-deep, 93°F water. Pool exercises focused on single planar motion of the cervical spine, shoulders, elbows, wrists, hands, hips, knees, and ankles. During weeks 4–6, exercise sessions involved a total body fitness program of cardiovascular, strength, and flexibility training" (Rooks, 2006).

Step 2: GRADE Summary of findings

	exercise compared to no exercise for osteoarthritis of the hip						
	Patient or population: patients with osteoarthritis of the hip **Settings:** **Intervention:** exercise **Comparison:** no exercise						
Outcomes	**Illustrative comparative risks* (95% CI)** Assumed risk **no exercise**	Corresponding risk **exercise**	**Relative effect (95% CI)**	**Absolute difference**	**No of Participants (studies)**	**Quality of the evidence (GRADE)**	**NNT**
Benefit							
Pain pooled WOMAC and VAS . Scale from: 0 to 100. (follow-up: 3-18 months)	34%	56% of those in any exercise group experienced a decrease in pain (38% to 100%)	1.6	22%	310 (7[2])	⊕⊕⊕O **moderate**[1]	4 (2 to 18)
Function	Not reported						
Harms							
Safety	Not reported						

Withdrawals	Not reported
Adherence	Not reported
	*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI). CI: Confidence interval;
	GRADE Working Group grades of evidence **High quality:** Further research is very unlikely to change our confidence in the estimate of effect. **Moderate quality:** Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. **Low quality:** Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate. **Very low quality:** We are very uncertain about the estimate.
	[1] although Isquared = 0, different interventions pooled, including aquatic, tai chi, and land exercise. [2] Fransen 2007, Rooks 2006, Cochrane 2005, Tak 2005, Foley 2003, Hopman-Rock 2000, Van Baar 1998.* Hinman 2007 was not included in analysis since hip was not index joint and Ravaud 2007 was not included in analysis because it created large heterogeneity.

Visual Summary of Findings Table
Exercise compared to no exercise for osteoarthritis of the hip

Chance: Improving pain after 3-18 months	
NNT: 4	
😐 44 people out of 100 don't improve whether or not they exercise	
☺ 34 people out of 100 improve whether or not they exercise	
☺ **22 more people** out of 100 improve with exercise	
Chance: Improving function after 3-18 months	
Improvement in function with exercise was not reported	
Chance: Withdrawls	
The number of people who left the study was not reported.	
Chance: Safety	
Safety of exercise was not reported.	
Chance: Adherence	
Adherence to exercise was not reported.	

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Step 3: GRADE Evidence profile
See Table 1 h: Exercise compared to no exercise for osteoarthritis of the hip

Step 4: Other recommendations

Group	Recommendation
EULAR	Non-pharmacological treatment of knee OA should include education, *exercise*, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	Patients with hip and knee OA should be encouraged to undertake, and continue to undertake, regular aerobic, muscle strengthening and range of motion exercises. For patients with systematic hip OA, exercises in the water can be effective.
AAOS (knee only)	We recommend patients with symptomatic OA of the knee be encouraged to participate in low-impact aerobic fitness exercises. Range of motion/flexibility exercises are an option for patients with symptomatic OA of the knee. We suggest quadriceps strengthening for patients with symptomatic OA of the knee.

Step 5: GRADE Recommendation

References

Hernandez-Molina G, Reichenbach S, Zhang B, Lavalley M, Felson DT. Effect of Therapeutic Exercise for Hip Osteoarthritis Pain: Results of a Meta-analysis. Arthritis & Rheum 2008;59(9):1221-8.

Rooks DS, Huang J, Bierbaum BE, Bolus SA, Rubano J, Connolly CE, et al. Effect of preoperative exercise on measures of functional status in men and women undergoing total hip and knee arthroplasty. Arthritis Rheum 2006;55:700-8.

2. INSOLES

2.1 Laterally wedged insoles versus neutrally wedged insoles for knee OA

Are laterally wedged insoles effective in reducing pain and improving function in patients with symptomatic medial compartment knee OA compared to neutrally wedged insoles? Are patients adherent to these treatment regimens?

Step 1: Search Results

We chose Brouwer, 2008 for lateral wedge insoles since it is the most recent and relevant SR (SR). This SR reported only one RCT comparing laterally and neutrally wedged insoles: Maillefert, 2001.

Intervention description: Insoles were made of Ledos material (Société Française d'Orthopodie, Paris, France), mounted on a leather strip. The Ledos material is made of pure rubber with cork powder, and has a great capacity to absorb impact loading. The laterally elevated insoles were individually modeled, with elevation depending on static pedometer evaluation, but without any biomechanical evaluation during walking.

Step 2: GRADE Summary of findings

Laterally wedged insoles compared to neutrally wedged insoles for painful medial knee osteoarthritis

Patient or population: patients with painful medial Knee OA
Intervention: Laterally wedged insoles
Comparison: neutrally wedged insoles

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **neutrally wedged insoles**	Corresponding risk **Laterally wedged insoles**					
Benefits							
Pain WOMAC. Scale from: 0 to 100. (follow-up: 6 months)	35%[1]	25% (16% to 36%)	-10%	0.71	147 (1)	⊕⊕OO low[2,3]	Not statistically significant *Laterally wedged insoles show less improvement in pain than neutrally wedged insoles.
Physical function WOMAC. Scale from: 0 to 100. (follow-up: mean 6 months)	35%[4]	25% (16% to 37%)	-10%	0.71	147 (1)	⊕⊕OO low[2,3]	Not statistically significant *Laterally wedged insoles show less improvement in function than neutrally wedged insoles.
Harms							
Adherence number of patients who wore insoles permanently during the study period (follow-up: 6 months)	74%	88% (75% to 100%)	14%	1.18 (1.01 to 1.38)	156 (1)	⊕⊕⊕O moderate[2]	7 (4 to 135) *Laterally wedged insoles show better compliance than neutrally wedged insoles.
Withdrawals due to intolerance to the treatment number of patients who withdrew from the study because of intolerance to the treatment (follow-up: 6 months)	1%	0% (0% to 10%)	-1%	0.30 (0.01 to 7.28)	156 (1)	⊕⊕OO low[2,3]	Not statistically significant *Laterally wedged insoles show less withdrawals due to intolerance than neutrally wedged insoles.

[1] This SMD was calculated using RevMan 5 with the 6-month end of study data. WOMAC pain was more decreased in the neutrally wedged group than the laterally wedged group. This result along with those at 1, 3, 12 and 24 months is not statistically significant.
[2] The randomization procedure and allocation concealment were not described. The trial (Maillefert, 2001) did not blind the outcome assessors and the care providers. The insoles were individually modeled and therefore the intervention was not identical for all patients. The quality assessment score was not reduced because of this.
[3] The confidence interval ranges from not being clinically significant to a very large clinical effect, which is a sign of imprecision.
[4] This SMD was calculated using RevMan 5 with the 6-month end of study data. WOMAC function was more decreased in the laterally wedged group than the neutrally wedged group. This result along with those at 1, 3, 12 and 24 months is not statistically significant.

Visual Summary of findings figure:
Laterally wedged insoles compared to neutrally wedged insoles for painful medial Knee OA

Chance: Improving pain and physical function (6 Months)	
NNT: Not statistically significant	Not statistically significant
😐 65 people out of 100 don't improve	
☺ 25 people out of 100 improve either type of insole	
☹ **10 fewer people** out of 100 improve with laterally wedged insoles	
Chance: Adherence (6 months): number of patients who wore insoles permanently during the study period	
NNH: 7	
😐 74 people out of 100 wore either type of insole permanently during the study period.	
☹ 12 people out of 100 did not wear either type of insole permanently during the study period.	
☹ **14 fewer people** out of 100 wore neutrally wedged insoles permanently during the study period.	
Chance: Withdrawing from the trials after 6 months because of intolerance to the treatment.	
NNH: Not statistically significant	**Not statistically significant**
😐 99 out of 100 people did not drop out of the trials	
☹ 0 out of 100 people dropped out with either type of insole	
☹ 1 **more person** out of 100 dropped out with neutrally wedged insoles.	

Step 3: GRADE Evidence profile

See Table 2 a: Laterally wedged insoles versus neutrally wedged insoles

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	We suggest *lateral heel wedges not be prescribed* for patients with symptomatic medial compartmental OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, *insoles*, knee bracing) and weight reduction.
OARSI	Every patient with hip and knee OA should receive advice concerning appropriate footwear. In patients with knee OA, *insoles* can reduce pain and improve ambulation. Lateral wedged insoles can be of symptomatic benefit for some patients with medial tibio-femoral compartment OA.

Step 5: GRADE Recommendation

References

Brouwer RW, Jakma TS, Verhagen AP, Verhaar JA, Bierma-Zeinstra SM. Braces and orthoses for treating osteoarthritis of the knee. Cochrane Database of Syst Rev 2005;(1):CD004020.

Maillefert JF, Hudry C, Baron G et al. Laterally elevated wedged insoles in the treatment of medial knee osteoarthritis: a prospective randomized controlled study. Osteoarthritis Cartilage 2001;9(8):738-45.

2.2 Medial wedged insoles versus neutrally wedged insoles for knee OA

Are medial wedged insoles effective in reducing pain and improving function in patients with symptomatic lateral compartment knee OA compared to neutrally wedged insoles?

Step 1: Search Results

We chose Rodrigues, 2008 for medial wedged insoles since it is the only RCT we found in the literature review and no SRs have been done on the subject.

Intervention description: The medial insole group wore 8-mm-high medial-wedge insoles for the rearfoot inserted into a new shoe for 8 weeks. The neutral insole group wore an insole resembling that of the former group but without raised wedges for 8 weeks. Patients of both groups received the same new shoe and were blind to insole use. The ethylene-vinyl-acetate (density 50) insoles were provided by the AACD Institute (Associaçao de Assistência à Criança Deficiente). A commercial neoprene with elastic banding was used for ankle support. Both groups used similar standard shoes supplied by the hospital. Each participant was instructed to use the splints (shoes and elastic banding) for 3–6 hours daily.

Step 2: GRADE Summary of findings

*This study has a very small sample size (n=30), which could undermine its validity.

Medially wedged insoles compared to neutrally wedged insoles for knee OA

Patient or population: patients with knee OA
Intervention: Medially wedged insoles
Comparison: neutrally wedged insoles

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk neutrally wedged insoles	Corresponding risk Medially wedged insoles					
Benefits							
Pain on movement VAS scale transformed into percentage of change over time. Scale from: 0 to 100. (follow-up: 8 weeks)	41%	85% (60% to 97%)[1]	44%	2.07	30 (1)	⊕⊕⊕O moderate[2]	3 (2 to 5)
Function WOMAC transformed into percentage of change over time. Scale from: 0 to 100. (follow-up: 8 weeks)	27%	86% (59% to 97%)[1]	59%	3.19	30 (1)	⊕⊕⊕O moderate[2]	2 (2 to 3)
Harms							
Mild discomfort number of patients with event (follow-up: 8 weeks)	7%	2% (0% to 47%)	-5%	0.29 (0.01 to 6.69)	30 (1)	⊕⊕OO low[2,3]	Not statistically significant
Adherence	All patients used the insoles regularly throughout the study						
Withdrawals	No withdrawals						

[1] This SMD was calculated using RevMan 5 with the percentage of change over time provided by the authors.
[2] The sample is small: 30 women with valgus knee OA. Pain at rest was statistically different at baseline.
[3] The confidence interval ranges from not being clinically significant to a very large clinical effect, which shows imprecision.

Visual Summary of findings figure:
Medially wedged insoles compared to neutrally wedged insoles for knee OA

Chance: Improving pain when moving after 8 weeks	
NNT: 3	
15 people out of 100 don't improve with either type of insole	
41 people out of 100 improve with either type of insole	
44 more people out of 100 improve with Medially wedged insoles	
Chance: Improving function after 8 weeks	
NNT: 2	
14 people out of 100 don't improve with either type of insole	
27 people out of 100 improve with either type of insole	
59 more people out of 100 improve with Medially wedged insoles	
Chance: Mild discomfort after 8 weeks	
NNH: n/a	**Not significantly significant**
93 people out of 100 avoid mild discomfort with either type of insole.	
2 people out of 100 have mild discomfort with either type of insole.	
5 more people out of 100 have mild discomfort with neutrally wedged insoles	
Chance: Adherence	
All patients used the insoles regularly throughout the study	
Chance: Withdrawls	
There were no withdrawals from the study	

Step 3: GRADE Evidence profile
See Table 2 b: Medial wedged insoles versus neutrally wedged insoles for knee osteoarthritis

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	We suggest *lateral heel wedges not be prescribed* for patients with symptomatic medial compartmental OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, *insoles*, knee bracing) and weight reduction.
OARSI	Every patient with hip and knee OA should receive advice concerning appropriate footwear. In patients with knee OA, *insoles* can reduce pain and improve ambulation. Lateral wedged insoles can be of symptomatic benefit for some patients with medial tibio-femoral compartment OA.

Step 5: GRADE Recommendation

References

Rodrigues PT. Effectiveness of medial-wedge insole treatment for valgus knee osteoarthritis. Arthritis and rheumatism 2008;59(5):603-8.

2.3. Subtalar strapped insoles versus inserted laterally wedged insoles for knee OA

Are subtalar strapped insoles effective in reducing pain and improving function in patients with symptomatic knee OA compared to inserted laterally wedged insoles?

Step 1: Search Results

We chose the SR by Brouwer 2008 which reported one RCT which can be found in three articles by Toda (RCT published in 2001 with follow-up data published in 2004 and 2006). We are presenting the data at 6 months follow-up for efficacy and at 8 weeks for side effects as these were the only time points at which these were evaluated respectively.

Intervention description: Radiographs were evaluated for changes characteristic of OA in anteroposterior views using the Kellgren-Lawrence grade, as described in the *Atlas of Standard Radiographs*. Two types of lateral wedge insoles were prepared: urethane wedges made from household bath mat material with elevations of 6.35 mm strapped to an ankle sprain supporter (Sofra Wolfer®, Taketora Co. Ltd., Japan) designed to fit around the ankle and subtalar joints (strapped insole, Figure 1A); and a traditional inserted insole (Wedge Heel Type®, Sanshinkousan Co. Ltd., Japan), a lateral rubber heel wedge with an elevation of 6.35 mm (inserted insole, Figure 1B). Each participant

was instructed to use the insole whenever wearing shoes, for between 3 and 6 hours each day for 8 weeks.

Step 2: GRADE Summary of findings

Subtalar strapped insoles compared to inserted laterally wedged insoles for knee OA

Patient or population: patients with knee OA
Intervention: Subtalar strapped insoles
Comparison: inserted laterally wedged insoles

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **Inserted laterally wedged insoles**	Corresponding risk **Subtalar strapped insoles**					
Benefits							
Pain visual analog scale. Scale from: 0 to 100. (follow-up: 6 months)	36%	58% (38% to 76%)[1]	22%	1.61	61 (1)	⊕⊕⊕O moderate[2]	4 (3 to 35)
Function Lequesne index (follow-up: 6 months)	37%	48% (29% to 67%)[3]	11%	1.30	61 (1)	⊕⊕⊕O moderate[2]	Not statistically significant
Harms							
Side effects number of patients with event (follow-up: 8 weeks)	2%	13% (2% to 100%)[4]	11%	5.74 (0.72 to 45.77)	90 (1)	⊕⊕OO LOW[2,6]	Not statistically significant
Withdrawals number of patients who withdrew after randomization (follow-up: 6 months)	6%	9% (2% to 53%)[5]	3%	1.59 (0.28 to 8.93)	66 (1)	⊕⊕OO LOW[2,6]	Not statistically significant
Adherence				Not reported			

[1] This SMD was calculated using Rev Man 5 with the 6-months end of study data. This result along with the one at 8 weeks are statistically significant (SMD= -0.42 (-0.83, 0)). The data at 24 month were not statistically significant.
[2] The randomization procedure was done according to birth date and the allocation concealment was not described. The trials (Toda, 2001, 2004 and 2006) did not blind the outcome assessors, the care providers or the patients.
[3] This SMD was calculated using Rev Man 5 with the 6-months end of study data. This result along with the one at 8 weeks and 24 months are not statistically significant.
[4] In the strapped insole group, 3 participants complained of popliteal pain, 2 reported low back pain and one had foot sole pain. Only one patient complained of foot sole pain in the inserted insole group. However, side effects were not severe enough to deter participants from continuing to wear the insole.
[5] People who withdrew had either moved or cited household commitments.
[6] The confidence interval ranges from not being clinically significant to a very large clinical effect, which is a sign of imprecision.

Visual Summary of findings figure:
Subtalar strapped insoles compared to inserted laterally wedged insoles for knee OA

Chance: Improving pain after 6 Months	
NNT: 4	
42 people out of 100 don't improve with either type of insole	
36 people out of 100 improve with either type of insole	
22 more people out of 100 improve with Subtalar strapped insoles	
Chance: Improving function after 6 Months	
NNT: Not statistically significant	**Not statistically significant**
52 people out of 100 don't improve with either type of insole	
37 people out of 100 improve with either type of insole	
11 more people out of 100 improve with Subtalar strapped insoles	
Chance: Side effects after 8 weeks	
NNH: Not statistically significant	**Not statistically significant**
87 out of 100 people avoid side effects	
2 out of 100 people had side effects with either type of insole	
11 more people out of 100 had side effects with Subtalar strapped insoles	
Chance: Withdrawing from the trials after 6 months	
NNH: Not statistically significant	**Not statistically significant**
91 out of 100 people did not drop out of the trials	
6 out of 100 people dropped out with either type of insole	
3 more people out of 100 dropped out with Subtalar strapped insoles	

Chance: Adherence	
Adherence was not reported	

Step 3: GRADE Evidence profile
See Table 2 c: Subtalar strapped insoles versus inserted laterally wedged insoles

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	We suggest *lateral heel wedges not be prescribed* for patients with symptomatic medial compartmental OA of the knee.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, *insoles*, knee bracing) and weight reduction.
OARSI	Every patient with hip and knee OA should receive advice concerning appropriate footwear. In patients with knee OA, *insoles* can reduce pain and improve ambulation. Lateral wedged insoles can be of symptomatic benefit for some patients with medial tibio-femoral compartment OA.

Step 5: GRADE Recommendation

References

Brouwer RW, Jakma TS, Verhagen AP, Verhaar JA, Bierma-Zeinstra SM. Braces and orthoses for treating osteoarthritis of the knee. Cochrane Database of Syst Rev 2005;(1):CD004020.

Toda Y, Tsukimura N. A six-month followup of a randomized trial comparing the efficacy of a lateral-wedge insole with subtalar strapping and an in-shoe lateral-wedge insole in patients with varus deformity osteoarthritis of the knee. Arthritis Rheum 2004; 50(10):3129-3136.

Toda Y. A 2-year follow-up of a study to compare the efficacy of lateral wedged insoles with subtalar strapping and in-shoe lateral wedged insoles in patients with varus deformity osteoarthritis of the knee. Osteoarthritis and cartilage / OARS , Osteoarthritis Research Society 2006;14(3):231-7.

Toda Y, Segal N, Kato A, Yamamoto S, Irie M. Effect of a novel insole on the subtalar joint of patients with medial compartment osteoarthritis of the knee. J Rheumatol 2001; 28(12):2705-2710

TABLE 1. Lower Extremity Kinesthesia and Balance Exercises Used in the Study

1. Week	1. Modified Romberg exercise (standing in balance with eyes closed)
	a) On hard ground
	b) On soft ground (on a mat)
	2. Retrowalking (25 m)
	3. Walking on heels (25 m)
	4. Walking on toes (25 m)
	5. Walking with eyes closed (25 m)
	6. Standing on one extremity for 30 seconds (repeated in both extremities)
	Leaning forward, backward, and to the sides on one extremity (eyes open)
	Leaning forward, backward, and to the sides on one extremity (eyes closed)
	Sitting down and standing up from a high chair slowly
2. Week (in addition)	1. Exercise with "rocker-bottom" balance board
	2. Sitting down and standing up from a low chair slowly
	3. Plyometric exercise (crossing a height of 15 cm by jumping)
	4. 8 exercise
	a) Walking slowly, wide circle
	b) Walking quickly, wide circle
	c) Walking slowly, narrow circle
	d) Walking quickly, narrow circle
3. Week (in addition)	1. Exercise with "BAPS board" balance board
	a) Balance with 2 legs, eyes open, multidirectional
	b) Balance with 2 legs, eyes closed, multidimensional
	c) Balance with one leg, eyes open, unidimensional
	d) Balance with one leg, eyes closed, unidimensional
	e) Balance with one leg, eyes open, multidimensional
	f) Balance with one leg, eyes closed, multidimensional
	2. Minitrampoline exercise (jumping and jogging)
	3. Plyometric exercise (crossing a height of 15 cm by jumping)
	4. Carioca crossover maneuver

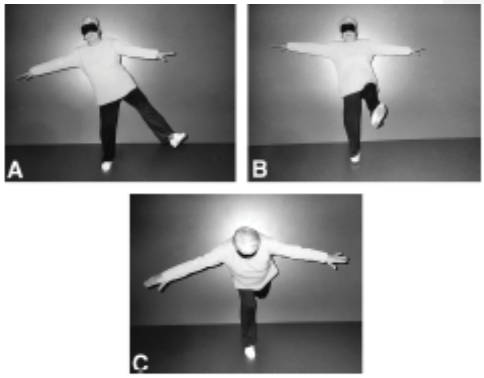


FIGURE 1. (A) Balance exercise toward the sides on a single foot while the eyes are closed. (B) Balance exercise toward the back on a single foot while the eyes are closed. (C) Balance exercise toward the front on a single foot while the eyes are closed.

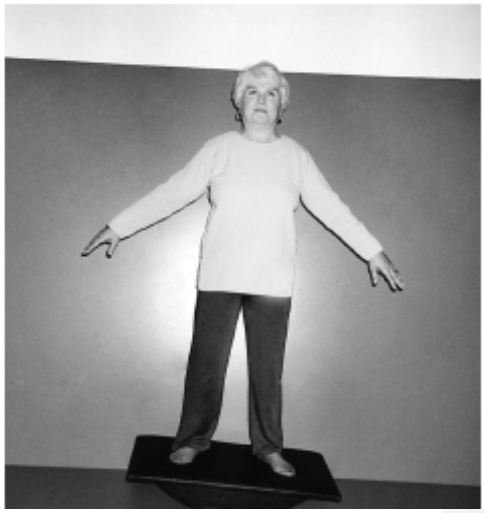


TABLE 2. Lower Extremity Isometric and Isotonic Strengthening Program Used in the Study

1. Week	1. 5-min fixed bike exercise without resistance
	2. Range-of-motion and active stretching exercises applied to hamstring and quadriceps muscles
	3. Quadriceps isometric strengthening exercise
	4. Hamstring muscles isometric exercise
2. Week (in addition)	1. Short-arc terminal extension exercise for the knee joint
	2. Isometric exercise for the abductor and adductor muscles of the hip joint
3. Week (in addition)	1. Short-arc terminal extension exercise with resistance for the knee joint
	2. Isometric strenghtening exercise with resistance for the hamstring muscles

3. SELF-MANAGEMENT

Are self-management programs effective in reducing pain and improving function in patients with symptomatic knee osteoarthritis (OA) compared to usual care?

Step 1: Search Results
Three meta-analyses on self-management programs were found (Chodosh, 2005; Devos-Comby, 2006; Warsi, 2004). Although Devos-Comby (2006) was the most recent evidence, exercise and self-management were presented such that outcomes from each intervention could not be separated. Warsi (2004) did not focus on OA. Chodosh (2005) met our selection criteria and was therefore chosen as the best available evidence. Devos-Comby (2006) had similar results to Chodosh (2005), whereby, no clinically significant effect was found on physical outcomes.

Interventions description: Chronic disease self-management program was defined by the authors of the systematic review as "a systematic intervention that is targeted toward patients with chronic disease. The intervention should help them actively participate in either or both of the following: self-monitoring (of symptoms or of physiologic processes) or decision making (managing the disease or its impact through self-monitoring)" (Chodosh, 2005).

Step 2: GRADE Summary of findings

Self-management program compared to no self-management for knee OA

Patient or population: patients with Osteoarthritis
Intervention: Self-management program
Comparison: no self-management

Outcomes	Illustrative comparative risks* (95% CI) Assumed risk no self-management	Corresponding risk Self-management program	Relative effect (95% CI)	Absolute difference	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
Benefit							
pain Not specified but likely pooled several different scales (follow-up: 2-6 months)	41%	43% of those in self-management program group experienced a decrease in pain (41% to 44%)	1.05	2%	Not available	⊕⊕OO LOW	36 (22 to 108)
function Not specified but likely pooled several different scales (follow-up: 2-6 months)	31%	33% (31% to 34%)	1.06	2%	Not available	⊕⊕OO LOW	34 (21 to 103)
Harms							
safety			Not reported				
adherence			Not reported				
withdrawals			Not reported				

NOTE 1: *Although we acknowledge that psychological outcomes are relevant to self-management interventions, we decided a priori to focus only on effects on pain and function outcomes. Chodosh (2005) did not report any psychological outcomes. Devos-Comby (2006) found that although psychological outcomes were significantly improved, perceived psychological health was not statistically different.*

NOTE 2: *There was a rigorous exchange of ideas between Drs. Holman and Lorig and the authors of Chodosh (2005). The conclusion was that increased evidence is needed on the different types of self-management programs as well as long term data. This exchange can be found at* http://www.annals.org/cgi/content/abstract/143/6/427

Visual Summary of Findings Table
Self-management program compared to no self-management for osteoarthritis

Chance: Improving pain after 8 weeks	
NNT: 6	
57 people out of 100 don't improve whether they take a self management program or not	
41 people out of 100 improve with either intervention	
2 more people out of 100 improve with a self-management program	
Chance: Improving function after 8 weeks	
NNT: 6	
67 people out of 100 don't improve whether they take a self management program or not	
31 people out of 100 improve with either intervention	
2 more people out of 100 improve with a self-management program	
Chance: Safety, Adherence, Withdrawals	
NNH: n/a The safety of self-management and the number of people who adhered to a self-management program and the number of people who withdrew from self management programs was not reported.	**Not reported**

Step 3: GRADE Evidence profile
See Table 3: Self-management

NOTE: Post-hoc tests including 5 essential elements (tailoring, group setting, feedback, psychological, and medical care) were unrevealing.

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	• We suggest patients with symptomatic OA of the knee be encouraged to participate in self-management educational programs such as those conducted by the Arthritis Foundation, and incorporate activity modifications (e.g. walking instead of running; alternative activities) into their lifestyle. • Regular contact to promote self-care is an option for patients with symptomatic OA of the knee. (No recommendations for hip).
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	• Optimal management of OA requires a combination of non-pharmacological and pharmacological modalities. • All patients with hip and knee OA should be given information access and education about the objectives of treatment and the importance of changes in lifestyle, exercise, pacing of activities, weight reduction, and other measures to unload the damaged joint(s). The initial focus should be on self-help and patient-driven treatments rather than on passive therapies delivered by health professionals. Subsequently emphasis should be placed on encouraging adherence to the regimen of non-pharmacological therapy. • The clinical status of patients with hip or knee OA can be improved if patients are contacted regularly by phone.

Step 5: GRADE Recommendation

References

Chodosh J, Morton S, Mojica W, Maglione M, Suttorp M, Hilton L, Rhodes S, Shekelle P. Meta-analysis: Chronic disease self-management programs for older adults. Ann Int Med 2005;143(6):427-38.

Devos-Comby L, Cronan T, Roesch SC. Do exercise and self-management interventions benefit patients with osteoarthritis of the knee? A metaanalytic review. J Rheumatol 2006;33(4):744-56.

Lorig KR, Sobel DS, Stewart AL, Brown BW Jr., Bandura A, Ritter P, et al. Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization : a randomized trial. Med Care 1999;37(1):5-14.

Warsi A, Wang PS, L Valley MP, Avorn J, Solomon DH. Self-management education programs in chronic disease: a systematic review and methodological critique of the literature. Arch Intern Med 2004;164(15):1641-49.

4. MANUAL THERAPY

4.1 Manual therapy program versus exercise therapy program for hip OA

Is manual therapy effective in reducing pain and improving function in patients with symptomatic hip osteoarthritis (OA) compared to exercise therapy? Are patients compliant to these treatment regimens and do they experience adverse effects?

Step 1: Search Results
There were no meta-analyses which reported the efficacy of manual therapy in patients with hip OA. There was one RCT which assessed the efficacy of manual therapy vs. exercise therapy in patients with hip OA: Hoeksma (2004).

Intervention description: Subjects in both the manual therapy program and the exercise therapy program attended 25-minute sessions twice a week for a total of 9 treatments. Manual therapy consists of manipulation and stretching with the aim of improving the elasticity of the joint capsule and surrounding muscles. Each manual therapy session began with 10 to 15 minutes of stretching of shortened muscles. Manipulation was then performed using a traction manipulation technique.
The exercise therapy program was tailored to each individual participant's needs. The 4 main treatment goals were 1) increase of muscle function through muscle strengthening exercises using weight or strengthening equipment; endurance by treadmill walking of cycling on a home trainer; and coordination by walking and balancing exercises; 2) improvement of range of joint motion by motions that go beyond the daily activity range of motion and stretching; 3) decrease of pain through active joint and stretching exercises as well as second and third degree traction; 4) improvement of walking ability through specific walking exercises to adjust gait pattern, use of walking aids, and stair-climbing instruction.

In both groups, participants also received education and advice on the load ability of the hip joint and increasing their physical activity. The exercise group received additional instruction for home exercise, based on the specific exercises performed during the treatment session.

Further details about the treatment programs are described on the pages following the results.

Step 2: GRADE Summary of findings

Manual therapy compared to exercise therapy for hip OA

Patient or population: patients with hip OA
Intervention: manual therapy
Comparison: exercise therapy

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **exercise therapy**	Corresponding risk **manual therapy**					
Benefits							
Pain at rest VAS. Scale from: 0 to 100. Follow-up: 5 weeks	35%	54% (38% to 69%)[1]	19%	1.54	103 (1 study)	⊕⊕⊕⊕ high[2]	5 (3 to 27)
Physical function SF-36 Scale from: 0 to 100. Follow-up: 5 weeks	35%	39% (26% to 55%)[1]	4%	1.11	103 (1 study)	⊕⊕⊕O moderate [2,3]	Not statistically significant
Pain at rest VAS. Scale from: 0 to 100. Follow-up: 29 weeks	40%	50% (34% to 66%)[4]	10%	1.25	89 (1 study)	⊕⊕⊕O moderate [2,3]	Not statistically significant
Physical function SF-36 Scale from: 0 to 100. Follow-up: 29 weeks	35%	45% (29% to 62%)[4]	10%	1.29	88 (1 study)	⊕⊕⊕O moderate [2,3]	Not statistically significant
Harms							
Lack of adherence number of patients who prematurely discontinued the treatment programs Follow-up: 5 weeks	6%	7% (2% to 31%)	1%	1.26 (0.30 to 5.37)	109 (1 study)	⊕⊕⊕O moderate [2,3]	Not statistically significant
Adverse effects number of patients who discontinued the treatment programs because of increase of complaints[5]	4%	5% (1% to 31%)	1%	1.42 (0.25 to 8.16)	109 (1 study)	⊕⊕⊕O moderate [2,3]	Not statistically significant
Losses to follow-up number of patients who were lost to follow-up Follow-up: 29 weeks	17%	21% (10% to 47%)	4%	1.26 (0.58 to 2.75)	109 (1 study)	⊕⊕⊕O moderate [2,3]	Not statistically significant

[1] This SMD was calculated with RevMan 5 with the end-of-study data at the end of the treatment period (5-weeks).

[2] This trial was a single-blind study. The authors mention that it was not possible to blind either patients or therapists for the allocated treatment. Therefore, extra attention was given to the blinding of the outcome assessor. A placebo effect may also be present in this study due to the nature of the interventions. Finally, a limitation of the study is the relatively large number of patients who received total hip arthroplasty during the follow-up period. However, no significant differences were found between the conclusions based on the intention-to-treat analysis and the per-protocol analysis. The quality of the study was not downgraded because of these reasons.
[3] The confidence interval ranges from not being clinically significant to a very large clinical effect, which is a sign of imprecision.
[4] This SMD was calculated with RevMan 5 with the end-of-study data at 29 weeks of follow-up.
[5] In the exercise program, one patient also discontinued treatment because of cardiorespiratory disease.

Visual Summary of Findings Table
Manual therapy compared to exercise therapy for hip OA

Chance: Improving pain at rest after 5 weeks		
NNT: 5		
😐	46 people out of 100 don't improve with either treatment	
☺	35 people out of 100 improve with either treatment	
☺.	**19 more people** out of 100 improve with manual therapy	
Chance: Improving pain at rest after 29 weeks		
NNT: n/a		**Not statistically significant**
😐	50 people out of 100 don't improve with either treatment	
☺	40 people out of 100 improve with either treatment	
☺	**10 more people** out of 100 improve with manual therapy	
Chance: Improving function after 5 weeks		
NNT: n/a		**Not statistically significant**
😐	61 people out of 100 don't improve with either treatment	
☺	35 people out of 100 improve with either treatment	
☺.	**4 more people** out of 100 improve with manual therapy	
Chance: Improving function after 29 weeks		
NNT: n/a		**Not statistically significant**
😐	55 people out of 100 don't improve with either treatment	

	35 people out of 100 improve with either treatment	
	10 more people out of 100 improve with manual therapy	
Chance: Lack of adherence; discontinuation of therapy after 5 weeks		
NNH: n/a		
	93 people out of 100 continued with either treatment	**Not significantly significant**
	6 people discontinued the study with either treatment	
	1 more person discontinued the study while taking manual therapy	
Chance: Adverse effects		
NNH: n/a		
	95 people out of 100 completed either treatment because of complaints about the therapy they received.	**Not significantly significant**
	4 people out of 100 dropped out of either treatment because of complaints about the therapy they received.	
	1 more person out of 100 dropped out of manual therapy because of complaints about the therapy.	
Chance: Loss to follow-up (people who did not complete the study)		
NNH: n/a		
	79 people out of 100 completed the study with either therapy	**Not significantly significant**
	17 people out of 100 did not complete the study with either therapy	
	4 more people out of 100 did not complete the study when taking part in manual therapy	

Step 3: GRADE Evidence profile
See Table 4 a: Manual therapy program versus exercise therapy program for hip OA

Step 4: Other recommendations

Group	Recommendation
AAOS	N/A No recommendations for hip.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, *insoles*, knee bracing) and weight reduction.
OARSI	Optimal management of OA requires a combination of non-pharmacological and pharmacological modalities.

Step 5: GRADE Recommendation

References

Hoeksma HL, Dekker J, Ronday HK et al. Comparison of manual therapy and exercise therapy in osteoarthritis of the hip: a randomized clinical trial. Arthritis Rheum 2004; 51(5):722-9.

APPENDIX A: MANUAL THERAPY IN OSTEOARTHRITIS OF THE HIP: A PROTOCOL

Developed by the Department of Physical Therapy, Leyenburg Hospital and the Netherlands Institute for Health Services Research

Frequency of sessions and duration of episode

The duration of a session is 25 minutes. The frequency is twice a week at a total of 9 treatments.

Treatment protocol

Manual therapy (manipulation and stretching) is particularly aimed at the improvement of elasticity of the joint capsule and the surrounding muscles.

Muscle stretching. Muscle stretching is an integrated part of the manual therapy program. Each session starts with stretching of shortened muscles. The following muscle (groups) are stretched: m. iliopsoas, m. quadriceps femoris, m. tensor fascia latae, m. sartorius, m.m. adductors and m. gracilis (1). Starting posture is a supine position. The patient has to experience a stretching sensation. Actual stretching is applied for 8 to 10 seconds. Repeat stretching of each muscle (group) 2 times. Total time: 10–15 minutes.

Manipulation. Manipulation is performed according to a traction manipulation technique (2). The therapist's hands are placed just above the ankle joint. All manipulations are performed in slight abduction to avoid slamming of the femoral head into the acetabular surface. The first traction manipulation is performed in the maximum loosed packed position of the hip joint (2). With each following manipulation, the hip joint is placed in a more limited position (which differs per patient). In total, a maximum of 5 manipulations can be applied. The final manipulation is performed in the most limited position of the hip joint. In between manipulations, active assisted motions of the hip joint are performed for relaxation.

To evaluate the success of manipulation, after each manipulation "end feel" of the hip joint is tested using a

traction test and by passive hip flexion. This is compared with the contralateral hip. When end feel of the treated hip is similar to the contralateral hip, optimal result is concluded.

Patient education and advice. The promotion of physical activities in general is of importance. Main goal is to couple improvement in joint function with physical activities, such as walking, cycling, and swimming. Furthermore, instruction about load ability of the hip joint has to be provided.

Appendix References

1. Evjenth O, Hamberg J. Autostretching: the complete manual of specific stretching. Chattanooga (TN): Chattanooga Corp.; 1991.
2. Cyriax JH. Illustrated manual of orthopedic medicine. 2nd ed. London: Butterworth-Heinemann Medical; 1996.

APPENDIX B: EXERCISE THERAPY IN OSTEOARTHRITIS OF THE HIP: A PROTOCOL

Developed by the Department of Physical Therapy, Leyenburg Hospital and the Netherlands Institute for Health Services Research

Introduction

This is a summary of the exercise protocol. The protocol is an adaptation of the protocol of Van Baar et al (1). In addition, the book of Evjenth and Hamberg is followed on muscle stretching techniques (2). All participating physical therapists are instructed in training sessions. These training sessions will be repeated every 3 months.

Frequency of sessions and duration of episode

The duration of a session is 25 minutes. The frequency is twice a week at a total of 9 treatments.

Treatment protocol

The exercise program is tailored to the individual patient's needs by the therapist. The first session is used to compile exercise therapy treatment goals by questioning, physical examination, and observation of walking ability. It is of great importance to identify specific impairments and disabilities that are of high priority to the patient.

There are 4 main treatment goals on which exercise therapy focuses: 1) increase of muscle function, including endurance, strength, and coordination; 2) improvement of range of motion; 3) decrease of pain; and 4) improvement of walking ability. Furthermore, education and advice need to be provided to the patient.

Muscle function. Mainly active exercises have to be applied to improve muscle function. Exercises consist of muscle strengthening exercises with the use of weight or strengthening equipment. Endurance is trained by walking on a treadmill or cycling on a home trainer. Finally, coordination is trained through walking exercises with increased complexity and through balancing exercises.

Range of motion. If regarded necessary, range of joint motion can be increased through both passive and active exercises. Active exercises should have the upper hand.

Active exercises consist of 3-dimensional motions of the hip joint that go beyond the range of joint motion that most patients use in activities of daily living. These exercises can be performed in weight-bearing and non–weight-bearing positions. In addition, these exercises can be applied in different positions, such as during standing, sitting on a chair, and while lying down.

Passive exercises contain passive movement of the hip and stretching exercises according to Evjenth and Hamberg. Postures and starting positions for stretching exercises can be found in the book of Evjenth and Hamberg (2).

Pain. If regarded necessary, exercises for pain relief can be applied. Pain relief is also achieved through active joint motion exercises and through stretching exercises. In addition, second and third degree traction in the maximum loosed packed position of the hip can be applied (2).

Walking ability. Walking ability is trained by specific walking exercises with adjustment of gait pattern, use of walking aids, and instruction on climbing of stairs.

Patient education, advice, and home exercises. The promotion of exercise in general is of great importance; such activities as walking, cycling, and swimming are recommended. Concerning home management and social activities, these are specifically focused to take an active approach to pain, instead of taking rest and sitting down. Avoidance of prolonged static load and instruction on load ability of the hip should be emphasized. Instructions for home exercises, derived from the specific exercises as performed during the treatment sessions, are provided.

Appendix References

1. Van Baar ME, Assendelft WJ, Dekker J, Oostendorp RA, Bijlsma JW. The effectiveness of exercise therapy in patients with osteoarthritis of the hip or knee: a randomized clinical trial. J Rheumatol 1998;25:2432–9.
2. Evjenth O, Hamberg J. Autostretching: the complete manual of specific stretching. Chattanooga (TN): Chattanooga Corp.; 1991.

4.2 Manual therapy in combination with supervised exercise and home exercise program versus home exercise program alone for knee OA

Is individualized manual therapy in combination with supervised exercise and home exercise program effective in reducing pain and improving function in patients with symptomatic knee OA compared to home exercise program? Are patients compliant to these treatment regimens?

Step 1: Search Results

There were no meta-analyses which reported the efficacy of manual therapy in patients with knee OA. A few RCTs assessed the efficacy of manual therapy specifically in patients with knee OA but most had limitations (sample size smaller than 50 participants) or used manual therapy in combination with other modalities such as taping and massage, making it difficult to evaluate its efficacy. We chose the only RCT conducted in patients with knee OA which assessed the efficacy of manual therapy in combination with supervised exercises, the treatment combination deemed the most used in clinical practice by our team of experts: Deyle (2005). We contacted the authors in order to report results for the pain and function subscales of the WOMAC since only the total WOMAC score was reported in their publication. The treatment programs used in this study are described following the results.

Intervention description: Subjects in the clinic treatment group attended 8 treatment sessions over a 4 week period in the physical therapy clinic. Manual therapy programs were individualized based on the results of the examination. The manual therapy techniques, consisting of passive physiological and accessory movements, muscle stretching, and soft tissue mobilization, were applied by the treating physical therapist primarily to the knee and surrounding structures. In addition to receiving manual therapy treatments, subjects in the clinic treatment group performed a standardized knee exercise program at each treatment session. This program consisted of active ROM exercises, muscle strengthening, muscle stretching, and riding a stationary bicycle. A physical therapist or physical therapy technician supervised these exercises. The number of strengthening exercise bouts and stationary bicycle riding time were increased or decreased by the treating physical therapist based on subject response. Subjects in the clinic treatment group performed the same home exercise program as the home exercise group each day that they were not treated in the physical therapy clinic.

Step 2: GRADE Summary of findings

Manual therapy in combination with supervised exercise and home exercise program compared to home exercise for knee OA

Patient or population: patients with knee OA
Intervention: manual therapy in combination with supervised exercise and home exercise program
Comparison: home exercise

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **Home exercise**	Corresponding risk **Manual therapy + supervised exercise and home exercise program**					
Benefits							
Pain WOMAC. Scale from: 0 to 500. Follow-up: 8 weeks	37%	53% (39% to 67%)	16%	1.43	120 (1 study[2])	⊕⊕⊕⊕ high[1]	6 (3 to 43)
Function WOMAC. Scale from: 0 to 1700. Follow-up: 8 weeks	37%	52% (38% to 66%)	15%	1.41	120 (1 study)	⊕⊕⊕⊕ high	6 (3 to 70)
Harms							
Safety				**Not reported**			
Discontinuations due to lack of adherence number of patients who discontinued due to lack of adherence to the treatment regimen (whether subjects attended all clinical appointments and reported for testing at 0, 4 and 8 weeks). Follow-up: 8 weeks	0%	0%	0%	0	120 (1 study)	⊕⊕⊕⊕ high	Not statistically significant
Withdrawals people who withdrew from the study after randomization. Follow-up: 8 weeks	12 %[3]	9% (3% to 25%)[4]	-3%	0.77 (0.28 to 2.11)	134 (1 study)	⊕⊕⊕O moderate[5]	Not statistically significant

[1] The authors report that the intention to treat results with 134 subjects did not differ substantially from the results of the 120 subjects.
[2] Another outcome reported by the author was the use of medications for OA by patients at 52 weeks. Use of medications for OA was higher in the home exercise group (68%) than the clinic treatment group (48%) and this difference was statistically significant (p=0.03).
[3] In the control group, withdrawals were due to: knee injections (1), changed medications (1), shoulder surgery (1), not willing to return (2) and moved from area (3).
[4] In the treatment group, withdrawals were due to: knee injections (2), changed medications (1), not willing to return (1), not willing to walk (1) and unrelated medical condition (1).
[5] The confidence interval ranges from not being clinically significant to a very large clinical effect, which is a sign of imprecision.

Visual Summary of Findings Table
Manual therapy in combination with supervised exercise and home exercise program compared to home exercise for knee OA

Chance: Improving pain after 8 weeks	
NNT: 6	
47 people out of 100 don't improve with either treatment	
37 people out of 100 improve with either treatment	
16 more people out of 100 improve with manual therapy in combination with a supervised exercise and home exercise program	
Chance: Improving function after 8 weeks	
NNT: 6	
48 people out of 100 don't improve with either treatment.	
37 people out of 100 improve with either treatment	
15 more people out of 100 improve with manual therapy in combination with a supervised exercise and home exercise program.	
Chance: Lack of adherence; discontinuation of therapy after 8 weeks	
NNH: n/a	**Not significantly significant**
100 people out of 100 completed either treatment	
0 people out of 100 dropped out of either treatment	
0 more people out of 100 dropped out of the manual therapy in combination with a supervised exercise and home exercise program	
Chance: Withdrawals from the trial after 8 weeks	
NNH: n/a	**Not significantly significant**
88 people out of 100 did not drop out of either treatment	
9 people out of 100 dropped out of either treatment	

☹	**3 more people** out of 100 dropped out of the home exercise program.	
Safety		
NNH: n/a		**Not reported**

Step 3: GRADE Evidence profile

See Table 4 b: Manual therapy in combination with supervised exercise and home exercise program versus home exercise program alone for knee OA

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	No recommendations for manual therapy.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, *insoles*, knee bracing) and weight reduction.
OARSI	Optimal management of OA requires a combination of non-pharmacological and pharmacological modalities.

Step 5: GRADE Recommendation

References

Deyle GD, Allison SC, Matekel RL et al. Physical therapy treatment effectiveness for osteoarthritis of the knee: a randomized comparison of supervised clinical exercise and manual therapy procedures versus a home exercise program. Phys Ther 2005;85(12):1301-17.

Description of the treatment programs:

Subjects in the clinic treatment group attended 8 treatment sessions over a 4 week period in the physical therapy clinic. Manual therapy programs were individualized based on the results of the examination. The manual therapy techniques, consisting of passive physiological and accessory movements, muscle stretching, and soft tissue mobilization, were applied by the treating physical therapist primarily to the knee and surrounding structures. In addition to receiving manual therapy treatments, subjects in the clinic treatment group performed a standardized knee exercise program at each treatment session. This program consisted of active ROM exercises, muscle strengthening, muscle stretching, and riding a stationary bicycle. A physical therapist or physical therapy technician supervised these exercises. The number of strengthening exercise bouts and stationary bicycle riding time were increased or decreased by the treating physical therapist based on subject response. Subjects in the clinic treatment group performed the

same home exercise program as the home exercise group each day that they were not treated in the physical therapy clinic.

The home exercise group received detailed verbal and hands-on instruction in a home-based program of the same exercises as the clinical treatment group. Similar to the subjects who received clinical treatment, subjects in the home exercise group were instructed that pain should be avoided in all exercises except in the case that pain or stiffness decreased with each repetition. Each subject received a detailed supporting handout containing instructions and photographs of the exercises. Subjects in the home exercise group were allowed to ride a stationary bicycle if they stated that riding a bicycle was currently part of their exercise routine or if they could not walk for safety reasons. A follow-up examination was performed for the home exercise group 2 weeks after the initial visit.

Table 1.
Comparison of Interventions by Intervention Group

Clinical Treatment Group Interventions	Performance	Home Exercise Group Interventions	Performance
Strengthening exercise	Clinic and home	Strengthening exercise	Home
Stretching exercise		Stretching exercise	
ROM exercise		ROM exercise	
Stationary bicycle[a]		Stationary bicycle[a]	
Manual therapy	Clinic	No manual therapy	
Level of exercise supervision and instruction	1 exercise instruction session 7 supervised exercise sessions	Level of exercise supervision and instruction	2 exercise instruction sessions

[a] Home stationary bicycle riding in both exercise groups was allowed if it was part of the participant's exercise program before the study. Participants in the home exercise group were not specifically instructed to ride a stationary bicycle, nor was it recorded on the exercise adherence log. ROM=range of motion.

5. PSYCHOSOCIAL INTERVENTIONS

Are psychosocial interventions effective in reducing pain and improving function in patients with symptomatic knee OA compared to usual care?

Step 1: Search Results
The chosen evidence (Dixon, 2007) constitutes the best and most recent meta-analysis found, although it pooled different psychosocial therapies without separating cognitive behavioural therapy, which constituted 70% of the interventions in the meta-analysis and did not separate patients with knee or hip OA. Other SRs were older and did not contain necessary data.

Intervention description: Program consisting of three phases: (1) education of patient; (2) skills-training in cognitive-behavioural coping skills; and (3) application to real-life situations. These are usually administered by health care professionals.

Step 2: GRADE Summary of findings

psychosocial intervention compared to no intervention for osteoarthritis of the hip and knee

Patient or population: patients with osteoarthritis of the hip and knee
Settings:
Intervention: psychosocial intervention
Comparison: no intervention

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	Absolute difference	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **no intervention**	Corresponding risk **psychosocial intervention**					
Benefits							
pain pooled different scales including AIMS and VAS (follow-up: 2-12 months)	41%	49% of those psychosocial intervention group experienced a decrease in pain (45% to 54%)	1.19	8%	1483 (8)	⊕⊕OO **low**[1,2]	10 (7 to 20)
Function (physical disability) (follow-up: 2-12 months)	41%	48% of those psychosocial intervention group experienced an increase in function (43% to 52)	1.17	7%	1483 (8^{2})	⊕⊕OO **low**[1,3]	12 (8 to 36)
Harms							
Safety	Not reported						
Withdrawals	Not reported						
Adherence	Not reported						

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is

likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] Pooled wide range of psychosocial interventions
[2] Affected joints not described therefore could not distinguish between hip, knee, and other.
[3] No description of type of scales used.
[4] Calfas 1992, Gay 2002, Keefe 2004, Keefe 1996, Keefe 1999, Keefe 1990, Keefe 1990, Lin 2003.

Visual Summary of Findings Table
Psychosocial intervention compared to no intervention for osteoarthritis of the hip and knee

Chance: Improving pain after 2-12 months	
NNT: 10	
😐	51 people out of 100 don't improve whether or not they take part in a psychosocial intervention.
☺	41 people out of 100 improve whether or not they take part in a psychosocial intervention.
☺	**8 more people** out of 100 improve with a psychosocial intervention.
Chance: Improving function after 2-12 months	
NNT: 12	
😐	52 people out of 100 don't improve whether or not they take part in a psychosocial intervention.
☺	41 people out of 100 improve whether or not they take part in a psychosocial intervention.
☺	**7 more people** out of 100 improve with a psychosocial intervention.
Chance: Withdrawls	
The number of people who left the study was not reported.	
Chance: Safety	
Safety of psychosocial interventions was not reported.	
Chance: Adherence	
Adherence to psychosocial interventions was not reported.	

Step 3: GRADE Evidence profile
See Table 5: Psychosocial intervention compared to no intervention for OA of the hip and knee

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	We suggest patients with symptomatic OA of the knee be encouraged to participate in self-management educational programs such as those conducted by the Arthritis Foundation, and incorporate activity modifications (e.g., walking instead of running; alternative activities) into their lifestyle.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	Optimal management of OA requires a combination of non-pharmacological and pharmacological modalities. 2. All patients with hip and knee OA should be given information access and education about the objectives of treatment and the importance of changes in lifestyle, exercise, pacing of activities, weight reduction, and other measures to unload the damaged joint(s). The initial focus should be on self-help and patient-driven treatments rather than on passive therapies delivered by health professionals. Subsequently emphasis should be placed on encouraging adherence to the regimen of non-pharmacological therapy.

Step 5: GRADE Recommendation

References

Dixon KE, Keefe FJ, Scipio CD, Perri LCM, Abernethy AP. Psychological interventions for arthritis for arthritis pain management in adults: a meta-analysis. Health Psychol 2007;26(3):241-50.

Lin EH, Katon W, Von Korff M, Tang L, Williams JW, Kroenke K et al. Effect of improving depression care on pain and functional outcomes among older adults with arthritis: a randomized controlled trial. JAMA 2003;290(18):2428-9.

6. WEIGHT LOSS

Is weight loss effective in reducing pain and improving function in patients with symptomatic knee OA compared to usual care and sham acupuncture?

Step 1: Search Results
We found one meta-analysis (Christensen, 2007), which pooled the results from 4 randomized controlled trials (Christensen, 2005; Messier, 2000; Messier, 2004; Toda, 1998). Toda, 1998 results were not included in this summary of findings due to the use of pharmacological intervention to achieve weight loss. [The 8 remaining publications found were single randomized controlled trials (RCTs) and were not included. These were either already included in the meta-analysis (2), did not fall under the inclusion criteria (2) or were written in a language other than English (2). It is uncertain why 2 RCTs (Fotch 2005 and Miller 2006) were not included in the meta-analysis; it is suggested thatthese RCTs were indexed after the search performed in 2006. All of the additional RCTs findings were in the same direction as those of Christensen 2007.]

Interventions description: interventions included were weight loss interventions using CBT, nutrition, and/or exercise approaches and excluded pharmacological interventions

Step 2: GRADE Summary of findings

weight loss compared to control (no weight loss program) for knee OA

Patient or population: patients with knee osteoarthritis
Settings:
Intervention: weight loss
Comparison: control (no weight loss program)

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	Absolute difference	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **Control (no weight loss)**	Corresponding risk **Weight loss**					
Benefits							
pain WOMAC 500mm. Scale from: 0 to 500. (follow-up: 8-24 weeks)	36%	44% of those in weight loss group experienced a decrease in pain (37% to 52%)	1.2	7.8%	416 (2^{2})	⊕⊕⊕O **moderate**[1]	11 (not estimable)
function WOMAC 1700mm. Scale from: 0 to 1700.	34%	43% (36% to 50%)	1.26	9%	416 (2^{2})	⊕⊕⊕O **moderate**[1]	9 (5 to 52)

(follow-up: mean 8-24 weeks)	
	Harms – no harms were reported
safety	Not reported
withdrawals	Not reported
adherence	Not reported
	*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI). CI: Confidence interval;
	GRADE Working Group grades of evidence **High quality:** Further research is very unlikely to change our confidence in the estimate of effect. **Moderate quality:** Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. **Low quality:** Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate. **Very low quality:** We are very uncertain about the estimate.
	[1] Christensen 2005 used only low-energy diet whereas Messier 2000 used exercise and diet intervention. Length of follow-up also varied (8-24 weeks). [2] Christensen 2005, Messier 2000

Visual Summary of findings figure:
Weight loss compared to control (no weight loss program) for knee osteoarthritis

Chance: Improving pain after between 8 and 24 weeks	
NNT: 11	
😐	56 people out of 100 don't improve with or without a weight loss program
☺	36 people out of 100 improve with or without a weight loss program
☺	**8 more people** out of 100 improve with participation in a weight loss program
Chance: Improving function after between 8 and 24 weeks	
NNT: 9	
😐	57 people out of 100 don't improve with or without a weight loss program
☺	34 people out of 100 improve with or without participating in a weight loss program
☺	**9 more people** out of 100 improve with participation in a weight loss program
Chance: Harms	
Safety, adherence and the number of people who withdrew were not reported in the SR.	

Step 3: GRADE Evidence profile
See Table 6: Weight loss compared to control (no weight loss program) for knee OA

Step 4: Other recommendations

Group	Recommendation
AAOS - knee	We recommend patients with symptomatic OA of the knee, who are overweight (as defined by a BMI>25), should be encouraged to lose weight (a minimum of five percent (5%) of body weight) and maintain their weight at a lower level with an appropriate program of dietary modification and exercise.
EULAR - knee	Non-pharmacological treatment of knee OA should include regular education, exercise, appliances (sticks, insoles) and weight reduction if obese or overweight.
EULAR – hip	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, knee bracing) and weight reduction.
OARSI	All patients with hip and knee OA should be given information access and education about the objectives of treatment and the importance of changes in lifestyle, exercise, pacing of activities**, weight reduction,** and other measures to unload the damaged joint(s). The initial focus should be on self-help and patient-driven treatments rather than on passive therapies delivered by health professionals. Subsequently emphasis should be placed on encouraging adherence to the regimen of non-pharmacological therapy.

Step 5: GRADE Recommendation

References

Christensen R, Bartels EM, Astrup A, Bliddal H. Effect of weight reduction in obese patients diagnosed with knee osteoarthritis: a systematic review and meta-analysis. Ann Rheum Dis 2007;66(4): 433-9.

Toda Y, Toda T, Takemura S, Wada T, Morimoto T, Ogawa R. Change in body fat, but not body weight or metabolic correlates of obesity, is related to symptomatic relief of obese patients with knee osteoarthritis after a weight control program. J Rheumatol 1998; 25(11):2181–6.

Messier SP, Loeser RF, Mitchell MN, Valle G, Morgan TP, Rejeski WJ, et al. Exercise and weight loss in obese older adults with knee osteoarthritis: a preliminary study. J Am Geriatr Soc 2000;48(9):1062–72.

Messier SP, Loeser RF, Miller GD, Morgan TM, Rejeski WJ, Sevick MA, et al. Exercise and dietary weight loss in overweight and obese older adults with knee osteoarthritis: the Arthritis, Diet, and Activity Promotion Trial. Arthritis Rheum 2004;50(5):1501–10.

Christensen R, Astrup A, Bliddal H. Weight loss: the treatment of choice for knee osteoarthritis? A randomized trial. Osteoarthritis Cartilage 2005;13(1):20–7.

7. BRACES

7.1 Braces and medical (conservative) treatment versus medical (conservative) treatment in knee OA

Are braces and conservative treatment effective in reducing pain and improving function in patients with symptomatic uni-compartmental knee osteoarthritis (OA) and a mal-alignment compared to conservative treatment alone?

Step 1: Search Results
The most recent systematic review (SR) was the one by Brouwer, 2008 which reported one RCT conducted by the same author in 2006 and one by Kirkley in 1999. The RCT conducted by Kirkley in 1999 showed different results than the RCT by Brouwer (2006), thus we decided to display the results from both studies in the present document (section 1a and 1b).

For part 1a, we found the results reported in the SR are not the same as the ones in the Brouwer 2006 RCT so we contacted the authors. The authors mentioned that the RCT reported results stemming from an analysis which forwarded last measurements available for subjects who were lost to follow-up or for whom data were incomplete. Results in the RCT were also adjusted for baseline characteristics which were not similar. The authors recommended that we report the data from the RCT.

Intervention description: The conservative treatment was identical in both groups and consisted of standard care: i.e., patient education (adaptation of activities and/or weight loss), and (if needed) physical therapy and analgesics. In the intervention group patients were fitted with a knee brace (OAsys brace, Innovation Sports, Irvine, CA, USA); this brace is commercially available for right/left leg in four sizes. The brace consists of a thigh shell and a calf shell (both of carbon fiber) connected by titanium hinges on the medial and lateral sides. The adjustable slide bar on the medial side of the brace provides

valgisation (1 to 12.5 degrees) with medial unloading, or varisation (1 to 10 degrees) with lateral unloading. The degree of varisation or valgisation depends on the degree of malalignment and the acceptance of the patient (extensive correction will cause pressure ulcers). A specialized orthopedic technician applied the brace and gave instructions to the patients. During the follow-up this specialized orthopedic technician was present at the orthopedic outpatient department. If necessary, the brace was adjusted during the follow-up visits.

Step 2: GRADE Summary of findings

Brace and standard conservative treatment compared to standard conservative treatment only for knee OA

Patient or population: patients with knee OA
Intervention: brace and standard conservative treatment
Comparison: standard conservative treatment only

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk	Corresponding risk					
	standard conservative treatment only	**Brace and standard conservative treatment**					
Benefits							
Pain VAS. Scale from: 0 to 10. Follow-up: 6 months	38%	43% (36% to 50%)[2]	5%	1.13	117 (1 study) [1]	⊕⊕⊕O moderate [3,4]	Not statistically significant
Knee function Hospital for Special Surgery Score (HSS). Scale from: 0 to 100. Follow-up: 6 months	24%	28% (23% to 35%)[2]	4%	1.17	117 (1 study) [1]	⊕⊕⊕O moderate [3,4]	Not statistically significant
Harms							
Withdrawal from treatment due to adverse events number of patients who stopped the treatment due to adverse events Follow-up: 12 months	7%[5]	0%	-7%	8.56 (0.47 to 155.45)	117 (1 study) [1]	⊕⊕OO low [3,4,6]	Not statistically significant
Withdrawals from treatment number of patients who stopped the treatment after randomization Follow-up: 12 months	25%	42% (24% to 72%)[7]	17%	1.70 (0.98 to 2.92)	117 (1 study) [1]	⊕⊕OO low [3,4,6]	Not statistically significant
Adherence	Not reported						

[1] The SR by Brouwer (2008) reported one trial by the same authors (Brouwer, 2006).

[2] We calculated the SMD using the mean difference and confidence interval between groups with RevMan. The MD was adjusted by the authors for baseline values for age, gender, BMI, duration of complaints, severity of knee OA, pain severity, knee function, walking distance, medication and quality of life since these characteristics were not similar at baseline.
[3] The trial (Brouwer, 2006) did not blind the outcome assessors, the care providers nor the patients. Outcomes of interest were not similar at baseline.
[4] The authors of the meta-analysis conducted the present study, which may lead to a potential conflict of interest. The quality was not downgraded because of this.
[5] Adverse events include skin irritation (n=2) and bad fit (n=2).
[6] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[7] Patients stopped treatment mostly because of lack of effectiveness (n=15).

[1. a]

Visual Summary of Findings Table

Brace and standard conservative treatment compared to standard conservative treatment only for knee OA

Chance: Improving pain after 6 months		
NNT: n/a		**Not statistically significant**
😐	57 people out of 100 don't improve whether they use a brace or not.	
🙂	38 people out of 100 improve whether they use a brace or not.	
🙂	**5 more people** out of 100 improve with a brace.	
Chance: Withdrawals due to treatment after 12 months		
NNH: n/a		**Not statistically significant**
😐	93 people out of 100 did not leave the study due to adverse events whether they use a brace or not.	
☹	7 people out of 100 left the study due to adverse events whether they use a brace or not.	
☹	**No more** people out of 100 left the study when they used a brace.	
Chance: Withdrawals due to any reason after 12 months		
NNH: n/a		**Not statistically significant**
😐	58 people out of 100 did not leave the study whether they use a brace or not..	
☹	25 people out of 100 left the study whether they use a brace or not.	
☹	**17 more** people out of 100 left the study when they used a brace.	

Chance: Adherence
Adherence to using a brace was not reported.

Step 3: GRADE Evidence profile

See Table 7 a: Braces and medical (conservative) treatment versus medical (conservative) treatment

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	● We are unable to recommend for or against the use of a brace with a *valgus* directing force for patients with medial uni-compartmental OA of the knee. ● We are unable to recommend for or against the use of a brace with a *varus* directing force for patients with lateral uni-compartmental OA of the knee. ● We suggest patients with symptomatic OA of the knee use patellar taping for short term relief of pain and improvement in function.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, *knee bracing*) and weight reduction.
OARSI	In patients with knee OA and mild/moderate *varus* or *valgus* instability, a knee brace can reduce pain, improve stability and diminish the risk of falling.

Step 5: GRADE Recommendation

References

Brouwer RW, Jakma TS, Verhagen AP, Verhaar JA, Bierma-Zeinstra SM. Braces and orthoses for treating osteoarthritis of the knee. Cochrane Database of Syst Rev 2005;(1):CD004020.

Brouwer RW, van Raaij TM, Verhaar JA, Coene LN, Bierma-Zeinstra SM. Brace treatment for osteoarthritis of the knee: a prospective randomized multi-centre trial. Osteoarthritis Cartilage 2006;14(8):777.

7.2 Braces with medical (conservative) treatment versus medical (conservative) treatment alone in knee OA

Are braces in addition to medical treatment effective in reducing pain and improving function in patients with varus gonarthrosis compared to medical treatment alone?

Step 1: Search Results
Since an RCT conducted by Kirkley in 1999 showed different results than the RCT by Brouwer (2006), we decided to display the results from both studies in the present document (section 1a and 1b). The results shown in the present table were computed using the data sent to our research team by Dr. Brouwer, who had recently received it from the Kirkley Research Group but did not have time to report it in his systematic review.

Intervention description: The treatment that was provided in the medical treatment group represents the standard medical management of patients who have osteoarthritis of the knee. These patients were given an educational pamphlet on osteoarthritis, which described the pathological characteristics of the disease, how the diagnosis is determined, methods of coping, and the medical treatments available; instructions to use plain acetaminophen on an as-needed basis for relief of pain; and instructions on a home program to maintain flexibility. The regimen did not include formal physiotherapy. Patients who were taking nonsteroidal anti-inflammatory drugs at the time of presentation were asked to continue taking these medications as they had previously. All patients were asked to keep a diary about any medication that they used during the course of the trial. The patients in the unloader brace group had the same medical treatment as the control group, but they also were fitted with a Generation II valgus-producing functional knee (unloader) brace (Generation II Orthotics, Richmond, British Columbia, Canada). The brace is custom-made and consists of a polyethylene thigh shell connected to a polyethylene calf shell through a polyaxial hinge on the medial side. The hinge was

altered with use of a calibrated apparatus to allow application of a 4-degree increase in valgus in the anteroposterior plane. The patients were instructed to wear the brace while they were awake for activities that had been troublesome to them in the past and to keep a diary about their use of the brace.

Step 2: GRADE Summary of findings

Brace and medical treatment compared to medical treatment for knee OA

Patient or population: patients with knee OA
Intervention: brace and medical treatment
Comparison: medical treatment

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **Medical treatment**	Corresponding risk **brace and medical treatment**					
Benefits							
Pain WOMAC pain. Scale from: 0 to 500. Follow-up: 6 months	29%	64% (45% to 80%)[1]	35%	2.21	74 (1 study)	⊕⊕⊕O moderate[2]	3 (2 to 6)
Function WOMAC function. Scale from: 0 to 1700. Follow-up: 6 months	29%	58% (39% to 75%)[1]	29%	2	74 (1 study)	⊕⊕⊕O moderate[2]	3 (2 to 8)
Harms							
Withdrawals number of patients who withdrew from the study after randomization Follow-up: 6 months	18%	0% (0% to 19%)	-18%	0.07 (0.00 to 1.10)[3]	81 (1 study)	⊕⊕⊕O moderate[2]	Not statistically significant
Safety	Not reported						
Adherence	Not reported						

[1] The results shown in the present table were computed using the data sent to our research team by Dr. Brouwer who had recently received it from the Kirkley Research Group but did not have time to report it in his systematic review.
[2] Blinding of patients and assessors as well as intention-to-treat analyses were not mentioned in this study.
[3] We calculated this relative risk using Rev Man 5. Reasons for withdrawals include: dissatisfaction with the group to which they had been randomized (n=5), inability to attend appointments (n=2), ill health (n=1) and a change in a scheduled date for an operation (n=1).

[1. b]
Visual Summary of Findings Table
Brace and medical treatment compared to medical treatment for knee OA

Chance: Improving pain after 6 months	
NNT: 3	
😐 36 people out of 100 don't improve whether they use a brace or not.	
🙂 29 people out of 100 improve whether they use a brace or not.	
🙂 **35 more people** out of 100 improve with a brace.	
Chance: Improving function after 6 months	
NNT: 3	
😐 42 people out of 100 don't improve whether they use a brace or not.	
🙂 29 people out of 100 improve whether they use a brace or not.	
🙂 **29 more people** out of 100 improve with a brace.	
Chance: Withdrawals after 6 months	
NNH: n/a	**Not statistically significant**
😐 82 people out of 100 did not leave the study whether they use a brace or not.	
☹ 18 people out of 100 left the study whether they use a brace or not.	
☹ **No more** people out of 100 left the study when they used a brace.	
Chance: Safety	
Safety of using a brace was not reported	
Chance: Adherence	
Adherence to using a brace was not reported.	

Step 3: GRADE Evidence profile
See Table 7 b: Braces with medical (conservative) treatment versus medical (conservative) treatment alone

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	● We are unable to recommend for or against the use of a brace with a *valgus* directing force for patients with medial uni-compartmental OA of the knee. ● We are unable to recommend for or against the use of a brace with a *varus* directing force for patients with lateral uni-compartmental OA of the knee. ● We suggest patients with symptomatic OA of the knee use patellar taping for short term relief of pain and improvement in function.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, *knee bracing*) and weight reduction.
OARSI	In patients with knee OA and mild/moderate *varus* or *valgus* instability, a knee brace can reduce pain, improve stability and diminish the risk of falling.

Step 5: GRADE Recommendation

References

Kirkley A, Webster-Bogaert S, Litchfield R et al. The effect of bracing on varus gonarthrosis. J Bone Joint Surg Am 1999;81(4):539-48.

7.3 Braces and medical treatment versus neoprene sleeve with medical treatment in knee OA

Are braces in addition to medical treatment effective in reducing pain and improving function in patients with varus gonarthrosis compared to a neoprene sleeve combined with medical treatment?

Step 1: Search Results

The most recent SR on braces for knee OA was the one by Brouwer, 2008 which reported one RCT for braces versus neoprene sleeve conducted by Kirkley (1999). The results shown in the present table were computed using the data sent to our research team by Dr. Brouwer who had recently received it from the Kirkley Research Group but did not have time to report it in his systematic review.

Intervention description: Patients in the neoprene-sleeve group were directed to use the neoprene sleeve while they were awake for activities that had been troublesome to them in the past. Patients in the unloader-brace group were fitted with a Generation II valgus-producing functional knee brace. The brace is custom-made and consists of a polyethylene calf shell through a polyaxial hinge on the medial side. The hinge was altered with use of a calibrated apparatus to allow application of a 4-degree increase in valgus in the anteroposterior plane. Patients were instructed to wear the brace in the same way as the other group. The length of the treatment program was not clearly stated in the article. However, given there was a 6-month follow-up assessment, we assumed participants received treatment for that length of time.

Step 2: GRADE Summary of findings

Brace and medical treatment compared to neoprene sleeve and medical treatment for knee OA

Patient or population: patients with knee OA
Intervention: brace and medical treatment
Comparison: neoprene sleeve and medical treatment

Outcomes	Illustrative comparative risks* (95% CI)		Absolute effect	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk	Corresponding risk					
	neoprene sleeve and medical treatment	**brace and medical treatment**					
Benefits							
Pain WOMAC pain. Scale from: 0 to 500. Follow-up: 6 months	30%	47% (30% to 65%)[1]	17%	1.57	77 (1 study)	⊕⊕OO low[2,3]	Not statistically significant
Function WOMAC function. Scale from: 0 to 1700. Follow-up: 6 months	31%	45% (28% to 62%)[1]	14%	1.45	77 (1 study)	⊕⊕OO low[2,3]	Not statistically significant
Harms							
Withdrawals number of patients who withdrew from the study after randomization Follow-up: 6 months	5%	0% (0% to 20%)	-5%	0.19 (0.01 to 3.75)[4]	79 (1 study)	⊕⊕OO low[2,3]	Not statistically significant
Safety				Not reported			
Adherence				Not reported			

[1] The results shown in the present table were computed using the data sent to our research team by Dr. Brouwer who had recently received it from the Kirkley Research Group but did not have time to report it to his systematic review.
[2] Blinding of patients and assessors as well as intention-to-treat analyses were not mentioned in this study.
[3] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[4] We calculated this relative risk using Rev Man 5. Reasons for withdrawals for the 7 withdrawals in the control group and the 2 from the neoprene sleeve group include: dissatisfaction with the group to which they had been randomized (n=5), inability to attend appointments (n=2), ill health (n=1) and a change in a scheduled date for an operation (n=1) in the three treatment groups (brace, medical treatment and neoprene sleeve).

Step 3: GRADE Evidence profile

See Table 7 c: Braces and medical treatment versus neoprene sleeve with medical treatment

[1. c]

Visual Summary of Findings Table

Brace and medical treatment compared to neoprene sleeve and medical treatment for knee OA

Chance: Improving pain after 6 months		
NNT: 3		**Not statistically significant**
😐	53 people out of 100 don't improve with either treatment	
🙂	30 people out of 100 improve with either treatment	
🙂	**17 more people** out of 100 improve with a brace and medical treatment	
Chance: Improving function after 6 months		
NNT: 3		**Not statistically significant**
😐	55 people out of 100 don't improve with either treatment	
🙂	31 people out of 100 improve with either treatment	
🙂	**14 more people** out of 100 improve with a brace and medical treatment.	
Chance: Withdrawals after 6 months		
NNH: n/a		**Not statistically significant**
😐	95 people out of 100 did not leave the study with either treatment	
☹	5 people out of 100 left the study with either treatment.	

No more people out of 100 left the study with a brace and medical treatment	
Chance: Safety	
Safety of using a brace and medical treatment was not reported	
Chance: Adherence	
Adherence to using a brace and medical treatment was not reported.	

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	● We are unable to recommend for or against the use of a brace with a *valgus* directing force for patients with medial uni-compartmental OA of the knee. ● We are unable to recommend for or against the use of a brace with a *varus* directing force for patients with lateral uni-compartmental OA of the knee. ● We suggest patients with symptomatic OA of the knee use patellar taping for short term relief of pain and improvement in function.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, *knee bracing*) and weight reduction.
OARSI	In patients with knee OA and mild/moderate *varus* or *valgus* instability, a knee brace can reduce pain, improve stability and diminish the risk of falling.

Step 5: GRADE Recommendation

References

Kirkley A, Webster-Bogaert S, Litchfield R, Amendola A, MacDonald S, McCalden R, et al. The effect of bracing on varus gonarthrosis. J Bone Joint Surg Am 1999;81(4):539-48.

Correspondence between the Kirkley research group and Dr. Brouwer, which was sent to us by Dr. Brouwer.

8. TAPING

8.1 Medially-directed patellar taping versus no taping in knee OA

Is medially-directed patellar taping effective in reducing pain and improving function in patients with symptomatic knee OA compared to no taping?

Step 1: Search Results
We chose the most recent SR conducted by Warden 2008 which pooled results from 2 studies on patellar taping in OA patients (Hinman, 2003 and Hinman, 2003) for pain. However, only one of these trials (published in the British Medical Journal) reported function, safety, adherence and withdrawals.

Intervention description in the RCT by Hinman 2003 published in BMJ:
The trial comprised a three week intervention period and a three week follow up. Tape was applied by 12 trained physiotherapists at the university (n=4) and in private practice (n=8) around the metropolitan region. The tape was worn for three weeks and reapplied weekly. Skin was shaved before application. Therapeutic tape provided medial glide, medial tilt, and anteroposterior tilt to the patella. As inflamed soft tissue is aggravated by stretch, tape was also applied to unload either the infrapatellar fat pad or the pes anserinus (determined by clinical assessment to ascertain the most tender). Hypoallergenic undertape (Fixomull stretch; Beiersdorf, North Rhyde, NSW) was applied beneath the rigid tape (Leuko Sportstape Premium Plus; Beiersdorf) to prevent irritation of the skin. Control tape aimed to provide sensory input only. Hypoallergenic tape alone was laid over the same areas of skin as the therapeutic tape. Participants allocated to the no tape group received no intervention. All participants continued current treatments but were instructed to refrain from starting new ones.

Intervention description in the crossover study by Hinman 2003 published in Rheumatology:
Therapeutic tape was applied in a standardized manner by the same investigator, regardless of clinical presentation. Skin was shaved prior to tape application. Two pieces of rigid tape (Leuko Sportstape Premium Plus, Beiersdorf Australia Ltd) applied a medial patellar glide and corrected lateral and AP tilt. Two further pieces of tape applied distal to the patella unloaded the infrapatellar fat pad. Hypoallergenic undertape (Fixomull1 stretch, Beiersdorf Australia Ltd) was applied beneath the rigid tape to prevent skin irritation. For the neutral taping condition, hypoallergenic undertape was applied over the same areas of skin as therapeutic tape, but with no force applied to realign the patella or unload soft tissues. Participants rested for 5 min between test conditions to minimize carry-over effects of tape on cutaneous sensation. The length of time the tape was worn and the timing of the outcome assessment was not reported.

Step 2: GRADE Summary of findings

Medially-directed patellar taping compared to no taping for knee OA

Patient or population: patients with knee OA
Intervention: medially-directed patellar taping
Comparison: no taping

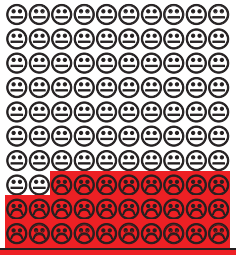
Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **No taping**	Corresponding risk **Medially-directed patellar taping**					
Benefits							
Pain[1] VAS. Scale from: 0 to 100. Follow-up: 3 weeks[2]	40%	82% (72% to 90%)[3]	42%	2.05	94 (2 studies[4])	⊕⊕OO low[5,6]	3 (2 to 3)
Function WOMAC. Scale from: 0 to 68. Follow-up: 3 weeks	37%	52% (32% to 71%)[7]	15%	1.41	58 (1 study[8])	⊕⊕OO low[9,10]	Not statistically significant
Harms							
Minor skin irritations number of subjects presenting with minor skin irritations Follow-up: 6 weeks	0%	28%	28%	17 (1.03 to 281.5)	58 (1 study[11])	⊕⊕OO low[9,10]	6 (0 to 3333) *by estimating control risk at 1%
Withdrawals number of patients who withdrew after randomization Follow-up: 6 weeks	3%	0% (0% to 27%)	-3%	0.33 (0.01 to 7.86)	58 (1 study[12])	⊕⊕OO low[9,10]	Not statistically significant
Adherence number of participants who continued to wear the tape as prescribed Follow-up: 6 weeks	100%	100%	0%	1	58 (1 study[13])	⊕⊕⊕O moderate[10]	Not statistically significant

[1] Two studies were pooled by the authors who reported a SMD (Hinman, 2003 and Hinman, 2003).
[2] One study looks at the immediate effect of taping and the other one at 3 weeks.
[3] This effect size was reported in the SR by Warden.
[4] One study was a crossover study and the other was a controlled study.
[5] According to the trials, both studies did not blind subjects and therapists who administered the treatment. However, subjects were not aware of which taping technique was considered therapeutic. Furthermore, because one of the studies (published in Rheumatology) used a crossover (within subject) design, it did not ensure proper allocation concealment and comparability of group characteristics at baseline. The quality assessment reported in the SR by Warden is not consistent with the information given in the RCTs.
[6] There is a publication bias indicated by significant funnel plot asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[7] We calculated the SMD with the end of study data using RevMan.
[8] The SR did not report function. One study (Hinman, 2003 in BMJ) reported function at 3 weeks.
[9] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[10] There is a possibility of publication bias since the funnel plot showed asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.

[11] One study (Hinman, 2003 in BMJ) reported adverse effects. Another study by the same author (Hinman, 2003 in Rheumatology) reported an absence of adverse effects.
[12] One study (Hinman, 2003 in BMJ) reported withdrawals.
[13] One study (Hinman, 2003 in BMJ) reported adherence.

Step 3: GRADE Evidence profile
See table 8 a: Medially-directed patellar taping versus no taping in knee OA

[2 a.]
Visual Summary of Findings Table
Medially-directed patellar taping compared to no taping for knee OA

Chance: Improving pain after 3 weeks		
NNT: 3		
😐	18 people out of 100 don't improve whether they applied taping or not.	
🙂	40 people out of 100 improve whether they applied taping or not.	
🙂	**42 more people** out of 100 improve with taping.	
Chance: Improving function after 3 weeks		
NNT: n/a		**Not statistically significant**
😐	48 people out of 100 don't improve whether they applied taping or not.	
🙂	37 people out of 100 improve whether they applied taping or not.	
🙂	**15 more people** out of 100 improve with taping.	
Chance: Minor skin irritation after 6 weeks		
NNH: 6		
😐	72 people out of 100 did not have minor skin irritation whether they applied taping or not	
☹	No one had a minor skin irritation whether they applied taping or not	
☹	**28 more** people out of 100 had minor skin irritation when they applied tape.	
Chance: Withdrawals after 6 weeks		

NNH: n/a		**Not statistically significant**
😐	100 people out of 100 stayed in the study whether they applied taping or not.	
☹	3 people out of 100 left the study whether they applied taping or not.	
☺	**3 fewer** people out of 100 left the study when they applied tape.	
Chance: Adherence after 6 weeks		
NNH: n/a		**Not statistically significant**
😐	0 people out of 100 did not adhere to the treatment whether they use applied taping or not.	
☹	100 people out of 100 adhered to the treatment whether they applied taping or not.	
☹	**There was no difference** in the number of people who adhered to the treatment.	

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	● We are unable to recommend for or against the use of a brace with a *valgus* directing force for patients with medial uni-compartmental OA of the knee. ● We are unable to recommend for or against the use of a brace with a *varus* directing force for patients with lateral uni-compartmental OA of the knee. ● We suggest patients with symptomatic OA of the knee use patellar taping for short term relief of pain and improvement in function.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, *knee bracing*) and weight reduction.
OARSI	In patients with knee OA and mild/moderate *varus* or *valgus* instability, a knee brace can reduce pain, improve stability and diminish the risk of falling.

Step 5: GRADE Recommendation

References

Warden SJ, Hinman RS, Watson MA, Jr., Avin KG, Bialocerkowski AE, Crossley KM. Patellar taping and bracing for the treatment of chronic knee pain: a systematic review and meta-analysis. Arthritis Rheum 2008;59(1):73-83.

Hinman RS, Crossley KM, McConnell J, Bennell KL. Efficacy of knee tape in the management of osteoarthritis of the knee: blinded randomised controlled trial. BMJ 2003;327(7407):135.

Hinman RS, Bennell KL, Crossley KM, McConnell J. Immediate effects of adhesive tape on pain and disability in individuals with knee osteoarthritis. Rheumatology (Oxford) 2003;42(7):865-9.

8.2 Medially-directed patellar taping versus sham taping in knee OA

Is medially-directed patellar taping effective in reducing pain and improving function in patients with symptomatic knee OA compared to sham taping?

Step 1: Search Results

We chose the most recent SR conducted by Warden 2008 which pooled results from 3 studies on patellar taping in OA patients (Cushnaghan, 1994, Hinman, 2003 and Hinman, 2003) for pain.

Intervention description in the RCT by Hinman 2003 published in BMJ:

The trial comprised a three week intervention period and a three week follow up. Tape was applied by 12 trained physiotherapists at the university (n=4) and in private practice (n=8) around the metropolitan region. The tape was worn for three weeks and reapplied weekly. Skin was shaved before application. Therapeutic tape provided medial glide, medial tilt, and anteroposterior tilt to the patella. As inflamed soft tissue is aggravated by stretch, tape was also applied to unload either the infrapatellar fat pad or the pes anserinus (determined by clinical assessment to ascertain the most tender). Hypoallergenic undertape (Fixomull stretch; Beiersdorf, North Rhyde, NSW) was applied beneath the rigid tape (Leuko Sportstape Premium Plus; Beiersdorf) to prevent irritation of the skin. Control tape aimed to provide sensory input only. Hypoallergenic tape alone was laid over the same areas of skin as the therapeutic tape. Participants allocated to the no tape

group received no intervention. All participants continued current treatments but were instructed to refrain from starting new ones.

Intervention description in the crossover study by Hinman 2003 published in Rheumatology:
Therapeutic tape was applied in a standardized manner by the same investigator, regardless of clinical presentation. Skin was shaved prior to tape application. Two pieces of rigid tape (Leuko Sportstape Premium Plus, Beiersdorf Australia Ltd) applied a medial patellar glide and corrected lateral and AP tilt. Two further pieces of tape applied distal to the patella unloaded the infrapatellar fat pad. Hypoallergenic undertape (Fixomull1 stretch, Beiersdorf Australia Ltd) was applied beneath the rigid tape to prevent skin irritation. For the neutral taping condition, hypoallergenic undertape was applied over the same areas of skin as therapeutic tape, but with no force applied to realign the patella or unload soft tissues. Participants rested for 5 min between test conditions to minimize carry-over effects of tape on cutaneous sensation. The length of time the tape was worn and the timing of the outcome assessment was not reported.

Intervention description of the crossover study by Cushnaghan, 1994 : The three types of taping were: neutral, in which the tape was applied directly over the front of the patella, without any pressure; medial, in which the tape pulled the patella to the medial side of the knee joint; and lateral, in which the tape was used to pull the patella to the lateral side. The taping consisted of a strip of Leukotape P (Beiersdorf, UK) applied by the same person in each case. Each tape was applied for four days, with three days of no treatment between tape positions.

Step 2: GRADE Summary of findings

Medially-directed patellar taping compared to sham taping for knee OA

Patient or population: patients with knee OA
Intervention: medially-directed patellar taping
Comparison: sham taping

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **sham taping**	Corresponding risk **medially-directed patellar taping**					
Benefits							
Pain[1] VAS. Scale from: 0 to 100. Follow-up: 3 weeks[2]	41%	68% (52% to 81%)[3]	27%	1.66	122 (3 studies[4])	⊕⊕OO low [5,6]	4 (3 to 8)
Function WOMAC. Scale from: 0 to	38%	37% (19% to 57%)	-1%	0.97	58 (1 study[7])	⊕⊕OO low [8, 9]	Not statistically significant

68. Follow-up: 3 weeks							
Harms							
Minor skin irritations number of subjects presenting with minor skin irritations Follow-up: 3 weeks	3%	27% (4% to 100%)	24%	8 (1.07 to 59.95)	58 (1 study[10])	⊕⊕OO low [8,9]	36 (1 to 476)
Adherence number of participants who continued to wear the tape as prescribed Follow-up: 6 weeks	100%	100%	0%	1	58 (1 study[11])	⊕⊕⊕O moderate [9]	Not statistically significant
Withdrawals number of participants who withdrew after randomization Follow-up: 6 weeks	0%	0%	0%	1	58 (1 study[11])	⊕⊕⊕O moderate [9]	Not statistically significant

[1] Three studies were pooled by the systematic review authors who reported a SMD (Hinman, 2003, Hinman, 2003 and Cushnagan, 1994).
[2] Studies looked at the immediate effect of taping as well as the effect after 4 days and after 3 weeks of intervention.
[3] This effect size was reported in the SR by Warden.
[4] Two were crossover studies and one was an RCT.
[5] According to the trials, all studies did not blind subjects and therapists who administered the treatment. However, subjects were not aware of which taping technique was considered therapeutic. Furthermore, because the two other studies used a crossover (within subject) design, it did not ensure proper allocation concealment and comparability of group characteristics at baseline. The quality assessment reported in the SR by Warden is not consistent with the information given in the RCTs.
[6] There is a publication bias indicated by significant funnel plot asymmetry. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[7] The SR did not report function. One study (Hinman, 2003 in BMJ) reported function at 3 weeks.
investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[8] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[9] There is a possibility of publication bias since the funnel plot showed asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[10] One study (Hinman, 2003 in BMJ) reported adverse effects. The other studies reported an absence of adverse effects.
[11] One study (Hinman, 2003 in BMJ) reported adherence to the treatment regimen and withdrawals. Cushnagan also reported that all patients followed prescribe taping.

[2 b.]

Visual Summary of Findings Table
Medially-directed patellar taping compared to sham taping for knee OA

Chance: Improving pain after 3 weeks	
NNT: 4	
😐 32 people out of 100 don't improve no matter which type of taping was used.	
🙂 41 people out of 100 improve no matter which type of taping was used.	
🙂 **27 more people** out of 100 improve with medially-directed patellar taping.	
Chance: Improving function after 3 weeks	
NNT: n/a	**Not statistically significant**
😐 63 people out of 100 don't improve no matter which type of taping was used.	
🙂 37 people out of 100 improve no matter which type of taping was used.	
☹ **1 fewer person** out of 100 improve with medially-directed patellar taping.	
Chance: Minor skin irritation after 3 weeks	
NNH: 36	
😐 73 people out of 100 did not have minor skin irritation with either type of taping.	
☹ 3 people out of 100 had minor skin irritation with either type of taping.	
☹ **24 more** people out of 100 had minor skin irritation with medially-directed patellar taping.	
Chance: Adherence after 6 weeks	
NNH: n/a	**Not statistically significant**
😐 100 people out of 100 adhered to the treatment with either type of taping.	
☹ No one did not adhere to the treatment with either type of taping.	

☹	**There was no difference in the number of people** who adhered to either type of taping.	
Chance: Withdrawals		
NNH: n/a		**Not statistically significant**
😐	100 people out of 100 remained in the study with either type of taping.	
☹	No one left the study with either type of taping	
☹	**There was no difference** in the number of people who left the study with either type of taping.	

Step 3: GRADE Evidence profile

Table 8 b: Medially-directed patellar taping versus sham taping in knee OA

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	● We are unable to recommend for or against the use of a brace with a *valgus* directing force for patients with medial uni-compartmental OA of the knee. ● We are unable to recommend for or against the use of a brace with a *varus* directing force for patients with lateral uni-compartmental OA of the knee. ● We suggest patients with symptomatic OA of the knee use patellar taping for short term relief of pain and improvement in function.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, *knee bracing*) and weight reduction.
OARSI	In patients with knee OA and mild/moderate *varus* or *valgus* instability, a knee brace can reduce pain, improve stability and diminish the risk of falling.

Step 5: GRADE Recommendation

References

Warden SJ, Hinman RS, Watson MA, Jr., Avin KG, Bialocerkowski AE, Crossley KM. Patellar taping and bracing for the treatment of chronic knee pain: a systematic review and meta-analysis. Arthritis Rheum 2008;59(1):73-83.

Hinman RS, Crossley KM, McConnell J, Bennell KL. Efficacy of knee tape in the management of osteoarthritis of the knee: blinded randomised controlled trial. BMJ 2003;327(7407):135.

Hinman RS, Bennell KL, Crossley KM, McConnell J. Immediate effects of adhesive tape on pain and disability in individuals with knee osteoarthritis. Rheumatology (Oxford) 2003;42(7):865-9.

Cushnaghan J, McCarthy C, Dieppe P. Taping the patella medially: a new treatment for osteoarthritis of the knee joint? BMJ 1994;308:753–5.

8.3 Laterally-directed patellar taping versus medially-directed patellar taping in knee OA

Is laterally-directed patellar taping effective in reducing pain and improving function in patients with symptomatic knee OA compared to medially-directed patellar taping?

Step 1: Search Results

We chose the most recent SR conducted by Warden 2008 which reported one study comparing lateral to medial patellar taping in OA patients for pain (Cushnaghan, 1994).

Intervention description: The three types of taping in the Cushnaghan study were: neutral, in which the tape was applied directly over the front of the patella, without any pressure; medial, in which the tape pulled the patella to the medial side of the knee joint; and lateral, in which the tape was used to pull the patella to the lateral side. The taping consisted of a strip of Leukotape P (Beiersdorf, UK) applied by the same person in each case. Each tape was applied for four days, with three days of no treatment between tape positions.

Step 2: GRADE Summary of findings

Laterally-directed patellar taping compared to medially-directed patellar taping for knee OA

Patient or population: patients with knee OA
Intervention: laterally-directed patellar taping
Comparison: medially-directed patellar taping

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **medially-directed patellar taping**	Corresponding risk **laterally-directed patellar taping**					
Benefits							
Pain VAS. Scale from: 0 to 100. Follow-up: 4 days		*Not estimable due to lack of data	SMD 0.95 (0.42 to 1.48) [1]	*	28 (1 study[2])	⊕⊕◯◯ low [3,4]	*
Function	Not reported						
Harms							
Safety number of patients who reported adverse events follow-up: 4 days	0%	0%	0%	1	28 (1 study[2])	⊕⊕◯◯ low [3,4]	Not statistically significant
Adherence number of patients who wore tapes on for the full four days follow-up: 4 days	100%	100%	0%	1	28 (1 study[2])	⊕⊕◯◯ low [3,4]	Not statistically significant
Withdrawals number of patients who withdrew after entry to the study follow-up: 4 days	0%	0%	0%	1	28 (1 study[2])	⊕⊕◯◯ low [3,4]	Not statistically significant

[1] The SR by Warden reported an SMD for pain comparing lateral and medial taping based on the Cushnagan, 1994 study.
[2] This study has a crossover design with 14 participants.
[3] This study did not blind therapists who administered the treatment and it is unclear if patients were blinded. However, subjects were not aware of which taping technique was considered therapeutic. Also, because this study used a crossover (within subject) design, it did not ensure proper allocation concealment and comparability of group characteristics at baseline.
[4] There is a possibility of publication bias since the funnel plot showed asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.

[2 c.]
Visual Summary of Findings Table
Laterally-directed patellar taping compared to medially-directed patellar taping for knee OA

Chance: Improving pain after 4 days		
The improvement in pain was not estimable due to lack of data.		
Chance: Improving function after 4 days		
The improvement in function was not reported.		
Chance: Safety		
NNH: n/a		**Not statistically significant**
😐	100 people out of 100 did not have adverse events with either type of taping	
☹	No one had adverse events with either type of taping	
☹	**There was no difference** in the safety of the two types of taping.	
Chance: Adherence after 4 days		
NNH: n/a		**Not statistically significant**
😐	100 people out of 100 adhered to either type of taping	
☹	No one did not adhere to the treatment with either type of taping	
☹	**There was no difference** in the number of people who adhered to either type of taping**.**	
Chance: Withdrawals after 4 days		
NNH: n/a		**Not statistically significant**
😐	100 people out of 100 remained in the study with either type of taping.	
☹	No one left the study with either type of taping	
☹	**There was no difference** in the number of people who left the study with either type of taping.	

Step 3: GRADE Evidence profile
See Table 8c: Laterally-directed patellar taping versus medially-directed patellar taping in knee OA

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	● We are unable to recommend for or against the use of a brace with a *valgus* directing force for patients with medial uni-compartmental OA of the knee. ● We are unable to recommend for or against the use of a brace with a *varus* directing force for patients with lateral uni-compartmental OA of the knee. ● We suggest patients with symptomatic OA of the knee use patellar taping for short term relief of pain and improvement in function.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, *knee bracing*) and weight reduction.
OARSI	In patients with knee OA and mild/moderate *varus* or *valgus* instability, a knee brace can reduce pain, improve stability and diminish the risk of falling.

Step 5: GRADE Recommendation

References

Warden SJ, Hinman RS, Watson MA, Jr., Avin KG, Bialocerkowski AE, Crossley KM. Patellar taping and bracing for the treatment of chronic knee pain: a systematic review and meta-analysis. Arthritis Rheum 2008;59(1):73-83.

Cushnaghan J, McCarthy C, Dieppe P. Taping the patella medially: a new treatment for osteoarthritis of the knee joint? BMJ 1994;308:753–5.

8.4 Laterally-directed patellar taping versus neutral sham taping in knee OA

Is laterally-directed patellar taping effective in reducing pain and improving function in patients with symptomatic knee OA compared to sham taping?

Step 1: Search Results
We chose the most recent SR conducted by Warden 2008 which reported one study comparing lateral patellar taping to neutral sham taping in OA patients for pain (Cushnaghan, 1994).

Intervention description: The three types of taping in the Cushnaghan study were: neutral, in which the tape was applied directly over the front of the patella, without any pressure; medial, in which the tape pulled the patella to the medial side of the knee joint; and lateral, in which the tape was used to pull the patella to the lateral side. The taping consisted of a strip of Leukotape P (Beiersdorf, UK) applied by the same person in each case. Each tape was applied for four days, with three days of no treatment between tape positions.

Step 2: GRADE Summary of findings

Laterally-directed patellar taping compared to neutral sham taping for knee OA

Patient or population: patients with knee OA
Intervention: laterally-directed patellar taping
Comparison: neutral sham taping

Outcomes	Illustrative comparative risks* (95% CI)		Absolute difference	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	NNT
	Assumed risk **neutral sham taping**	Corresponding risk **laterally-directed patellar taping**					
Benefits							
Pain[1] VAS. Scale from: 0 to 100. Follow-up: 4 days	35%	33% (17% to 54%)	-2%	0.94	28 (1 study[2])	⊕OOO very low[3,4,5]	Not statistically significant
Function	Not reported						
Harms							
Safety number of patients who reported adverse events	0%	0%	0%	1	28 (1 study[2])	⊕⊕OO low[3,5]	Not statistically significant

follow-up: 4 days							
Adherence number of patients who wore tapes on for the full four days follow-up: 4 days	100%	100%	0%	1	28 (1 study[2])	⊕⊕OO low [3,5]	Not statistically significant
Withdrawals number of patients who withdrew after entry to the study follow-up: 4 days	0%	0%	0%	1	28 (1 study[2])	⊕⊕OO low [3,4]	Not statistically significant

[1] The SR by Warden reported an SMD for pain comparing lateral and neutral taping based on the Cushnagan, 1994 study.
[2] This study has a crossover design with 14 participants.
[3] This study did not blind therapists who administered the treatment and it is unclear if patients were blinded. Also, because this study used a crossover (within subject) design, it did not ensure proper allocation concealment and comparability of group characteristics at baseline.
[4] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[5] There is a possibility of publication bias since the funnel plot showed asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.

[2 d.]
Visual Summary of Findings Table
Laterally-directed patellar taping compared to neutral sham taping for knee OA

Chance: Improving pain after 4 days		
NNT: n/a		**Not statistically significant**
😐	67 people out of 100 don't improve with either type of taping	
☺	33 people out of 100 improve with either type of taping	
☹	**2 fewer people** out of 100 improve with laterally-directed patellar taping**.**	
Chance: Improving function after 4 days		
The improvement in function was not reported.		
Chance: Safety after 4 days		
NNH: n/a		**Not statistically significant**
😐	100 people out of 100 did not report adverse effects with either type of taping.	
☹	0 people out of 100 reported adverse effects with either type of taping	
☹	**There was no difference** in the safety of the two types of taping.	
Chance: Adherence after 4 days		
NNH: n/a		

😐	100 people out of 100 adhered to the treatment with either type of taping	**Not statistically significant**
☹	0 people out of 100 did not adhere to the treatment with either type of taping	
☹	**There was no difference** in the number of people who adhered to either type of taping.	
Chance: Withdrawals after 4 days		
NNH: n/a		**Not statistically significant**
😐	100 people out of 100 remained in the study with either type of taping.	
☹	No one left the study with either type of taping	
☹	**There was no difference** in the number of people who left the study with either type of taping.	

Step 3: GRADE Evidence profile
See Table 8 d: Laterally-directed patellar taping versus neutral sham taping in knee OA

Step 4: Other recommendations

Group	Recommendation
AAOS (knee)	● We are unable to recommend for or against the use of a brace with a *valgus* directing force for patients with medial uni-compartmental OA of the knee. ● We are unable to recommend for or against the use of a brace with a *varus* directing force for patients with lateral uni-compartmental OA of the knee. ● We suggest patients with symptomatic OA of the knee use patellar taping for short term relief of pain and improvement in function.
EULAR	Non-pharmacological treatment of knee OA should include education, exercise, appliances (sticks, insoles, *knee bracing*) and weight reduction.
OARSI	In patients with knee OA and mild/moderate *varus* or *valgus* instability, a knee brace can reduce pain, improve stability and diminish the risk of falling.

Step 5: GRADE Recommendation

References

Warden SJ, Hinman RS, Watson MA, Jr., Avin KG, Bialocerkowski AE, Crossley KM. Patellar taping and bracing for the treatment of chronic knee pain: a systematic review and meta-analysis. Arthritis Rheum 2008;59(1):73-83.

Cushnaghan J, McCarthy C, Dieppe P. Taping the patella medially: a new treatment for osteoarthritis of the knee joint? BMJ 1994;308:753–5.

ABBREVIATIONS

OA - osteoarthritis

RCT – randomized controlled trial

SR – SR

GRADE evidence profiles

Table 1 a: Home-based balance exercises versus home-based strengthening exercises for knee OA

Author(s): Karine Toupin April
Date: 2009-06-12
Question: Should balance training versus strength training be used for knee OA?
Bibliography: Chaipinyo, 2009

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	balance training	strength training	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 4 weeks; measured with: Knee injury and Osteoarthritis Outcome Score (KOOS); range of scores: 0-100; Better indicated by higher values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	serious[3]	None	24	18	0.73	SMD -0.23 (-0.85 to 0.38)[4]	⊕⊕OO LOW	CRITICAL
function in daily living (follow-up 4 weeks; measured with: Knee injury and Osteoarthritis Outcome Score (KOOS); range of scores: 0-100; Better indicated by higher values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	serious[3]	None	24	18	0.54	SMD -0.45 (-1.07 to 0.17)[4]	⊕⊕OO LOW	CRITICAL
Adherence (follow-up 4 weeks; Maximum number of days:28; measured with: average number of days of exercise performed by participants Better indicated by higher values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	serious[3]	None	24	18	-	MD 2 (-0.77 to 4.77)	⊕⊕OO LOW	CRITICAL
Withdrawals												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	serious[3]	None	0/24 0%	6/24 (25%)	0.08 (0.00 to 1.29)	23 fewer per 100 (from 25 fewer to 7 more)[5]	⊕⊕OO LOW	CRITICAL
Safety												
Not reported												

[1] The physiotherapists prescribing the exercises were not blinded to group allocation. We did not downgrade the quality assessment score for this. However, the number of patients in this trial is small (n=42), which could undermine its validity.
[2] Participants were volunteers from the community 50 years and older. We did not downgrade the quality assessment score for this.
[3] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[4] The authors report the mean difference over time between groups but it does not coincide with our results using Rev Man 5 because the authors did not report the level of accuracy needed (no decimals reported). We calculated the SMD using Rev Man 5.
[5] Withdrawals were due to other illnesses, personal reasons or impossibility to reach patients.

Table 1 b: Balance exercises in addition to strengthening exercises versus strengthening exercises alone for knee OA

Author(s): Karine Toupin April
Date: 2009-06-12
Question: Should kinesthesia and balance exercises in addition to strengthening exercises versus strengthening exercises be used for knee OA?
Bibliography: Diracoglu, 2005

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	kinesthesia and balance exercises in addition to strength exercises	strength exercises	Relative (95% CI)	Absolute	Quality	Importance
physical function (follow-up 8 weeks; measured with: WOMAC; range of scores: 0-10; Better indicated by lower values)												
1	randomised trials	serious[1]	No serious inconsistency	no serious indirectness[2]	Serious[3]	None	30	30	1.55	SMD 0.46 lower (0.97 lower to 0.05 higher)[4]	⊕⊕OO LOW	CRITICAL
Pain												
No evidence available[5]												
Adverse effects (follow-up 8 weeks; number of patients with event)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness[2]	no serious imprecision	none	0/30 (0%)	0/30 (0%)	1	0 more per 100	⊕⊕⊕O MODERATE	CRITICAL
Adherence (follow-up 8 weeks; Maximum number of visits:24; mean number of missed visits)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	24	24	-	MD -2	⊕⊕⊕O MODERATE	CRITICAL
Withdrawals (follow-up 8 weeks; number of patients who withdrew after randomization)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none	3/33 (9.1%)	3/33 (9.1%)	1 (0.22 to 4.6)	0 fewer per 100 (from 7 fewer to 33 more)[6]	⊕⊕⊕O MODERATE	CRITICAL

[1] The randomization method used is the "one-to-one" method which allocates one patient to the study group and the other patient to the control group one by one according to their order of application to the outpatient clinic. This method could lead to biases. Furthermore, blinding was not reported and intention to treat analyses were not performed.
[2] All patients included in the study were women 35 to 65 years old. We did not downgrade the quality of the study because of this.
[3] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[4] The authors reported the end of study results in both groups, which showed a statistically significant difference. However, their results did not coincide with our results from Rev Man 5 because the authors did not report the level of accuracy needed.
[5] Pain was not measured in the RCT. However, the use of paracetamol was reported, which could represent a proxy measure for pain to some extent. The authors report that 5 patients used paracetamol during the study in a dosage of less than 500 mg daily. The 2 groups were not significantly different from each other regarding paracetamol use ($P > 0.05$).
[6] Patients withdrew because of the difficulty to come to the clinic for exercises.

Table 1 c: Cardiovascular land-based exercise versus usual care for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should cardiovascular land exercise versus no exercise be used for osteoarthritis of the knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	cardiovascular land exercise	no exercise	Relative (95% CI)	Absolute	Quality	
pain (measured with: pooled studies with different scales including WOMAC and VAS amongst others; range of scores: 0-0; Better indicated by less)												
4[1]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness[2]	no serious imprecision	none	225	126	1.71	SMD -0.48 (-0.83 to -0.13)	⊕⊕⊕⊕ HIGH	CRITICAL
function (measured with: pooled studies with different scales including WOMAC and VAS amongst others; range of scores: 0-0; Better indicated by less)												
3[4]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness[2]	no serious imprecision	none	208	109	1.55	SMD -0.35 (-0.58 to -0.11)	⊕⊕⊕⊕ HIGH	CRITICAL
withdrawals (follow-up mean 18 months; number of withdrawals)												
1[5]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	serious[6]	none	27/144 (18.8%)	22/149 (14.8%)	RR 1.27 (0.76 to 2.12)	40 more per 1000 (from 36 fewer to 166 more)	⊕⊕⊕O MODERATE	CRITICAL
Safety (follow-up mean 18 months; number of falls)												
1[5]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	none	2/144 (1.4%)	0/149 (0%)	RR 5.17 (0.25 to 106.82)	0 more per 1000 (from 0 fewer to 0 more)	⊕⊕⊕O MODERATE	CRITICAL
adherence (follow-up mean 18 months; numbers of patients)												
1[5]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	none	98/144 (68.1%)	142/149 (95.3%)	RR 0.71 (0.63 to 0.80)	276 fewer per 1000 (from 191 fewer to 353 fewer)	⊕⊕⊕⊕ HIGH	CRITICAL

[1] Minor 1989, Ettinger 1997, Bautch 1997, Talbot 2003
[2] Evidence mostly included participants with early or mild symptomatic disease.
[4] Minor 1989, Ettinger 1997, Bautch 1997
[5] Ettinger 1997
[6] Is imprecise; includes no effect and significant benefit (0.76, 2.12)

Table 1 d: Resistance land-based exercise versus usual care for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should resistance land exercise versus no exercise be used for osteoarthritis of the knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	resistance land exercise	no exercise	Relative (95% CI)	Absolute	Quality	Importance
Pain (measured with: pooled studies with different scales including WOMAC and VAS amongst others; Better indicated by less)												
9	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness[1]	No serious imprecision	none	836	547	1.66	SMD -0.53 (-0.79 to -0.27)	⊕⊕⊕⊕ HIGH	CRITICAL
Function (measured with: pooled studies with different scales including WOMAC and VAS amongst others; Better indicated by less)												
9[2]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness[1]	No serious imprecision	none	836	547	2.5	SMD -0.58 (-0.88 to -0.27)	⊕⊕⊕⊕ HIGH	CRITICAL

[1] Evidence mostly included participants with early or mild symptomatic disease.
[2] Schilke 2006, Ettinger 1997, Baker 2001, Thomas 2002, Gur 2002, Huang 2003, Huang 2005, Thorstensson 2005, Mikesky 2006

Table 1 e: Aquatic exercise versus no exercise for OA of hip or knee

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-08-18
Question: Should aquatic exercise versus no exercise be used for osteoarthritis of hip or knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					Importance
							No of patients		Effect		Quality	
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	aquatic exercise	no exercise	Relative (95% CI)	Absolute		
Pain after intervention (measured with: Pooled different scales[1]; range of scores: -; Better indicated by less)												
4[2]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	no serious imprecision	none	306	332	1.2	SMD -0.19 (-0.04 to -0.35)	⊕⊕⊕⊕ HIGH	CRITICAL
Pain follow up (follow-up mean 18 months; measured with: WOMAC pain ; range of scores: 0-20; Better indicated by less)												
1[4]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	no serious imprecision	none	152	158	1.1	SMD -0.11 (-0.33 to 0.12)[5]	⊕⊕⊕⊕ HIGH	CRITICAL
Function after intervention (measured with: Pooled different scales[1]; range of scores: -; Better indicated by less)												
4[2]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	no serious imprecision	none	314	334	1.3	SMD -0.26 (-0.11 to -0.42)	⊕⊕⊕⊕ HIGH	CRITICAL
Function follow up (follow-up mean 18 months; measured with: WOMAC physical function; range of scores: 0-68; Better indicated by less)												
1[4]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	no serious imprecision	none	150	156	1.1	SMD -0.1 (-0.33 to 0.12)	⊕⊕⊕⊕ HIGH	CRITICAL
Withdrawals follow up (follow-up mean 18 months; total withdrawals)												
1[4]	randomised trial	no serious limitations[3]	no serious inconsistency	no serious indirectness	Serious[7]	none	53/153 (34.6%)	46/159 (28.9%)	RR 1.2 (0.86 to 1.66)	58 more per 1,000	⊕⊕⊕ MODERATE	IMPORTANT

[1] Pooled different scales including WOMAC, VAS, HAQ
[2] Cochrane 2005, Foley 2003, Wang 2004, Patrick 2001
[3] Patients not blinded to treatment as it is impossible to do so, therefore we did not downgrade
[4] Cochrane 2005
[5] This RCT had a significant SMD immediately after intervention
[7] 95% confidence interval (or alternative estimate of precision) around the pooled or best estimate of effect includes both negligible effect and appreciable benefit or appreciable harm

Table 1 f: Aquatic exercise versus land-based exercise for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should aquatic exercise versus land exercise be used for osteoarthritis of the knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					Importance
							No of patients		Effect		Quality	
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	aquatic exercise	land exercise	Relative (95% CI)	Absolute		
pain (follow-up mean 6 weeks; measured with: VAS; range of scores: 0-10; Better indicated by less)												
1[1]	randomised trial	serious[2]	no serious inconsistency	no serious indirectness[3]	very serious[4]	none	23	23	2.0	SMD -0.86 (-1.47 to -0.25)	⊕OOO VERY LOW	CRITICAL
function - walking ability (follow-up mean 6 weeks; measured with: timed 1-mile walk; range of scores: -; Better indicated by less)												
1[1]	randomised trial	no serious limitations[2]	no serious inconsistency	serious[3]	very serious[4]	none	23	23	1.9	SMD -0.43 (-1.01 to 0.16)	⊕OOO VERY LOW	CRITICAL

[1] Wyatt 2001
[2] Concealment of allocation was unclear
[3] no comparison to placebo
[4] N is low (n=42) and large CI (upper or lower confidence limit crosses an effect size of 0.5 in either direction)

Table 1 g: Tai Chi compared to no exercise (education on OA) for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should tai chi versus no exercise (education on OA) be used for osteoarthritis of the knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Tai Chi	no exercise (education on OA)	Relative (95% CI)	Absolute	Quality	
Pain (follow-up mean 12 weeks; measured with: WOMAC; range of scores: 0-35; Better indicated by less)												
1[1]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	very serious[2]	none	18	13	1.1	SMD 0.06 (-0.65 to 0.77)	⊕⊕OO LOW	CRITICAL
Function (follow-up mean 12 weeks; measured with: WOMAC; range of scores: 0-85; Better indicated by less)												
1[1]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	very serious[2]	none	18	13	1.1	SMD 0.07 (-0.65 to 0.78)	⊕⊕OO LOW	CRITICAL
Withdrawals (follow-up mean 12 weeks; Number of drop-outs)												
1[1]	randomised trial	no serious limitations	no serious inconsistency	no serious indirectness	Very serious[2]	none	4/22 (18.2%)	6/19 (31.6%)	RR 0.58 (0.19 to 1.74)	133 fewer per 1,000	⊕⊕OO LOW	IMPORTANT

[1] Brismee, 2007
[2] Imprecise because RR crosses no effect and significant benefit (for withdrawals)and small N=31

Table 1 h: Exercise compared to no exercise for osteoarthritis of the hip

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should exercise versus no exercise be used for osteoarthritis of the hip?
Settings:
Bibliography:

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	exercise	no exercise	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 3-18 months; measured with: pooled WOMAC ; range of scores: 0-100; Better indicated by less)												
7[1]	randomised trial	no serious limitations	No serious indirectness	Serious[2]	no serious imprecision	none	158	152	1.6	SMD -0.58 (-0.81 to -0.35)	⊕⊕⊕O MODERATE	CRITICAL

[1] Fransen 2007, Rooks 2006, Cochrane 2005, Tak 2005, Foley 2003, Hopman-Rock 2000, Van Baar 1998.
[2] although Isquared = 0, different interventions pooled, including aquatic, tai chi, and land exercise.

Table 2 a: Laterally wedged insoles versus neutrally wedged insoles for knee OA

Author(s): Jessie McGowan, Maria Benkhalti, Karine Toupin April
Date: 2009-04-28
Question: Should Laterally wedged insoles versus neutrally wedged insoles be used for painful medial Knee OA?
Bibliography: Brouwer, 2008

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Laterally wedged insoles	neutrally wedged insoles	Relative (95% CI)	Absolute	Quality	Importance
Pain (follow-up 6 months; measured with: WOMAC; range of scores: 0-100; Better indicated by less)												
1	randomised trial	serious[1]	No serious inconsistency	no serious indirectness	Serious[2]	None	78	69	0.71	SMD 0.31 (-0.01 to 0.64)[3]	⊕⊕OO LOW	CRITICAL
Physical function (follow-up mean 6 months; measured with: WOMAC; range of scores: 0-100; Better indicated by less)												
1	randomised trial	serious[1]	No serious inconsistency	no serious indirectness	Serious[2]	None	78	69	0.71	SMD 0.30 (-0.03 to 0.62)[4]	⊕⊕OO LOW	CRITICAL
Adherence (follow-up 6 months; number of patients who wore insoles permanently during the study period)												
1	randomised trial	serious[1]	No serious inconsistency	no serious indirectness	no serious imprecision	None	72/82 (87.8%)	55/74 (74.3%)	1.18 (1.01 to 1.38)	13 more per 100 (from 1 more to 28 more)	⊕⊕⊕O MODERATE	CRITICAL
Withdrawals due to intolerance to the treatment (follow-up 6 months; number of patients who withdrew from the study because of intolerance to the treatment)												
1	Randomized trial	serious[1]	No serious inconsistency	no serious indirectness	Serious[2]	None	0/82 (0%)	1/74 (1.4%)	0.30 (0.01 to 7.28)	1 more per 100 (from 1 more to 8 more)	⊕⊕OO LOW	CRITICAL

[1] The randomization procedure and allocation concealment were not described. The trial (Maillefert, 2001) did not blind the outcome assessors and the care providers. The insoles were individually modeled and therefore the intervention was not identical for all patients. The quality assessment score was not reduced because of this.
[2] The confidence interval ranges from not being clinically significant to a very large clinical effect, which shows imprecision.
[3] This SMD was calculated using RevMan 5 with the 6-month end of study data. WOMAC pain was more decreased in the neutrally wedged group than the laterally wedged group. This result along with those at 1, 3, 12 and 24 months is not statistically significant.
[4] This SMD was calculated using RevMan 5 with the 6-month end of study data. WOMAC function was more decreased in the laterally wedged group than the neutrally wedged group. This result along with those at 1, 3, 12 and 24 months is not statistically significant.

Table 2 b: Medial wedged insoles versus neutrally wedged insoles for knee OA

Author(s): Karine Toupin April
Date: 2009-05-01
Question: Should Medially wedged insoles versus neutrally wedged insoles be used for knee OA?
Bibliography: Rodrigues 2008

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Medially wedged insoles	neutrally wedged insoles	Relative (95% CI)	Absolute	Quality	
Pain on movement (follow-up 8 weeks; measured with: VAS scale transformed into percentage of change over time; range of scores: 0-100; Better indicated by lower values)												
1	randomised trial	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	None	16	14	2.07	SMD -1.25 (-2.04 to -0.46)[2]	⊕⊕⊕O MODERATE	CRITICAL
Function (follow-up 8 weeks; measured with: WOMAC transformed into percentage of change over time; range of scores: 0-100; Better indicated by lower values)												
1	randomised trial	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	None	16	14	3.19	SMD -1.70 (-2.55 to 0.84)[2]	⊕⊕⊕O MODERATE	CRITICAL
Mild discomfort (follow-up 8 weeks; number of patients with event)												
1	randomised trial	serious[1]	no serious inconsistency	no serious indirectness	serious[3]	None	0/16 (0%)	1/14 (7.1%)	0.29 (0.01 to 6.69)	5 fewer per 100 (from 7 fewer to 41 fewer)	⊕⊕OO LOW	IMPORTANT
Adherence												
All patients used the insoles regularly throughout the study												
Withdrawals												
No withdrawals												

[1] The sample is small: 30 women with valgus knee OA. Pain at rest was statistically different at baseline.
[2] This SMD was calculated using RevMan 5 with the percentage of change over time provided by the authors.
[3] The confidence interval ranges from not being clinically significant to a very large clinical effect, which shows imprecision.

Table 2 c: Subtalar strapped insoles versus inserted laterally wedged insoles for knee OA

Author(s): Karine Toupin April
Date: 2009-05-02
Question: Should Subtalar strapped insoles versus inserted laterally wedged insoles be used for knee OA?
Bibliography: Brouwer 2008

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Subtalar strapped insoles	inserted laterally wedged insoles	Relative (95% CI)	Absolute	Quality	Importance
Pain (follow-up 6 months; measured with: visual analog scale; range of scores: 0-100; Better indicated by lower values)												
1	Randomized trial	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	None	29	32	1.61	SMD -0.57 (-1.09 to -0.06)[2]	⊕⊕⊕O MODERATE	CRITICAL
Function (follow-up 6 months; measured with: Lequesne index; range of scores: 0-24; Better indicated by lower values)												
1	Randomized trial	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	None	29	32	1.30	SMD -0.27 (-0.78 to 0.23)[3]	⊕⊕⊕O MODERATE	CRITICAL
Side effects (follow-up 8 weeks; number of patients with event)												
1	Randomized trial	serious[1]	no serious inconsistency	no serious indirectness	serious[4]	None	6/46 (13%)	1/44 (2.3%)	5.74 (0.72 to 45.77)	11 more per 100 (from 1 fewer to 102 more)[5]	⊕⊕OO LOW	CRITICAL
Withdrawals												
1	Randomized trial	serious[1]	no serious inconsistency	no serious indirectness	serious[4]	None	3/32 (9.4%)	2/34 (5.9%)	1.59 (0.28 to 8.93)	3 more per 100 (from 4 fewer to 47 more)[6]	⊕⊕OO LOW	CRITICAL
Adherence												
Not reported												

[1] The randomization procedure was done according to birth date and the allocation concealment was not described. The trials (Toda, 2001, 2004 and 2006) did not blind the outcome assessors, the care providers or the patients.
[2] This SMD was calculated using Rev Man 5 with the 6-months end of study data. This result along with the one at 8 weeks are statistically significant (SMD= -0.42 (-0.83, 0)). The data at 24 month were not statistically significant.
[3] This SMD was calculated using Rev Man 5 with the 6-months end of study data. This result along with the one at 8 weeks and 24 months are not statistically significant.
[4] The confidence interval ranges from not being clinically significant to a very large clinical effect, which is a sign of imprecision.

[5] In the strapped insole group, 3 participants complained of popliteal pain, 2 reported low back pain and one had foot sole pain. Only one patient complained of foot sole pain in the inserted insole group. However, side effects were not severe enough to deter participants from continuing to wear the insole.
[6] People who withdrew had either moved or cited household commitments.

Table 3: Self-management programs for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-08-12
Question: Should Self-management program versus no self-management be used for knee osteoarthritis?
Bibliography: Chodosh, 2005

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Self-management program	no self-management	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 2-6 months; measured with: Not specified but likely pooled several different scales; range of scores: -; Better indicated by less)												
14[1]	randomised trial	no serious limitations	no serious inconsistency	very serious[2]	no serious imprecision	None	0[3]	0[3]	-	SMD -0.06 (-0.1 to -0.02)	⊕⊕OO LOW	CRITICAL
function (follow-up 2-6 months; measured with: Not specified but likely pooled several different scales; range of scores: -; Better indicated by less)												
12[4]	randomised trial	no serious limitations	no serious inconsistency	very serious[2]	no serious imprecision	None	0[3]	0[3]	-	SMD -0.06 (-0.1 to -0.02)	⊕⊕OO LOW	CRITICAL

[1] Barlow 2000, Blixen 2004, Edworth and Devins 1999, Goeppinger 1989, Hopman-Rock and Westhoff 2000, Hughes 2004, Keefe 1990, Lorig 1999, Lorig 1986, Lorig 1985, Lorig 1989, Messier 2004, Ravaud 2004, Solomon 2002
[2] This review had a very broad definition of self-management program and could not identify specific elements significantly associated with greater efficacy of self-management programs. Also, no specification of affected joints (knee, hip, or other)
[3] Total number of participants was not provided
[4] Barlow 2000, Blixen 2004, Edworthy and Devins 1999, Goeppinger 1989, Hughes 2004, Keefe 1990, Lorig 1999, Lorig 1986, Lorig 1985, Lorig 1989, Ravaud 2004, Solomon 2002

Table 4 a: Manual therapy program versus exercise therapy program for hip OA

Author(s): Karine Toupin April
Date: 2009-08-07
Question: Should manual therapy versus exercise therapy be used for hip OA?
Bibliography: Hoeksma 2004

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	manual therapy	exercise therapy	Relative (95% CI)	Absolute	Quality	
pain at rest (follow-up 5 weeks; measured with: visual analog scale; range of scores: 0-100; Better indicated by lower values)												
1	randomised trials	no serious limitations[1]	no serious inconsistency	no serious indirectness	no serious imprecision	None	53	50	1.54	SMD -0.47 (-0.86 to -0.08)[3]	⊕⊕⊕⊕ HIGH	CRITICAL
physical function (follow-up 5 weeks; range of scores: 0-100; Better indicated by higher values)												
1	randomised trials	no serious limitations[1]	no serious inconsistency	no serious indirectness	serious[2]	None	53	50	1.11	SMD 0.10 (-0.28 to 0.49)[3]	⊕⊕⊕O MODERATE	CRITICAL
pain at rest (follow-up 29 weeks; measured with: visual analog scale; range of scores: 0-100; Better indicated by lower values)												
1	randomised trials	no serious limitations[1]	no serious inconsistency	no serious indirectness	serious[2]	None	45	44	1.25	SMD -0.26 (-0.68 to 0.15)[4]	⊕⊕⊕O MODERATE	CRITICAL
physical function (follow-up 29 weeks; range of scores: 0-100; Better indicated by higher values)												
1	randomised trials	no serious limitations[1]	no serious inconsistency	no serious indirectness	serious[2]	None	44	44	1.29	SMD 0.25 (-0.17 to 0.67)[4]	⊕⊕⊕O MODERATE	CRITICAL
Adherence (follow-up 5 weeks; number of patients who prematurely discontinued the treatment programs)												
1	randomised trials	no serious limitations[1]	no serious inconsistency	no serious indirectness	serious[2]	None	4/56 (7.1%)	3/53 (5.7%)	1.26 (0.30 to 5.37)	1 more per 100 (from 4 fewer to 25 more)	⊕⊕⊕O MODERATE	CRITICAL
Adverse effects (number of patients who discontinued the treatment programs because of increase of complaints)												
1	randomised trials	no serious limitations[1]	no serious inconsistency	no serious indirectness	serious[2]	None	3/56 (5.4%)	2/53 (3.8%)	1.42 (0.25 to 8.16)	2 more per 100 (from 3 fewer to 27 more)[5]	⊕⊕⊕O MODERATE	CRITICAL
Losses to follow-up (follow-up 29 weeks; number of patients who were lost to follow-up)												
1	randomised trials	no serious limitations[1]	no serious inconsistency	no serious indirectness	serious[2]	None	12/56 (21.4%)	9/53 (17%)	1.26 (0.58 to 2.75)	4 more per 100 (from 7 fewer to 30 more)[5]	⊕⊕⊕O MODERATE	CRITICAL

[1] This trial was a single-blind study. The authors mention that it was not possible to blind either patients or therapists for the allocated treatment. Therefore, extra attention was given to the blinding of the outcome assessor. A placebo effect may also be present in this study due to the nature of the interventions. Finally, a limitation of the study is the relatively large number of patients who received total hip arthroplasty during the follow-up period. However, no significant differences were found between the conclusions based on the intention-to-treat analysis and the per-protocol analysis. The quality of the study was not downgraded because of these reasons.

[2] The confidence interval ranges from not being clinically significant to a very large clinical effect, which is a sign of imprecision.
[3] This SMD was calculated with RevMan 5 with the end-of-study data at the end of the treatment period (5-weeks).
[4] This SMD was calculated with RevMan 5 with the end-of-study data at 29 weeks of follow-up.
[5] In the exercise program, one patient also discontinued treatment because of cardio-respiratory disease.

Table 4 b: Manual therapy in combination with supervised exercise and home exercise program versus home exercise program alone for knee OA

Author(s): Karine Toupin April
Date: 2009-08-19
Question: Should manual therapy in combination with supervised exercise and home exercise program vs home exercise be used for knee OA?
Bibliography: Deyle, 2005

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Manual therapy+ supervised exercise and home exercise program	Home exercise	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 8 weeks; measured with: WOMAC; range of scores: 0-500; Better indicated by lower values)												
1[1]	randomised trials	no serious limitations[2]	no serious inconsistency	no serious indirectness	no serious imprecision	none	60	60	1.43	SMD -0.41 (-0.77 to -0.05)	⊕⊕⊕⊕ HIGH	CRITICAL
function (follow-up 8 weeks; measured with: WOMAC; range of scores: 0-1700; Better indicated by lower values)												
1	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	none	60	60	1.41	SMD -0.40 (-0.76 to -0.03)	⊕⊕⊕⊕ HIGH	CRITICAL
Discontinuations due to lack of adherence (follow-up 8 weeks; number of patients who were discontinued to lack of adherence to the treatment regimen)												
1	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	none	0/60 (0%)	0/60 (0%)	0 (0 to 0)	0 fewer per 100 (from 0 fewer to 0 fewer)	⊕⊕⊕⊕ HIGH	CRITICAL
Withdrawals (follow-up 8 weeks; people who withdrew from the study after randomization)												
1	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	serious[3]	none	6/66 (9.1%)[4]	8/68 (11.8%)[5]	RR 0.77 (0.28 to 2.11)	3 fewer per 100 (from 8 fewer to 13 more)	⊕⊕⊕O MODERATE	CRITICAL

[1] Another outcome reported by the author was the use of medications for OA by patients at 52 weeks. Use of medications for OA was higher in the home exercise group (68%) than the clinic treatment group (48%) and this difference was statistically significant (p=0.03).
[2] The authors report that the intention to treat results with 134 subjects did not differ substantially from the results of the 120 subjects.
[3] The confidence interval ranges from not being clinically significant to a very large clinical effect, which is a sign of imprecision.
[4] In the treatment group, withdrawals were due to: knee injections (2), changed medications (1), not willing to return (1), not willing to walk (1) and unrelated medical condition (1).
[5] In the control group, withdrawals were due to: knee injections (1), changed medications (1), shoulder surgery (1), not willing to return (2) and moved from area (3).

Table 5: Psychosocial intervention compared to no intervention for OA of the hip and knee

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-07-23
Question: Should psychosocial intervention vs no intervention be used for osteoarthritis of the hip and knee?
Settings:
Bibliography:

Quality assessment							Summary of findings					Importance
							No of patients		Effect		Quality	
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	psychosocial intervention	no intervention	Relative (95% CI)	Absolute		
pain (follow-up 2-12 months; measured with: pooled different scales including AIMS and VAS; range of scores: 0-0; Better indicated by less)												
8	randomised trial	serious[1]	no serious inconsistency	serious[2]	no serious imprecision	none	783[3]	700	1.19	SMD -0.22 (-0.11 to -0.33)	⊕⊕OO LOW	CRITICAL
function (physical disability) (follow-up 2-12 months; range of scores: 0-0; Better indicated by less)												
8[4]	randomised trial	serious[1]	no serious inconsistency	serious[5]	no serious imprecision	none	783	700	1.17	SMD 0.18 (0.06 to 0.29)	⊕⊕OO LOW	CRITICAL

[1] Pooled wide range of psychosocial interventions
[2] Affected joints not described therefore could not distinguish between hip, knee, and other.
[3] Data obtained from Dixon 2007 supplement (appendix 5)
[4] Calfas 1992, Gay 2002, Keefe 2004, Keefe 1996, Keefe 1999, Keefe 1990, Keefe 1990, Lin 2003.
[5] No description of type of scales used.

Table 6: Weight loss compared to control (no weight loss program) for knee OA

Author(s): Jessie McGowan, Maria Benkhalti
Date: 2009-04-28
Question: Should weight loss versus control (no weight loss program) be used for knee OA?
Bibliography: Christensen, 2007

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	weight loss	control (no weight loss)	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 8-24 weeks; measured with: pooled WOMAC 500mm; range of scores: 0-500 and Likert; range of scores 1-5; Better indicated by less)												
2[1]	randomised trial	no serious limitations	serious[2]	no serious indirectness	no serious imprecision	none	208	208	1.2	SMD -0.2 (-0.39 to 0)	⊕⊕⊕O MODERATE	CRITICAL
function (follow-up mean 8-24 weeks; measured with: pooled WOMAC 1700mm; range of scores: 0-1700 and self-reported disability; range of scores 23-115 ; Better indicated by less)												
2[1]	randomised trial	no serious limitations	serious[2]	no serious indirectness	no serious imprecision	none	208	208	1.3	SMD -0.23 (-0.42 to -0.04)	⊕⊕⊕O MODERATE	CRITICAL

[1] Christensen 2005, Messier 2000
[2] Christensen 2005 used only low-energy diet whereas Messier 2000 used exercise and diet intervention. Length of follow-up also varied (8-24 weeks).

Table 7 a: Braces and medical (conservative) treatment versus medical (conservative) treatment knee OA

Author(s): Jessie McGowan, Karine Toupin April
Date: 2009-05-21
Question: Should Brace and standard conservative treatment versus standard conservative treatment only be used for knee OA?
Bibliography: Brouwer,2008

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	Brace and standard conservative treatment	standard conservative treatment only	Relative (95% CI)	Absolute	Quality	
Pain (follow-up 6 months; measured with: VAS; range of scores: 0-10; Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	none[2]	60	57	1.13	SMD -0.12 (-0.30 to 0.06)[3]	⊕⊕⊕O MODERATE	CRITICAL
Knee function (follow-up 6 months; measured with: HSS; range of scores: 0-100; Better indicated by higher values)												
1	randomised trials	Serious[1]	no serious inconsistency	no serious indirectness	no serious imprecision	None[2]	60	57	1.03	SMD 0.15 (-0.16 to 0.20)[3]	⊕⊕⊕O MODERATE	CRITICAL
Withdrawal from treatment due to adverse events (follow-up 12 months; number of patients who stopped the treatment because of adverse events)												
1	randomised trials	Serious[1]	no serious inconsistency	no serious indirectness	Serious[4]	none[2]	4/60 (6.7%)[5]	0/57 (0%)	8.56 (0.47 to 155.45)	0 more per 100 (from 0 fewer to 0 more)	⊕⊕OO LOW	CRITICAL
Withdrawals from treatment (follow-up 12 months; number of patients who stopped the treatment after randomization)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	Serious[4]	None[2]	25/60 (41.7%)[6]	14/57 (24.6%)	1.70 (0.98 to 2.92)	17 more per 100 (from 0 fewer to 47 more)	⊕⊕OO LOW	CRITICAL
Adherence												
Not reported												

[1] The trial (Brouwer, 2006) did not blind the outcome assessors, the care providers nor the patients. Outcomes of interest were not similar at baseline.
[2] The authors of the meta-analysis conducted the present study, which may lead to a potential conflict of interest. The quality was not downgraded because of this.
[3] We calculated the SMD using the mean difference and confidence interval between groups with RevMan. The MD was adjusted by the authors for baseline values for age, gender, BMI, duration of complaints, severity of knee OA, pain severity, knee function, walking distance, medication and quality of life since these characteristics were not similar at baseline.
[4] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[5] Adverse events include skin irritation (n=2) and bad fit (n=2).
[6] Patients stopped treatment mostly because of lack of effectiveness (n=15).

Table 7 b: Braces and medical (conservative) treatment versus medical (conservative) treatment alone in knee OA

Author(s): Karine Toupin April
Date: 2009-09-14
Question: Should brace and medical treatment versus medical treatment be used for knee OA?
Bibliography: Kirkley 1999

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	brace and medical treatment	medical treatment	Relative (95% CI)	Absolute	Quality	Importance
pain (follow-up 6 months; measured with: WOMAC pain; range of scores: 0-500; Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	No serious imprecision	None	41	33	2.21	SMD -0.89 (-1.38 to -0.41)[2]	⊕⊕⊕O MODERATE	CRITICAL
function (follow-up 6 months; measured with: WOMAC function; range of scores: 0-1700; Better indicated by lower values)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	No serious imprecision	None	41	33	2	SMD -0.76 (-1.23 to -0.28)[2]	⊕⊕⊕O MODERATE	CRITICAL
withdrawals (follow-up 6 months; number of patients who withdrew from the study after randomization)												
1	randomised trials	Serious[1]	no serious inconsistency	no serious indirectness	No serious imprecision	None	0/41 (0%)	7/40 (17.5%)	0.07 (0.00 to 1.10)[3]	16 fewer per 100 (from 17 fewer to 2 more)	⊕⊕⊕O MODERATE	CRITICAL
Safety												
Not reported												
Adherence												
Not reported												

[1] Blinding of patients and assessors as well as intention-to-treat analyses were not mentioned in this study.
[2] The results shown in the present table were computed using the data sent to our research team by Dr. Brouwer who had recently received it from the Kirkley Research Group but did not have time to report it to his systematic review.
[3] We calculated this relative risk using Rev Man 5. Reasons for withdrawals include: dissatisfaction with the group to which they had been randomized (n=5), inability to attend appointments (n=2), ill health (n=1) and a change in a scheduled date for an operation (n=1).

Table 7 c: Braces and medical treatment versus neoprene sleeve with medical treatment in knee OA

Author(s): Karine Toupin Aprl
Date: 2009-09-14
Question: Should brace and medical treatment versus neoprene sleeve and medical treatment be used for knee OA?
Bibliography: Kirkley, 1999

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	brace and medical treatment	neoprene sleeve and medical treatment	Relative (95% CI)	Absolute	Quality	Importance
Pain (follow-up 6 months; measured with: WOMAC pain; range of scores: 0-500; Better indicated by lower values)												
1	randomised trials	Serious[1]	no serious inconsistency	no serious indirectness	Serious[2]	None	41	36	1.57	SMD -0.44 (-0.89 to 0.01)[3]	⊕⊕OO LOW	CRITICAL
function (follow-up 6 months; measured with: WOMAC function; range of scores: 0-1700; Better indicated by lower values)												
1	randomised trials	Serious[1]	no serious inconsistency	no serious indirectness	Serious[2]	None	41	36	1.45	SMD -0.35 (-0.80 to 0.10)[3]	⊕⊕OO LOW	CRITICAL
withdrawals (follow-up 6 months; number of patients who withdrew from the study after randomization)												
1	randomised trials	serious[1]	no serious inconsistency	no serious indirectness	Serious[2]	None	0/41 (0%)	2/38 (5.3%)	0.19 (0.01 to 3.75)[4]	4 fewer per 100 (from 5 fewer to 14 more)	⊕⊕OO LOW	CRITICAL
Safety												
Not reported												
Adherence												
Not reported												

[1] Blinding of patients and assessors as well as intention-to-treat analyses were not mentioned in this study.
[2] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[3] The results shown in the present table were computed using the data sent to our research team by Dr. Brouwer who had recently received it from the Kirkley Research Group but did not have time to report it to his systematic review. The SMDs were computed using the change in outcomes over time.
[4] We calculated this relative risk using Rev Man 5. Reasons for withdrawals the 7 withdrawals in the control group and the 2 from the neoprene sleeve group include: dissatisfaction with the group to which they had been randomized (n=5), inability to attend appointments (n=2), ill health (n=1) and a change in a scheduled date for an operation (n=1) in the three treatment groups (brace, medical treatment and neoprene sleeve).

Table 8 a: Medially-directed patellar taping versus no taping in knee OA

Author(s): Karine Toupin April
Date: 2009-06-16
Question: Should medially-directed patellar taping versus no taping be used for knee OA?
Bibliography: Warden, 2008

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	medially-directed patellar taping	no taping	Relative (95% CI)	Absolute	Quality	
pain (follow-up 3 weeks[1]; measured with: VAS; range of scores: 0-100; Better indicated by lower values)												
2	randomised trials[2]	serious[3]	no serious inconsistency	no serious indirectness	no serious imprecision	reporting bias[4]	47	47[5]	2.05	SMD -1.17 (-1.51 to -0.83)[6]	⊕⊕OO LOW	CRITICAL
function (follow-up 3 weeks; measured with: WOMAC; range of scores: 0-68; Better indicated by lower values)												
1[7]	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	serious[8]	reporting bias[9]	29	29	1.41	SMD -0.37 (-0.89 to 0.15)[10]	⊕⊕OO LOW	CRITICAL
minor skin irritations (follow-up 6 weeks; number of subjects presenting with minor skin irritations)												
1[11]	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	serious[8]	reporting bias[9]	8/29 (27.6%)	0/29 (0%)	17 (1.03 to 281.5)	0 more per 100 (from 0 more to 0 more)	⊕⊕OO LOW	CRITICAL
withdrawals (follow-up 6 weeks; number of patients who withdrew after randomization)												
1[12]	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	serious[8]	reporting bias[9]	0/29 (0%)	1/29 (3.4%)	0.33 (0.01 to 7.86)	2 fewer per 100 (from 3 fewer to 24 more)	⊕⊕OO LOW	CRITICAL
Adherence (follow-up 6 weeks; number of participants who continued to wear the tape as prescribed)												
1[13]	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	reporting bias[9]	29/29 (100%)	29/29 (100%)	1	0 fewer per 100 (from 100 fewer to 100 fewer)	⊕⊕⊕O MODERATE	CRITICAL

[1] One study looks at the immediate effect of taping and the other one at 3 weeks.
[2] One study was a crossover study and the other was a controlled study.
[3] According to the trials, both studies did not blind subjects and therapists who administered the treatment. However, subjects were not aware of which taping technique was considered therapeutic. Furthermore, because one of the studies (published in Rheumatology) used a crossover (within subject) design, it did not ensure proper allocation concealment and comparability of group characteristics at baseline. The quality assessment reported in the SR by Warden is not consistent with the information given in the RCTs.
[4] There is a publication bias indicated by significant funnel plot asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[5] The study in BMJ included 29 in each group and the crossover study in Rheumatology included 18 patients who had both medially-directed taping and no taping.
[6] This effect size was reported in the SR by Warden.
[7] The SR did not report function. One study (Hinman, 2003 in BMJ) reported function at 3 weeks.
[8] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[9] There is a possibility of publication bias since the funnel plot showed asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[10] We calculated the SMD with the end of study data using RevMan.
[11] One study (Hinman, 2003 in BMJ) reported adverse effects. Another study by the same author (Hinman, 2003 in Rheumatology) reported an absence of adverse effects.

[12] One study (Hinman, 2003 in BMJ) reported withdrawals.
[13] One study (Hinman, 2003 in BMJ) reported adherence.

Table 8 b: Medially-directed patellar taping versus sham taping in knee OA

Author(s): Karine Toupin April
Date: 2009-09-16
Question: Should medially-directed patellar taping versus sham taping be used for knee OA?
Bibliography: Warden, 2008

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	medially-directed patellar taping	sham taping	Relative (95% CI)	Absolute	Quality	
pain (follow-up 3 weeks[1]; measured with: VAS; range of scores: 0-100; Better indicated by lower values)												
3	randomised trials[2]	serious[3]	no serious inconsistency	no serious indirectness	no serious imprecision	reporting bias[4]	61	61[5]	1.66	SMD -0.69 (-1.11 to -0.28)[6]	⊕⊕OO LOW	CRITICAL
function (follow-up 3 weeks; measured with: WOMAC; range of scores: 0-68; Better indicated by lower values)												
1[7]	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	Serious[8]	reporting bias[9]	29	29	0.97	SMD 0.04 (-0.47 to 0.56)	⊕⊕OO LOW	CRITICAL
minor skin irritations (follow-up 3 weeks; number of subjects presenting with minor skin irritations)												
1[10]	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	Serious[8]	Reporting bias[9]	8/29 (27.6%)	1/29 (3.4%)	8 (1.07 to 59.95)	24 more per 100 (from 0 more to 203 more)	⊕⊕OO LOW	CRITICAL
adherence (follow-up 6 weeks; number of participants who continued to wear the tape as prescribed)												
1[11]	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	Reporting bias[9]	29/29 (100%)	29/29 (100%)	1	0 fewer per 100 (from 100 fewer to 100 fewer)	⊕⊕⊕O MODERATE	CRITICAL
Withdrawals												
1[11]	randomised trials	no serious limitations	no serious inconsistency	no serious indirectness	no serious imprecision	Reporting bias[9]	0/29 (0%)	0/29 (0%)	1	0 fewer per 100 (from 100 fewer to 100 fewer)	⊕⊕⊕O MODERATE	CRITICAL

[1] Studies looked at the immediate effect of taping as well as the effect after 4 days and after 3 weeks of intervention.
[2] Two were crossover studies and one was an RCT.
[3] According to the trials, studies did not blind subjects (though it is unclear in the Cushnagan study if patients were blinded) and therapists who administered the treatment. However, subjects were not aware of which taping technique was considered therapeutic. Furthermore, because the two other studies used a crossover (within subject) design, it did not ensure proper allocation concealment and comparability of group characteristics at baseline. The quality assessment reported in the SR by Warden is not consistent with the information given in the RCTs.
[4] There is a publication bias indicated by significant funnel plot asymmetry. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[5] The study published by Hinman in BMJ included 29 in each group, the study by the same author in Rheumatology included 18 patients and the study by Cushnagan included 14 patients.

[6] This effect size was reported in the SR by Warden.
[7] The SR did not report function. One study (Hinman, 2003 in BMJ) reported function at 3 weeks.
[8] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[9] There is a possibility of publication bias since the funnel plot showed asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[10] One study (Hinman, 2003 in BMJ) reported adverse effects. The other studies reported an absence of adverse effects.
[11] One study (Hinman, 2003 in BMJ) reported adherence to the treatment regimen. Cushnagan also reported that all patients followed prescribe taping.

Table 8 c: Laterally-directed patellar taping versus medially-directed patellar taping in knee OA

Author(s): Karine Toupin April
Date: 2009-09-16
Question: Should laterally-directed patellar taping versus medially-directed patellar taping be used for knee OA?
Bibliography: Warden, 2008

Quality assessment							Summary of findings					
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	laterally-directed patellar taping	medially-directed patellar taping	Relative (95% CI)	Absolute	Quality	Importance
Pain (follow-up 4 days; measured with: VAS; range of scores: 0-100; Better indicated by lower values)												
1	randomised trials[1]	Serious[2]	no serious inconsistency	no serious indirectness	no serious imprecision	reporting bias[3]	14	14[5]	*Not estimable due to lack of data	SMD 0.95 (0.42 to 1.48)[4]	⊕⊕OO LOW	CRITICAL
Function												
Not reported												
Safety (follow-up 4 days; number of patients who reported adverse events)												
1	randomised trials[1]	Serious[2]	no serious inconsistency	no serious indirectness	No serious imprecision	Reporting bias[3]	0/14 (0%)	0/14[5] (0%)	1	0 fewer per 100	⊕⊕OO LOW	CRITICAL
Adherence (follow-up 4 days; number of patients who wore tapes on for the full four days)												
1	randomised trials[1]	Serious[2]	no serious inconsistency	no serious indirectness	No serious imprecision	Reporting bias[3]	14/14 (0%)	14/14[5] (0%)	1	0 fewer per 100	⊕⊕OO LOW	CRITICAL
Withdrawals												
1	randomised trials[1]	Serious[2]	no serious inconsistency	no serious indirectness	No serious imprecision	Reporting bias[3]	0/14 (0%)	0/14[5] (0%)	1	0 fewer per 100	⊕⊕OO LOW	CRITICAL

[1] This study by Cushnaghan has a crossover design with 14 patients.
[2] This study did not blind therapists who administered the treatment and it is unclear if patients were blinded. However, subjects were not aware of which taping technique was considered therapeutic. Also, because this study used a crossover (within subject) design, it did not ensure proper allocation concealment and comparability of group characteristics at baseline.
[3] There is a possibility of publication bias since the funnel plot showed asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[4] This effect size was reported in the SR by Warden.
[5] 14 patients received all three types of taping (medial, lateral and neutral) at different time points.

Table 8 d: Laterally-directed patellar taping versus neutral sham taping in knee OA

Author(s): Karine Toupin April
Date: 2009-09-16
Question: Should laterally-directed patellar taping versus neutral sham taping be used for knee OA?
Bibliography: Warden, 2008

Quality assessment							Summary of findings					Importance
							No of patients		Effect			
No of studies	Design	Limitations	Inconsistency	Indirectness	Imprecision	Other considerations	laterally-directed patellar taping	neutral sham taping	Relative (95% CI)	Absolute	Quality	
Pain (follow-up 4 days; measured with: VAS; range of scores: 0-100; Better indicated by lower values)												
1	randomised trials[1]	Serious[2]	no serious inconsistency	no serious indirectness	serious[3]	Reporting bias[4]	14	14[5]	0.94	SMD 0.05 (-0.48 to 0.57)[6]	⊕OOO VERY LOW	CRITICAL
Function												
Not reported												
Safety (follow-up 4 days; number of patients who reported adverse events)												
1	randomised trials[1]	Serious[2]	no serious inconsistency	no serious indirectness	No serious imprecision	Reporting bias[4]	0/14 (0%)	0/14[5] (0%)	1	0 fewer per 100	⊕⊕OO LOW	CRITICAL
Adherence (follow-up 4 days; number of patients who wore tapes on for the full four days)												
1	randomised trials[1]	Serious[2]	no serious inconsistency	no serious indirectness	No serious imprecision	Reporting bias[4]	14/14 (0%)	14/14[5](0%)	1	0 fewer per 100	⊕⊕OO LOW	CRITICAL
Withdrawals												
1	randomised trials[1]	Serious[2]	no serious inconsistency	no serious indirectness	No serious imprecision	Reporting bias[4]	0/14 (0%)	0/14[5](0%)	1	0 fewer per 100	⊕⊕OO LOW	CRITICAL

[1] This study by Cushnaghan has a crossover design with 14 participants.
[2] This study did not blind therapists who administered the treatment and it is unclear if patients were blinded. However, subjects were not aware of which taping technique was considered therapeutic. Also, because this study used a crossover (within subject) design, it did not ensure proper allocation concealment and comparability of group characteristics at baseline. Finally, intention to treat was not performed.
[3] The confidence interval ranges from not being clinically significant to a large clinical effect, which shows imprecision.
[4] There is a possibility of publication bias since the funnel plot showed asymmetry in the SR. This asymmetry indicates that negative studies investigating patellar taping are less likely to be published and smaller studies are more likely to produce larger effect sizes.
[5] 14 patients received all three types of taping (medial, lateral and neutral) at different time points.
[6] This effect size was reported in the SR by Warden.