

# Non-Surgical Options for Managing Knee and Hip Osteoarthritis:

## Supporting Document

### 1. DECISION AID DETAILS AND TERMS OF USE

<b>Decision aids</b>	<p>The following decision aids are part of this collection:</p> <ol style="list-style-type: none"><li>1. Types of non-surgical options for managing knee osteoarthritis</li><li>2. Exercise options for managing knee osteoarthritis</li><li>3. Weight loss programs for managing knee osteoarthritis</li><li>4. Physical and psychological options for managing knee osteoarthritis</li><li>5. Medical options for managing knee osteoarthritis</li><li>6. Types of non-surgical options for managing hip osteoarthritis</li><li>7. Exercise options for managing hip osteoarthritis</li><li>8. Weight loss programs for managing hip osteoarthritis</li><li>9. Physical and psychological options for managing hip osteoarthritis</li><li>10. Medical options for managing hip osteoarthritis</li></ol>
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<b>Next update</b>	These decision aids were developed primarily for use in a demonstration project and, at the time of publication, there are no plans to update them further.
<b>Readability</b>	The Flesch-Kincaid Grade Level of these decision aids ranged from 5.4 to 8.6.
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<b>Conflicts of interest</b>	None of the authors of these decision aids or their affiliations stand to gain or lose from the decisions patients make after using the decision aids.
<b>Copyright</b>	<p>© 2019 The University of Sydney and the Agency for Clinical Innovation</p> <p>These decision aids may be reproduced in whole or part for non-commercial purposes subject to the inclusion of an acknowledgment of the source. To cite this collection of decision aids or an individual decision aid, please use the following references, respectively:</p> <p>Thompson R, Mac O, Trevena L. (2019). Non-surgical options for managing knee and hip osteoarthritis. Version 1.0. Sydney, Australia: The University of Sydney and the Agency for Clinical Innovation.</p> <p>Thompson R, Mac O, Trevena L. (2019). [Decision aid title]. Version 1.0. Sydney, Australia: The University of Sydney and the Agency for Clinical Innovation.</p>
<b>Terms of use</b>	<p><b>Patients:</b> These decision aids are not meant to give you medical advice or recommend a course of treatment and you should not rely on them to do so. They are not intended, and should not be used, to replace the advice or care provided by your health professional. Before making any health decisions, you should consult with your health professional and discuss your options.</p> <p><b>Health professionals:</b> These decision aids are not meant to give you clinical advice and you should not rely on them to do so. They are not intended, and should not be used, as a substitute for a full examination and consideration of medical history in reaching a diagnosis and treatment based on accepted clinical practices.</p> <p><b>All users:</b> Reasonable efforts have been made to ensure that the content provided in these decision aids is up-to-date and accurate. However, none of the authors, their organisations, or the funders of these decision aids accepts any liability or responsibility for the accuracy, currency or completeness of the information contained in the decision aids.</p>
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## 2. EVIDENCE SOURCES

Decision aid content was sourced primarily from the Guideline for the Management of Knee and Hip Osteoarthritis, Second Edition<sup>3</sup> and accompanying Technical Document<sup>1</sup> (hereafter referred to as the Guideline and the Technical Document), published by the Royal Australian College of General Practitioners (RACGP) in July 2018. The Guideline has a strong focus on self-management and its scope is all osteoarthritis interventions other than joint replacement. Specific evidence sources are elaborated below (see Sections 6 and 8) and also indicated via in-text citations in the enclosed versions of the decision aids (see Section 9).

## 3. TARGET POPULATION

The target population for these decision aids is adults diagnosed with symptomatic osteoarthritis of the knee and/or hip who are seeking non-surgical management of their osteoarthritis symptoms, with the exception of weight loss program decision aids, which are relevant only for adults who are overweight or obese. Some of the options presented in the decision aids may not be clinically appropriate for all patients. Health professionals are encouraged to provide supplemental counselling about safety individualised to each patient based on their clinical expertise as explained below (see Section 7.3).

## 4. OPTIONS

### 4.1 Options presented

With two exceptions, the options presented in the decision aids are interventions given a "Strong recommendation for the intervention" or "Conditional recommendation for the intervention" classification by the RACGP during the Guideline development process. More information about these recommendations is provided below (see Section 6.2).

The decision aids also present two options (i.e., topical nonsteroidal anti-inflammatory drugs, paracetamol) given a "Conditional (neutral) recommendation" classification by the RACGP but explicitly described as reasonable to trial for a short period with accompanying monitoring and capture of adverse events and discontinuation if ineffective.

### 4.2 Options not presented

The decision aids do not present interventions given a "Strong recommendation against the intervention", "Conditional recommendation against the intervention", or "Conditional (neutral) recommendation" classification by the RACGP, except as noted above (see Section 4.1). These excluded interventions are listed in the 'Knee osteoarthritis and other interventions' and 'Hip osteoarthritis and other interventions' reference documents available at askshareknow.com.au.

The decision aids do not include information on combination therapy with the exception of presenting weight loss programs with various components. Health professionals using the decision aids are encouraged to provide supplemental counselling about combination therapy.

Because the decision aids are intended for patients seeking management of their osteoarthritis symptoms, no 'no intervention' option is presented.

## 5. STRUCTURE

There are five decision aids that describe options for managing knee osteoarthritis and five decision aids that describe options for managing hip osteoarthritis. Each set of five comprises one decision aid that provides an overview of the categories of non-surgical management options (i.e., exercise options; weight loss programs; physical and psychological options; medical options). Each of the remaining four decision aids in each set focuses on a single category and provides comparative information about management options within it.

## 6.0 DECISION AID CONTENT

### 6.1 Evidence Quality

During the Guideline development process, the RACGP rated the overall quality of the evidence on each intervention using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach, which takes into account four domains of quality (i.e., risk of bias, inconsistency, indirectness, and imprecision). These overall quality of evidence ratings were extracted from the Technical Document and interventions rated as very low or low quality (as opposed to moderate or high quality) were noted in a statement on each decision aid. Notably, the quality rating was very low or low for most options presented in the decision aids. Guidance for health professionals in explaining evidence quality when using the decision aids is provided below (see Section 7.6).

### 6.2 Recommendation

During the Guideline development process, the RACGP formulated recommendations for each intervention considering the quality of evidence, the balance between benefits and harms, values and preferences, resource use, and other relevant considerations. These recommendations were extracted from the Guideline and presented immediately below the name of each option in the decision aids using a simplified label and visual aid, as follows:

Guideline Classification <sup>3</sup>	Decision Aid Label	Visual Aid
Strong recommendation for the intervention	Strong recommendation	
Conditional recommendation for the intervention	Conditional recommendation	
Conditional (neutral) recommendation	Neutral recommendation	

### 6.3 "What did people do?"

Systematic reviews and randomised controlled trials included in the evidence synthesis during Guideline development were sourced (where possible) and information on the interventions that underwent evaluation extracted and summarised. This summary was intended to enable patients to consider each intervention's alignment with their individual values, preferences, and circumstances but was not intended to provide detailed specifications or usage instructions. Where Guideline developers elected to apply evidence from research conducted with people with knee osteoarthritis to those with hip osteoarthritis (or vice versa), intervention descriptions were adapted to refer to the relevant joint or to be more general in nature.

### 6.3 "How much did it improve [pain/function]?"

Estimates of the effect size of each intervention, as compared to the relevant control (i.e., standardised mean differences), on pain and function were extracted from the Technical Document or, where not provided, calculated from source systematic reviews and/or randomised controlled trials. Effect sizes were converted to verbal descriptors based on Cohen's guidelines<sup>169</sup>, as follows:

Standardised Mean Difference	Cohen's Guidelines	Verbal Descriptor
0.01 – 0.19	–	Very small improvement
0.20 – 0.49	Small	Small improvement
0.50 – 0.79	Medium	Moderate improvement
0.80 +	Large	Large improvement

Note. Where the 95% confidence interval for a standardised mean difference spanned 0, a verbal descriptor of 'No improvement' was used.

#### 6.4 "What were some of the side effects?"

Randomised controlled trials included in the evidence synthesis during Guideline development were sourced (where possible) and information on the adverse events extracted and summarised. Due to relatively poor and inconsistent reporting of adverse events across trials, those noted in the decision aids should not be regarded as a comprehensive list or necessarily related to the intervention implemented.

#### 6.5 "How many people had serious side effects?"

Percentages of participants reported to have experienced serious adverse events were extracted from the Technical Document and converted to natural frequencies using a denominator of 100 (e.g., '2 in 100 people').

#### 6.6 "How much weight was lost?"

For the 'weight loss programs' decision aids only, randomised controlled trials included in the evidence synthesis during Guideline development were sourced and information on the average amount of weight loss observed over the intervention period extracted.

### 7. GUIDANCE FOR HEALTH PROFESSIONALS

#### 7.1 How should these decision aids be used?

These decision aids are intended primarily as a framework for a conversation between a health professional and a patient. Thus, the decision aids were designed to be used during (rather than outside of) a consultation with a patient. They aim to help make the different management options clear and guide a discussion about which options might be most suited to the individual patient given their values, preferences, and circumstances. Like any new tool, it might take a few practices to feel confident using these decision aids, but they do not typically require significant changes to the clinical workflow.

#### 7.2 Do I have to use every decision aid with every patient?

No. In some situations, it may be appropriate to discuss only a subset of available options. In these situations, the 'overview' decision aid that describes the categories of management options may be a helpful tool for alerting the patient to the full range of available options prior to having a more focused discussion about a subset of these.

#### 7.3 The decision aid lists options that are contraindicated for the patients I see. What do I do?

You may find that the decision aids list options that are not clinically appropriate for some patients. In this situation, you can simply cross out an option and explain to the patient why it is not safe in their circumstances.

#### 7.4 Our service doesn't offer the options presented in the decision aids. What do I do?

Discussing options not offered within your own service may be difficult for health professionals and/or frustrating for patients. However, it can also be detrimental to make assumptions about a patient's values, preferences, and circumstances ahead of time; one patient's willingness to travel or ability to pay for an option may be very different from another's. Wherever possible, we encourage open discussion about both the full range of options and the practical factors (e.g., time commitment, cost, local availability) that may affect the suitability of each for a patient. Additionally, we encourage supplemental counselling about locally available alternatives to options presented in the decision aids and the benefits and harms that may be expected from these alternatives. Blank decision aid templates on which alternative options can be summarised are available at [askshareknow.com.au](http://askshareknow.com.au).

#### 7.5 The options in the decision aid are too burdensome for the patients I see. What do I do?

Because decision aids are required to be based on scientific evidence<sup>170</sup>, these decision aids present only interventions studied in randomised controlled trials. However, we recognise that there is sometimes a mismatch between the interventions studied in trials and those feasible or adopted in practice. If a patient explains that an option in a decision aid is unrealistic in their circumstances, it may be possible to suggest alternatives based on your clinical expertise, along with supplemental counselling about the benefits and harms that may be expected from these alternatives. Blank decision aid templates on which alternative options can be summarised are available at [askshareknow.com.au](http://askshareknow.com.au).

#### 7.6 How do I explain evidence quality to patients?

The uncertainty introduced by the availability of only low or very low quality evidence can make decision-making more complex. However, transparency about the quality of scientific evidence is required in decision aids<sup>170</sup> and an important aspect of shared decision-making. Below is one way to explain low quality evidence and its meaning for the decision-making process. You may wish to use or adapt this example.

*"As you can see, the information on these options is from low quality or very low quality studies, not moderate or high quality studies. This can be because the studies had only a small number of people, were done on people with a different type of osteoarthritis, or had other problems. Unfortunately, there's nothing we can do about that. What this means for our decision-making today is that we can't be sure what the benefits and harms of these options will be and need to remember that your experiences might be very different from the people's in the studies."*

#### 7.7 How do I explain harms to patients?

As noted above (see Sections 6.4 and 6.5), the decision aids summarise adverse events reported in randomised controlled trials of the interventions and provide the frequency with which serious adverse events were experienced. Because the decision aids present frequencies using only negative framing (i.e., the number of people who experienced a serious adverse event), health professionals are encouraged to provide the equivalent positive framing (i.e., the number of people who *did not* experience a serious adverse event) verbally for balance.

#### 7.8 Can I give the decision aids to patients ahead of time?

Although these decision aids are intended to be used during the consultation, some patients value an opportunity to review the content and identify their questions ahead of time. Health professionals are not discouraged from giving the decision aids to patients to read ahead of a consultation. However, it is important to remember that the decision aids are general in nature (i.e., may present options not suitable for a particular patient) and may also include terms or concepts that are challenging for patients to understand without explanation.

#### 7.9 How do the decision aids fit with the 'Osteoarthritis of the Knee Clinical Care Standard'?

These decision aids complement and facilitate implementation of the Australian Commission on Safety and Quality in Health Care Osteoarthritis of the Knee Clinical Care Standard (2017)<sup>171</sup>, which aims to support the delivery of appropriate evidence-based clinical care and promote shared decision making. In particular, these decision aids assist implementation of care standards pertaining to education and self-management (i.e., Care Standard 3), weight loss and exercise (Care Standard 4), and medicines used to manage symptoms (Care Standard 5) by facilitating the participation of patients in decisions about osteoarthritis management and the development of self-management plans that consider their individual needs, preferences, and circumstances.

## 8. REFERENCES

1. The Royal Australian College of General Practitioners. *Guideline for the Management of Knee and Hip Osteoarthritis: Technical Document*. East Melbourne, VIC: RACGP; 2018.
2. Schünemann H, Brożek J, Guyatt G, Oxman A. GRADE Handbook. <https://gdt.gradepro.org/app/handbook/handbook.html>. Published 2013.
3. The Royal Australian College of General Practitioners. *Guideline for the Management of Knee and Hip Osteoarthritis*. 2nd ed. East Melbourne, VIC: RACGP; 2018.
4. Adler P. *The Effects of Tai Chi on Pain and Function in Older Adults with Osteoarthritis*. Case Western Reserve University; 2007.
5. Brismée J-M, Paige RL, Chyu M-C, et al. Group and home-based tai chi in elderly subjects with knee osteoarthritis: a randomized controlled trial. *Clin Rehabil*. 2007;21(2):99-111.
6. Fransen M, Nairn L, Winstanley J, Lam P, Edmonds J. Physical activity for osteoarthritis management: A randomized controlled clinical trial evaluating hydrotherapy or Tai Chi classes. *Arthritis Rheum*. 2007;57(3):407-414.
7. Hartman CA, Manos TM, Winter C, Hartman DM, Li B, Smith JC. Effects of T'ai Chi training on function and quality of life indicators in older adults with osteoarthritis. *J Am Geriatr Soc*. 2000;48(12):1553-1559.
8. Lee H-J, Park H-J, Chae Y, et al. Tai Chi Qigong for the quality of life of patients with knee osteoarthritis: a pilot, randomized, waiting list controlled trial. *Clin Rehabil*. 2009;23(6):504-511.
9. Tsai P-F, Chang JY, Beck C, Kuo Y-F, Keefe FJ. A Pilot Cluster-Randomized Trial of a 20-Week Tai Chi Program in Elders With Cognitive Impairment and Osteoarthritic Knee: Effects on Pain and Other Health Outcomes. *J Pain Symptom Manage*. 2013;45(4):660-669.
10. Wang C, Schmid CH, Hibberd PL, et al. Tai Chi is effective in treating knee osteoarthritis: A randomized controlled trial. *Arthritis Rheum*. 2009;61(11):1545-1553.
11. Song R, Lee E-O, Lam P, Bae S-C. Effects of tai chi exercise on pain, balance, muscle strength, and perceived difficulties in physical functioning in older women with osteoarthritis: a randomized clinical trial. *J Rheumatol*. 2003;30(9):2039-2044.
12. 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):387-392.
13. 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.
14. 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):1396-1405.
15. Ettinger WH, Burns R, Messier SP, 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.
16. Fransen M, McConnell S, Harmer AR, Van der Esch M, Simic M, Bennell KL. Exercise for osteoarthritis of the knee. *Cochrane Database Syst Rev*. 2015.
17. Salacinski AJ, Krohn K, Lewis SF, Holland ML, Ireland K, Marchetti G. The Effects of Group Cycling on Gait and Pain-Related Disability in Individuals With Mild-to-Moderate Knee Osteoarthritis: A Randomized Controlled Trial. *J Orthop Sport Phys Ther*. 2012;42(12):985-995.
18. Cheung C, Wyman JF, Resnick B, Savik K. Yoga for managing knee osteoarthritis in older women: a pilot randomized controlled trial. *BMC Complement Altern Med*. 2014;14(1):160.
19. Cheung C, Wyman JF, Bronas U, McCarthy T, Rudser K, Mathiason MA. Managing knee osteoarthritis with yoga or aerobic/strengthening exercise programs in older adults: a pilot randomized controlled trial. *Rheumatol Int*. 2017;37(3):389-398.
20. Bartels EM, Juhl CB, Christensen R, et al. Aquatic exercise for the treatment of knee and hip osteoarthritis. *Cochrane Database Syst Rev*. 2016;3:CD005523.
21. Osani M. Additional unpublished data supplied by systematic reviewers. 2019.
22. Maurer BT, Stern AG, Kinossian B, Cook KD, Schumacher HR. Osteoarthritis of the knee: isokinetic quadriceps exercise versus an educational intervention. *Arch Phys Med Rehabil*. 1999;80(10):1293-1299.
23. Jan M-H, Lin C-H, Lin Y-F, Lin J-J, Lin D-H. Effects of Weight-Bearing Versus Nonweight-Bearing Exercise on Function, Walking Speed, and Position Sense in Participants With Knee Osteoarthritis: A Randomized Controlled Trial. *Arch Phys Med Rehabil*. 2009;90(6):897-904.
24. Schilke JM, Johnson GO, Housh TJ, O'Dell JR. Effects of muscle-strength training on the functional status of patients with osteoarthritis of the knee joint. *Nurs Res*. 45(2):68-72.
25. Baker KR, Nelson ME, Felson DT, Layne JE, Sarno R, Roubenoff R. The efficacy of home based progressive strength training in older adults with knee osteoarthritis: a randomized controlled trial. *J Rheumatol*. 2001;28(7):1655-1665.
26. Gür H, Cakin N, Akova B, Okay E, Küçükoğlu S. Concentric versus combined concentric-eccentric isokinetic training: effects on functional capacity and symptoms in patients with osteoarthrosis of the knee. *Arch Phys Med Rehabil*. 2002;83(3):308-316.
27. Huang M-H, Lin Y-S, Yang R-C, Lee C-L. A comparison of various therapeutic exercises on the functional status of patients with knee osteoarthritis. *Semin Arthritis Rheum*. 2003;32(6):398-406.
28. Huang M-H, Yang R-C, Lee C-L, Chen T-W, Wang M-C. Preliminary results of integrated therapy for patients with knee osteoarthritis. *Arthritis Rheum*. 2005;53(6):812-820.
29. Thorstensson CA, Roos EM, Petersson IF, Ekdahl C. Six-week high-intensity exercise program for middle-aged patients with knee osteoarthritis: a randomized controlled trial [ISRCTN20244858]. *BMC Musculoskelet Disord*. 2005;6:27.
30. Jan M-H, Lin J-J, Liao J-J, Lin Y-F, Lin D-H. Investigation of Clinical Effects of High- and Low-Resistance Training for Patients With Knee Osteoarthritis: A Randomized Controlled Trial. *Phys Ther*. 2008;88(4):427-436.
31. Lund H, Weile U, Christensen R, et al. A randomized controlled trial of aquatic and land-based exercise in patients with knee osteoarthritis. *J Rehabil Med*. 2008;40(2):137-144.
32. Bennell KL, Hunt MA, Wrigley TV, et al. Hip strengthening reduces symptoms but not knee load in people with medial knee osteoarthritis and varus malalignment: a randomised controlled trial. *Osteoarthr Cartil*. 2010;18(5):621-628.
33. Foley A, Halbert J, Hewitt T, Crotty M. Does hydrotherapy improve strength and physical function in patients with osteoarthritis--a randomised controlled trial comparing a gym based and a hydrotherapy based strengthening programme. *Ann Rheum Dis*. 2003;62(12):1162-1167.
34. Foroughi N, Smith RM, Lange AK, Baker MK, Fiatarone Singh MA, Vanwanseele B. Lower limb muscle strengthening does not

- change frontal plane moments in women with knee osteoarthritis: A randomized controlled trial. *Clin Biomech.* 2011;26(2):167-174.
35. Bruce-Brand RA, Walls RJ, Ong JC, Emerson BS, O'Byrne JM, Moyna NM. Effects of home-based resistance training and neuromuscular electrical stimulation in knee osteoarthritis: a randomized controlled trial. *BMC Musculoskelet Disord.* 2012;13(1):118.
  36. Kao M-J, Wu M-P, Tsai M-W, Chang W-W, Wu S-F. The effectiveness of a self-management program on quality of life for knee osteoarthritis (OA) patients. *Arch Gerontol Geriatr.* 2012;54(2):317-324.
  37. Lim B, Hinman RS, Wrigley T V., Sharma L, Bennell KL. Does knee malalignment mediate the effects of quadriceps strengthening on knee adduction moment, pain, and function in medial knee osteoarthritis? A randomized controlled trial. *Arthritis Rheum.* 2008;59(7):943-951.
  38. Doi T, Akai M, Fujino K, et al. Effect of Home Exercise of Quadriceps on Knee Osteoarthritis Compared with Nonsteroidal Antiinflammatory Drugs. *Am J Phys Med Rehabil.* 2008;87(4):258-269.
  39. Lin D-H, Lin C-HJ, Lin Y-F, Jan M-H. Efficacy of 2 Non-Weight-Bearing Interventions, Proprioception Training Versus Strength Training, for Patients With Knee Osteoarthritis: A Randomized Clinical Trial. *J Orthop Sport Phys Ther.* 2009;39(6):450-457.
  40. Bezalel T, Carmeli E, Katz-Leurer M. The effect of a group education programme on pain and function through knowledge acquisition and home-based exercise among patients with knee osteoarthritis: A parallel randomised single-blind clinical trial. *Physiotherapy.* 2010;96(2):137-143.
  41. Salli A, Sahin N, Baskent A, Ugurlu H. The effect of two exercise programs on various functional outcome measures in patients with osteoarthritis of the knee: A randomized controlled clinical trial. *Isokinet Exerc Sci.* 2010;18(4):201-209.
  42. Simão AP, Avelar NC, Tossige-Gomes R, et al. Functional Performance and Inflammatory Cytokines After Squat Exercises and Whole-Body Vibration in Elderly Individuals With Knee Osteoarthritis. *Arch Phys Med Rehabil.* 2012;93(10):1692-1700.
  43. Chang T-F, Liou T-H, Chen C-H, Huang Y-C, Chang K-H. Effects of elastic-band exercise on lower-extremity function among female patients with osteoarthritis of the knee. *Disabil Rehabil.* 2012;34(20):1727-1735.
  44. Wang T-J, Belza B, Elaine Thompson F, Whitney JD, Bennett K. Effects of aquatic exercise on flexibility, strength and aerobic fitness in adults with osteoarthritis of the hip or knee. *J Adv Nurs.* 2007;57(2):141-152.
  45. Wang T-J, Lee S-C, Liang S-Y, Tung H-H, Wu S-F V, Lin Y-P. Comparing the efficacy of aquatic exercises and land-based exercises for patients with knee osteoarthritis. *J Clin Nurs.* 2011;20(17-18):2609-2622.
  46. 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 (Rockv).* 2005;9(31):iii-iv, ix-xi, 1-114.
  47. Arnold C. *Fall Risk in Older Adults with Hip Osteoarthritis: Decreasing Risk Through Education and Aquatic Exercise.* Saskatoon: University of Saskatchewan; 2008.
  48. Hale LA, Waters D, Herbison P. A Randomized Controlled Trial to Investigate the Effects of Water-Based Exercise to Improve Falls Risk and Physical Function in Older Adults With Lower-Extremity Osteoarthritis. *Arch Phys Med Rehabil.* 2012;93(1):27-34.
  49. Hinman RS, Heywood SE, Day AR. Aquatic Physical Therapy for Hip and Knee Osteoarthritis: Results of a Single-Blind Randomized Controlled Trial. *Phys Ther.* 2007;87(1):32-43.
  50. Kim I-S, Chung S-H, Park Y-J, Kang H-Y. The effectiveness of an aquarobic exercise program for patients with osteoarthritis. *Appl Nurs Res.* 2012;25(3):181-189.
  51. Lim J-Y, Tchai E, Jang S-N. Effectiveness of Aquatic Exercise for Obese Patients with Knee Osteoarthritis: A Randomized Controlled Trial. *PM&R.* 2010;2(8):723-731.
  52. Patrick DL, Ramsey SD, Spencer AC, Kinne S, Belza B, Topolski TD. Economic evaluation of aquatic exercise for persons with osteoarthritis. *Med Care.* 2001;39(5):413-424.
  53. Stener-Victorin E, Kruse-Smidje C, Jung K. Comparison between electro-acupuncture and hydrotherapy, both in combination with patient education and patient education alone, on the symptomatic treatment of osteoarthritis of the hip. *Clin J Pain.* 20(3):179-185.
  54. Miller GD, Nicklas BJ, Davis C, Loeser RF, Lenchik L, Messier SP. Intensive Weight Loss Program Improves Physical Function in Older Obese Adults with Knee Osteoarthritis\*. *Obesity.* 2006;14(7):1219-1230.
  55. Bliddal H, Leeds AR, Stigsgaard L, Astrup A, Christensen R. Weight loss as treatment for knee osteoarthritis symptoms in obese patients: 1-year results from a randomised controlled trial. *Ann Rheum Dis.* 2011;70(10):1798-1803.
  56. Messier SP, Loeser RF, Miller GD, 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):1501-1510.
  57. Jones A, Silva PG, Silva AC, et al. Impact of cane use on pain, function, general health and energy expenditure during gait in patients with knee osteoarthritis: a randomised controlled trial. *Ann Rheum Dis.* 2012;71(2):172-179.
  58. Yip YB, Tam ACY. An experimental study on the effectiveness of massage with aromatic ginger and orange essential oil for moderate-to-severe knee pain among the elderly in Hong Kong. *Complement Ther Med.* 2008;16(3):131-138.
  59. Perlman AI, Sabina A, Williams A-L, Njike VY, Katz DL. Massage Therapy for Osteoarthritis of the Knee. *Arch Intern Med.* 2006;166(22):2533.
  60. Perlman AI, Ali A, Njike VY, et al. Massage Therapy for Osteoarthritis of the Knee: A Randomized Dose-Finding Trial. *PLoS One.* 2012;7(2):e30248.
  61. Atkins D V, Eichler DA. The effects of self-massage on osteoarthritis of the knee: a randomized, controlled trial. *Int J Ther Massage Bodywork.* 2013;6(1):4-14.
  62. Cheing GL, Hui-Chan CW, Chan KM. Does four weeks of TENS and/or isometric exercise produce cumulative reduction of osteoarthritic knee pain? *Clin Rehabil.* 2002;16(7):749-760.
  63. Cheing GLY, Tsui AYY, Lo SK, Hui-Chan CWY. Optimal stimulation duration of tens in the management of osteoarthritic knee pain. *J Rehabil Med.* 2003;35(2):62-68.
  64. Law PPW, Cheing GLY, Tsui AYY. Does Transcutaneous Electrical Nerve Stimulation Improve the Physical Performance of People With Knee Osteoarthritis? *JCR J Clin Rheumatol.* 2004;10(6):295-299.
  65. Yurtkuran M, Kocagil T. TENS, electroacupuncture and ice massage: comparison of treatment for osteoarthritis of the knee. *Am J Acupunct.* 1999;27(3-4):133-140.
  66. Ng MML, Leung MCP, Poon DMY. The Effects of Electro-Acupuncture and Transcutaneous Electrical Nerve Stimulation on Patients with Painful Osteoarthritic Knees: A Randomized Controlled Trial with Follow-Up Evaluation. *J Altern Complement Med.* 2003;9(5):641-649.
  67. Smith CR, Lewith GT, Machin D. TNS and osteo-arthritic pain. Preliminary study to establish a controlled method of assessing

- transcutaneous nerve stimulation as a treatment for the pain caused by osteo-arthritis of the knee. *Physiotherapy*. 1983;69(8):266-268.
68. Pollard H, Ward G, Hoskins W, Hardy K. The effect of a manual therapy knee protocol on osteoarthritic knee pain: a randomised controlled trial. *J Can Chiropr Assoc*. 2008;52(4):229-242.
  69. Moss P, Sluka K, Wright A. The initial effects of knee joint mobilization on osteoarthritic hyperalgesia. *Man Ther*. 2007;12(2):109-118.
  70. Denegar CR, Dougherty DR, Friedman JE, et al. Preferences for heat, cold, or contrast in patients with knee osteoarthritis affect treatment response. *Clin Interv Aging*. 2010;5:199-206.
  71. Mazzuca SA, Page MC, Meldrum RD, Brandt KD, Petty-Saphon S. Pilot study of the effects of a heat-retaining knee sleeve on joint pain, stiffness, and function in patients with knee osteoarthritis. *Arthritis Rheum*. 2004;51(5):716-721.
  72. Yıldırım N, Filiz Ulusoy M, Bodur H. The effect of heat application on pain, stiffness, physical function and quality of life in patients with knee osteoarthritis. *J Clin Nurs*. 2010;19(7-8):1113-1120.
  73. Helminen E-E, Sinikallio SH, Valjakka AL, Väisänen-Rouvali RH, Arokoski JP. Effectiveness of a cognitive-behavioural group intervention for knee osteoarthritis pain: a randomized controlled trial. *Clin Rehabil*. 2015;29(9):868-881.
  74. Keefe FJ, Caldwell DS, Williams DA, et al. Pain coping skills training in the management of osteoarthritic knee pain: A comparative study. *Behav Ther*. 1990;21(1):49-62.
  75. Smith MT, Finan PH, Buenaver LF, et al. Cognitive-Behavioral Therapy for Insomnia in Knee Osteoarthritis: A Randomized, Double-Blind, Active Placebo-Controlled Clinical Trial. *Arthritis Rheumatol*. 2015;67(5):1221-1233.
  76. Somers TJ, Blumenthal JA, Guilak F, et al. Pain coping skills training and lifestyle behavioral weight management in patients with knee osteoarthritis: A randomized controlled study. *Pain*. 2012;153(6):1199-1209.
  77. Bensen WG, Fiechtner JJ, McMillen JI, et al. Treatment of Osteoarthritis With Celecoxib, a Cyclooxygenase-2 Inhibitor: A Randomized Controlled Trial. *Mayo Clin Proc*. 1999;74(11):1095-1105.
  78. Boswell DJ, Ostergaard K, Philipson RS, et al. Evaluation of GW406381 for treatment of osteoarthritis of the knee: two randomized, controlled studies. *Medscape J Med*. 2008;10(11):259.
  79. Sheldon E, Beaulieu A, Paster Z, Dutta D, Yu S, Sloan VS. Efficacy and tolerability of lumiracoxib in the treatment of osteoarthritis of the knee: A 13-week, randomized, double-blind comparison with celecoxib and placebo. *Clin Ther*. 2005;27(1):64-77.
  80. Tannenbaum H, Berenbaum F, Reginster J-Y, et al. Lumiracoxib is effective in the treatment of osteoarthritis of the knee: a 13 week, randomised, double blind study versus placebo and celecoxib. *Ann Rheum Dis*. 2004;63(11):1419-1426.
  81. Schnitzer TJ, Hochberg MC, Marrero CE, Duquesroix B, Frayssinet H, Beekman M. Efficacy and Safety of Naproxinod in Patients with Osteoarthritis of the Knee: A 53-Week Prospective Randomized Multicenter Study. *Semin Arthritis Rheum*. 2011;40(4):285-297.
  82. Case JP, Baliunas AJ, Block JA. Lack of efficacy of acetaminophen in treating symptomatic knee osteoarthritis: a randomized, double-blind, placebo-controlled comparison trial with diclofenac sodium. *Arch Intern Med*. 2003;163(2):169-178.
  83. Clegg DO, Reda DJ, Harris CL, et al. Glucosamine, Chondroitin Sulfate, and the Two in Combination for Painful Knee Osteoarthritis. *N Engl J Med*. 2006;354(8):795-808.
  84. Conaghan PG, Dickson J, Bolten W, Cevc G, Rother M. A multicentre, randomized, placebo- and active-controlled trial comparing the efficacy and safety of topical ketoprofen in Transfersome gel (IDEA-O33) with ketoprofen-free vehicle (TDT O64) and oral celecoxib for knee pain associated with osteoarthritis. *Rheumatology*. 2013;52(7):1303-1312.
  85. Fleischmann R, Sheldon E, Maldonado-Cocco J, Dutta D, Yu S, Sloan VS. Lumiracoxib is effective in the treatment of osteoarthritis of the knee: a prospective randomized 13-week study versus placebo and celecoxib. *Clin Rheumatol*. 2006;25(1):42-53.
  86. Hochberg MC, Fort JG, Svensson O, Hwang C, Sostek M. Fixed-dose combination of enteric-coated naproxen and immediate-release esomeprazole has comparable efficacy to celecoxib for knee osteoarthritis: two randomized trials. *Curr Med Res Opin*. 2011;27(6):1243-1253.
  87. Kivitz A, Eisen G, Zhao WW, Bevirt T, Recker DP. Randomized placebo-controlled trial comparing efficacy and safety of valdecoxib with naproxen in patients with osteoarthritis. *J Fam Pract*. 2002;51(6):530-537.
  88. Lehmann R, Brzosko M, Kopsa P, et al. Efficacy and tolerability of lumiracoxib 100 mg once daily in knee osteoarthritis: a 13-week, randomized, double-blind study vs. placebo and celecoxib. *Curr Med Res Opin*. 2005;21(4):517-526.
  89. Schnitzer TJ, Kivitz A, Frayssinet H, Duquesroix B. Efficacy and safety of naproxinod in the treatment of patients with osteoarthritis of the knee: a 13-week prospective, randomized, multicenter study. *Osteoarthr Cartil*. 2010;18(5):629-639.
  90. Abou-Raya S, Abou-Raya A, Helmii M. Duloxetine for the management of pain in older adults with knee osteoarthritis: randomised placebo-controlled trial. *Age Ageing*. 2012;41(5):646-652.
  91. Chappell AS, Desai D, Liu-Seifert H, et al. A Double-blind, Randomized, Placebo-controlled Study of the Efficacy and Safety of Duloxetine for the Treatment of Chronic Pain Due to Osteoarthritis of the Knee. *Pain Pract*. 2011;11(1):33-41.
  92. Chappell AS, Ossanna MJ, Liu-Seifert H, et al. Duloxetine, a centrally acting analgesic, in the treatment of patients with osteoarthritis knee pain: A 13-week, randomized, placebo-controlled trial. *Pain*. 2009;146(3):253-260.
  93. Beyaz S. Comparison of efficacy of intra-articular morphine and steroid in patients with knee osteoarthritis. *J Anaesthesiol Clin Pharmacol*. 2012;28(4):496.
  94. de Campos GC, Rezende MU, Pailo AF, Frucchi R, Camargo OP. Adding Triamcinolone Improves Viscosupplementation: A Randomized Clinical Trial. *Clin Orthop Relat Res*. 2013;471(2):613-620.
  95. Henriksen M, Christensen R, Klokke L, et al. Evaluation of the Benefit of Corticosteroid Injection Before Exercise Therapy in Patients With Osteoarthritis of the Knee. *JAMA Intern Med*. 2015;175(6):923.
  96. Jones A, Doherty M. Intra-articular corticosteroids are effective in osteoarthritis but there are no clinical predictors of response. *Ann Rheum Dis*. 1996;55(11):829-832.
  97. Miller J, White J, Norton T. The value of intra-articular injections in osteoarthritis of the knee. *J Bone Joint Surg Br*. 1958;40-B(4):636-643.
  98. Ozturk C, Atamaz F, Hepguler S, Argin M, Arkun R. The safety and efficacy of intraarticular hyaluronan with/without corticosteroid in knee osteoarthritis: 1-year, single-blind, randomized study. *Rheumatol Int*. 2006;26(4):314-319.
  99. Petrella RJ, Emans PJ, Alleyne J, Dellaert F, Gill DP, Maroney M.

- Safety and performance of Hydros and Hydros-TA for knee osteoarthritis: a prospective, multicenter, randomized, double-blind feasibility trial. *BMC Musculoskelet Disord.* 2015;16(1):57.
100. Ravaud P, Moulinier L, Giraudeau B, et al. Effects of joint lavage and steroid injection in patients with osteoarthritis of the knee: Results of a multicenter, randomized, controlled trial. *Arthritis Rheum.* 1999;42(3):475-482.
101. Raynauld J-P, Buckland-Wright C, Ward R, et al. Safety and efficacy of long-term intraarticular steroid injections in osteoarthritis of the knee: A randomized, double-blind, placebo-controlled trial. *Arthritis Rheum.* 2003;48(2):370-377.
102. Smith MD, Wetherall M, Darby T, et al. A randomized placebo-controlled trial of arthroscopic lavage versus lavage plus intra-articular corticosteroids in the management of symptomatic osteoarthritis of the knee. *Rheumatology.* 2003;42(12):1477-1485.
103. Wright V, Chandler GN, Morison RAH, Hartfall SJ. Intra-Articular Therapy in Osteo-Arthritis: Comparison of Hydrocortisone Acetate and Hydro-Cortisone. *Ann Rheum Dis.* 1960;19(3):257-261.
104. Yavuz U, Sökücü S, Albayrak A, Öztürk K. Efficacy comparisons of the intraarticular steroidal agents in the patients with knee osteoarthritis. *Rheumatol Int.* 2012;32(11):3391-3396.
105. Cederlöf S, Jonson G. Intraarticular prednisolone injection for osteoarthritis of the knee. A double blind test with placebo. *Acta Chir Scand.* 1966;132(5):532-537.
106. Young L, Katrib A, Cuello C, et al. Effects of intraarticular glucocorticoids on macrophage infiltration and mediators of joint damage in osteoarthritis synovial membranes: Findings in a double-blind, placebo-controlled study. *Arthritis Rheum.* 2001;44(2):343-350.
107. Castro M, Font P, Escudero A, Frias G, Munoz E, Collantes E. Evaluation of effectiveness of five modalities of intraarticular treatment in patients with osteoarthritis of the knee. *Ann Rheum Dis.* 2007;66((Suppl II)):515.
108. Popov V, Bunchuk N, Apenysheva N. Treatment of patients with gonarthrosis by intra-articular administration of drugs. *Klin Meditsina.* 1989;67(4):104-108.
109. Schue J. Treatment of knee osteoarthritis with intraarticular infliximab may improve knee function and reduce synovial infiltration by macrophages. *Proc Am Coll Rheumatol 2011 Conf.* 2011.
110. Zhilyayev E, Zagrebneva A, Glazunov A, Glazunov P, Alkhimenko T. Efficacy of intraarticular and periarticular glucocorticoid injections in patients with knee osteoarthritis: A randomized double-blind study. *Int J Rheum Dis.* 2012;15:95.
111. Chao J, Wu C, Sun B, et al. Inflammatory Characteristics on Ultrasound Predict Poorer Longterm Response to Intraarticular Corticosteroid Injections in Knee Osteoarthritis. *J Rheumatol.* 2010;37(3):650-655.
112. Dieppe PA, Sathapatayavongs B, Jones HE, Bacon PA, Ring EF. Intra-articular steroids in osteoarthritis. *Rheumatol Rehabil.* 1980;19(4):212-217.
113. Di Sante L, Paoloni M, Dimaggio M, et al. Ultrasound-guided aspiration and corticosteroid injection compared to horizontal therapy for treatment of knee osteoarthritis complicated with Baker's cyst: a randomized, controlled trial. *Eur J Phys Rehabil Med.* 2012;48(4):561-567.
114. Frias G, Caracuel MA, Escudero A, et al. Assessment of the efficacy of joint lavage versus joint lavage plus corticoids in patients with osteoarthritis of the knee. *Curr Med Res Opin.* 2004;20(6):861-867.
115. Friedman DM, Moore ME. The efficacy of intraarticular steroids in osteoarthritis: a double-blind study. *J Rheumatol.* 7(6):850-856.
116. Gaffney K, Ledingham J, Perry JD. Intra-articular triamcinolone hexacetonide in knee osteoarthritis: factors influencing the clinical response. *Ann Rheum Dis.* 1995;54(5):379-381.
117. Grecomoro G, Piccione F, Letizia G. Therapeutic synergism between hyaluronic acid and dexamethasone in the intra-articular treatment of osteoarthritis of the knee: a preliminary open study. *Curr Med Res Opin.* 1992;13(1):49-55.
118. Baraf HSB, Gold MS, Clark MB, Altman RD. Safety and Efficacy of Topical Diclofenac Sodium 1% Gel in Knee Osteoarthritis: A Randomized Controlled Trial. *Phys Sportsmed.* 2010;38(2):19-28.
119. Barthel HR, Haselwood D, Longley S, Gold MS, Altman RD. Randomized Controlled Trial of Diclofenac Sodium Gel in Knee Osteoarthritis. *Semin Arthritis Rheum.* 2009;39(3):203-212.
120. Kneer W, Rother M, Mazgareanu S, Seidel EJ, European IDEA-O33 study group. A 12-week randomized study of topical therapy with three dosages of ketoprofen in Transfersome® gel (IDEA-O33) compared with the ketoprofen-free vehicle (TDT 064), in patients with osteoarthritis of the knee. *J Pain Res.* 2013;6:743.
121. Roth SH, Shainhouse JZ. Efficacy and Safety of a Topical Diclofenac Solution (Pennsaid) in the Treatment of Primary Osteoarthritis of the Knee. *Arch Intern Med.* 2004;164(18):2017.
122. Rother M, Conaghan PG. A Randomized, Double-blind, Phase III Trial in Moderate Osteoarthritis Knee Pain Comparing Topical Ketoprofen Gel with Ketoprofen-free Gel. *J Rheumatol.* 2013;40(10):1742-1748.
123. Simon LS, Grierson LM, Naseer Z, Bookman AAM, Shainhouse ZJ. Efficacy and safety of topical diclofenac containing dimethyl sulfoxide (DMSO) compared with those of topical placebo, DMSO vehicle and oral diclofenac for knee osteoarthritis. *Pain.* 2009;143(3):238-245.
124. Amadio P, Cummings D. Evaluation of acetaminophen in the management of osteoarthritis of the knee. *Curr Ther Res Clin Exp.* 1983;34:59-66.
125. Zoppi M, Peretti G, Boccard E. Placebo-controlled study of the analgesic efficacy of an effervescent formulation of 500 mg paracetamol in arthritis of the knee or the hip. *Eur J Pain.* 1995;16:42-48.
126. Golden HE, Moskowitz RW, Minic M. Analgesic efficacy and safety of nonprescription doses of naproxen sodium compared with acetaminophen in the treatment of osteoarthritis of the knee. *Am J Ther.* 11(2):85-94.
127. Miceli-Richard C, Le Bars M, Schmidely N, Dougados M. Paracetamol in osteoarthritis of the knee. *Ann Rheum Dis.* 2004;63(8):923-930.
128. Pincus T, Koch G, Lei H, et al. Patient Preference for Placebo, Acetaminophen (paracetamol) or Celecoxib Efficacy Studies (PACES): two randomised, double blind, placebo controlled, crossover clinical trials in patients with knee or hip osteoarthritis. *Ann Rheum Dis.* 2004;63(8):931-939.
129. Herrero-Beaumont G, Ivorra JAR, del Carmen Trabado M, et al. Glucosamine sulfate in the treatment of knee osteoarthritis symptoms: A randomized, double-blind, placebo-controlled study using acetaminophen as a side comparator. *Arthritis Rheum.* 2007;56(2):555-567.
130. Altman RD, Zinsenheim JR, Temple AR, Schweinle JE. Three-month efficacy and safety of acetaminophen extended-release for osteoarthritis pain of the hip or knee: a randomized, double-blind, placebo-controlled study. *Osteoarthr Cartil.* 2007;15(4):454-461.

131. Prior MJ, Harrison DD, Frustaci ME. A randomized, double-blind, placebo-controlled 12 week trial of acetaminophen extended release for the treatment of signs and symptoms of osteoarthritis. *Curr Med Res Opin.* 2014;30(11):2377-2387.
132. Machado GC, Maher CG, Ferreira PH, et al. Efficacy and safety of paracetamol for spinal pain and osteoarthritis: systematic review and meta-analysis of randomised placebo controlled trials. *BMJ.* 2015;350:h1225.
133. Fernandes L, Storheim K, Sandvik L, Nordsletten L, Risberg MA. Efficacy of patient education and supervised exercise vs patient education alone in patients with hip osteoarthritis: a single blind randomized clinical trial. *Osteoarthr Cartil.* 2010;18(10):1237-1243. doi:10.1016/j.joca.2010.05.015
134. Juhakoski R, Tenhonen S, Malmivaara A, Kiviniemi V, Anttonen T, Arokoski JP. A pragmatic randomized controlled study of the effectiveness and cost consequences of exercise therapy in hip osteoarthritis. *Clin Rehabil.* 2011;25(4):370-383. doi:10.1177/O269215510388313
135. Krauß I, Steinhilber B, Haupt G, Miller R, Martus P, Janßen P. Exercise therapy in hip osteoarthritis--a randomized controlled trial. *Dtsch Arztebl Int.* 2014;111(35-36):592-599. doi:10.3238/arztebl.2014.0592
136. Fernandes L, Storheim K, Sandvik L, Nordsletten L, Risberg MA. Efficacy of patient education and supervised exercise vs patient education alone in patients with hip osteoarthritis: a single blind randomized clinical trial. *Osteoarthr Cartil.* 2010;18(10):1237-1243. doi:10.1016/j.joca.2010.05.015
137. Juhakoski R, Tenhonen S, Malmivaara A, Kiviniemi V, Anttonen T, Arokoski JP. A pragmatic randomized controlled study of the effectiveness and cost consequences of exercise therapy in hip osteoarthritis. *Clin Rehabil.* 2011;25(4):370-383. doi:10.1177/O269215510388313
138. Krauß I, Steinhilber B, Haupt G, Miller R, Martus P, Janßen P. Exercise therapy in hip osteoarthritis--a randomized controlled trial. *Dtsch Arztebl Int.* 2014;111(35-36):592-599. doi:10.3238/arztebl.2014.0592
139. Poulsen E, Hartvigsen J, Christensen HW, Roos EM, Vach W, Overgaard S. Patient education with or without manual therapy compared to a control group in patients with osteoarthritis of the hip. A proof-of-principle three-arm parallel group randomized clinical trial. *Osteoarthr Cartil.* 2013;21(10):1494-1503. doi:10.1016/j.joca.2013.06.009
140. Abbott JH, Robertson MC, Chapple C, et al. Manual therapy, exercise therapy, or both, in addition to usual care, for osteoarthritis of the hip or knee: a randomized controlled trial. 1: clinical effectiveness. *Osteoarthr Cartil.* 2013;21(4):525-534. doi:10.1016/j.joca.2012.12.014
141. Broderick JE, Keefe FJ, Bruckenthal P, et al. Nurse practitioners can effectively deliver pain coping skills training to osteoarthritis patients with chronic pain: A randomized, controlled trial. *Pain.* 2014;155(9):1743-1754. doi:10.1016/j.pain.2014.05.024
142. Gay M-C, Philippot P, Luminet O. Differential effectiveness of psychological interventions for reducing osteoarthritis pain: a comparison of Erickson hypnosis and Jacobson relaxation. *Eur J Pain.* 2002;6(1):1-16. doi:10.1053/eujp.2001.0263
143. Murphy SL, Kratz AL, Kidwell K, Lyden AK, Geisser ME, Williams DA. Brief time-based activity pacing instruction as a singular behavioral intervention was not effective in participants with symptomatic osteoarthritis. *Pain.* 2016;157(7):1563-1573. doi:10.1097/j.pain.0000000000000549
144. Rini C, Porter LS, Somers TJ, et al. Automated Internet-based pain coping skills training to manage osteoarthritis pain. *Pain.* 2015;156(5):837-848. doi:10.1097/j.pain.0000000000000121
145. Allen KD, Yancy WS, Bosworth HB, et al. A Combined Patient and Provider Intervention for Management of Osteoarthritis in Veterans. *Ann Intern Med.* 2016;164(2):73. doi:10.7326/M15-0378
146. Poulsen E, Hartvigsen J, Christensen HW, Roos EM, Vach W, Overgaard S. Patient education with or without manual therapy compared to a control group in patients with osteoarthritis of the hip. A proof-of-principle three-arm parallel group randomized clinical trial. *Osteoarthr Cartil.* 2013;21(10):1494-1503. doi:10.1016/j.joca.2013.06.009
147. Abbott JH, Robertson MC, Chapple C, et al. Manual therapy, exercise therapy, or both, in addition to usual care, for osteoarthritis of the hip or knee: a randomized controlled trial. 1: clinical effectiveness. *Osteoarthr Cartil.* 2013;21(4):525-534. doi:10.1016/j.joca.2012.12.014
148. Broderick JE, Keefe FJ, Bruckenthal P, et al. Nurse practitioners can effectively deliver pain coping skills training to osteoarthritis patients with chronic pain: A randomized, controlled trial. *Pain.* 2014;155(9):1743-1754. doi:10.1016/j.pain.2014.05.024
149. Gay M-C, Philippot P, Luminet O. Differential effectiveness of psychological interventions for reducing osteoarthritis pain: a comparison of Erickson hypnosis and Jacobson relaxation. *Eur J Pain.* 2002;6(1):1-16. doi:10.1053/eujp.2001.0263
150. Murphy SL, Kratz AL, Kidwell K, Lyden AK, Geisser ME, Williams DA. Brief time-based activity pacing instruction as a singular behavioral intervention was not effective in participants with symptomatic osteoarthritis. *Pain.* 2016;157(7):1563-1573. doi:10.1097/j.pain.0000000000000549
151. Rini C, Porter LS, Somers TJ, et al. Automated Internet-based pain coping skills training to manage osteoarthritis pain. *Pain.* 2015;156(5):837-848. doi:10.1097/j.pain.0000000000000121
152. Allen KD, Yancy WS, Bosworth HB, et al. A Combined Patient and Provider Intervention for Management of Osteoarthritis in Veterans. *Ann Intern Med.* 2016;164(2):73. doi:10.7326/M15-0378
153. Makarowski W, Zhao WW, Bevirt T, Recker DP. Efficacy and safety of the COX-2 specific inhibitor valdecoxib in the management of osteoarthritis of the hip: a randomized, double-blind, placebo-controlled comparison with naproxen. *Osteoarthr Cartil.* 2002;10(4):290-296. doi:10.1053/joca.2001.0510
154. Schnitzer TJ, Dattani ID, Seriola B, et al. A 13-week, multicenter, randomized, double-blind study of lumiracoxib in hip osteoarthritis. *Clin Rheumatol.* 2011;30(11):1433-1446. doi:10.1007/s10067-011-1776-4
155. Baerwald C, Verdecchia P, Duquesroix B, Frayssinet H, Ferreira T. Efficacy, safety, and effects on blood pressure of naproxinod 750 mg twice daily compared with placebo and naproxen 500 mg twice daily in patients with osteoarthritis of the hip: A randomized, double-blind, parallel-group, multicenter study. *Arthritis Rheum.* 2010;62(12):3635-3644. doi:10.1002/art.27694
156. Atchia I, Kane D, Reed MR, Isaacs JD, Birrell F. Efficacy of a single ultrasound-guided injection for the treatment of hip osteoarthritis. *Ann Rheum Dis.* 2011;70(1):110-116. doi:10.1136/ard.2009.127183
157. Lambert RGW, Hutchings EJ, Grace MGA, Jhangri GS, Conner-Spady B, Maksymowych WP. Steroid injection for osteoarthritis of the hip: A randomized, double-blind, placebo-controlled trial. *Arthritis Rheum.* 2007;56(7):2278-2287. doi:10.1002/art.22739
158. Kullenberg B, Runesson R, Tuvhag R, Olsson C, Resch S. Intraarticular corticosteroid injection: pain relief in osteoarthritis of the hip? *J Rheumatol.* 2004;31(11):2265-2268. <http://www.ncbi.nlm.nih.gov/pubmed/15517641>. Accessed August 6, 2019.
159. Qvistgaard E, Christensen R, Torp-Pedersen S, Bliddal H. Intra-

- articular treatment of hip osteoarthritis: a randomized trial of hyaluronic acid, corticosteroid, and isotonic saline. *Osteoarthritis Cartil.* 2006;14(2):163-170. doi:10.1016/j.joca.2005.09.007
160. Flanagan J, Casale FF, Thomas TL, Desai KB. Intra-articular injection for pain relief in patients awaiting hip replacement. *Ann R Coll Surg Engl.* 1988;70(3):156-157. <http://www.ncbi.nlm.nih.gov/pubmed/2457352>. Accessed August 6, 2019.
161. Makarowski W, Zhao WW, Bevirt T, Recker DP. Efficacy and safety of the COX-2 specific inhibitor valdecoxib in the management of osteoarthritis of the hip: a randomized, double-blind, placebo-controlled comparison with naproxen. *Osteoarthritis Cartil.* 2002;10(4):290-296. doi:10.1053/joca.2001.0510
162. Schnitzer TJ, Dattani ID, Seriola B, et al. A 13-week, multicenter, randomized, double-blind study of lumiracoxib in hip osteoarthritis. *Clin Rheumatol.* 2011;30(11):1433-1446. doi:10.1007/s10067-011-1776-4
163. Baerwald C, Verdecchia P, Duquesroix B, Frayssinet H, Ferreira T. Efficacy, safety, and effects on blood pressure of naproxen 750 mg twice daily compared with placebo and naproxen 500 mg twice daily in patients with osteoarthritis of the hip: A randomized, double-blind, parallel-group, multicenter study. *Arthritis Rheum.* 2010;62(12):3635-3644. doi:10.1002/art.27694
164. Atchia I, Kane D, Reed MR, Isaacs JD, Birrell F. Efficacy of a single ultrasound-guided injection for the treatment of hip osteoarthritis. *Ann Rheum Dis.* 2011;70(1):110-116. doi:10.1136/ard.2009.127183
165. Lambert RGW, Hutchings EJ, Grace MGA, Jhangri GS, Conner-Spady B, Maksymowych WP. Steroid injection for osteoarthritis of the hip: A randomized, double-blind, placebo-controlled trial. *Arthritis Rheum.* 2007;56(7):2278-2287. doi:10.1002/art.22739
166. Kullenberg B, Runesson R, Tuvhag R, Olsson C, Resch S. Intraarticular corticosteroid injection: pain relief in osteoarthritis of the hip? *J Rheumatol.* 2004;31(11):2265-2268.
167. Qvistgaard E, Christensen R, Torp-Pedersen S, Bliddal H. Intra-articular treatment of hip osteoarthritis: a randomized trial of hyaluronic acid, corticosteroid, and isotonic saline. *Osteoarthritis Cartil.* 2006;14(2):163-170. doi:10.1016/j.joca.2005.09.007
168. Flanagan J, Casale FF, Thomas TL, Desai KB. Intra-articular injection for pain relief in patients awaiting hip replacement. *Ann R Coll Surg Engl.* 1988;70(3):156-157.
169. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. Second. Hillsdale, NJ: Erlbaum; 1988.
170. International Patient Decision Aid Standards (IPDAS) Collaboration. *IPDAS 2005: Criteria for Judging the Quality of Patient Decision Aids.*; 2005.
171. Australian Commission on Safety and Quality in Health Care. *Osteoarthritis of the Knee Clinical Care Standard*. Sydney, Australia: ACSQHC; 2017.



## TYPES OF NON-SURGICAL OPTIONS

### for managing knee osteoarthritis

This decision aid aims to help you and your health professional talk about types of non-surgical options for managing knee osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

**Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.**

	EXERCISE OPTIONS	WEIGHT LOSS PROGRAMS (if overweight or obese)	PHYSICAL + PSYCHOLOGICAL OPTIONS	MEDICAL OPTIONS
What did people do?	Attended Tai Chi, walking, muscle strengthening, stationary cycling, yoga, or water-based exercise classes	Completed weight loss programs focused on dietary education, diet, exercise, or a combination	Used a walking stick; received massage; had transcutaneous electrical nerve stimulation; or received manual therapy, heat therapy, or cognitive behaviour therapy.	Took oral NSAIDs or duloxetine (off-label use); had corticosteroid injections; applied topical NSAIDs; or took paracetamol
How much did it improve pain?	Up to a <b>large</b> improvement, depending on the option	Up to a <b>moderate</b> improvement, depending on the program (and amount of weight loss)	Up to a <b>large</b> improvement, depending on the option	A <b>small</b> improvement
How much did it improve function?	Up to a <b>large</b> improvement, depending on the option	Up to a <b>moderate</b> improvement, depending on the program (and amount of weight loss)	Up to a <b>large</b> improvement, depending on the option	Up to a <b>small</b> improvement, depending on the option
How many people had serious side effects?	Up to 5 in 100 people (but unknown for some options)	<b>None</b> (but unknown for some programs)	<b>None</b> (but unknown for some options)	Up to 2 in 100 people
Where can I learn more?	See <b>Exercise Options for Managing Knee Osteoarthritis</b> decision aid	See <b>Weight Loss Programs for Managing Knee Osteoarthritis</b> decision aid	See <b>Physical and Psychological Options for Managing Knee Osteoarthritis</b> decision aid	See <b>Medical Options for Managing Knee Osteoarthritis</b> decision aid

**Caution:** The research on most of these options was low quality or very low quality<sup>1</sup>. This means that the actual effects of most of these options may be very different from what the research found<sup>2</sup>.

## EXERCISE OPTIONS

### for managing knee osteoarthritis

This decision aid aims to help you and your health professional talk about exercise options for managing knee osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.

	TAI CHI	WALKING	MUSCLE STRENGTHENING	STATIONARY CYCLING	YOGA	WATER-BASED EXERCISE
	<b>Strong recommendation<sup>3</sup></b> 	<b>Strong recommendation<sup>3</sup></b> 	<b>Strong recommendation<sup>3</sup></b> 	<b>Conditional recommendation<sup>3</sup></b> 	<b>Conditional recommendation<sup>3</sup></b> 	<b>Conditional recommendation<sup>3</sup></b> 
<b>What did people do?</b>	Attended Tai Chi classes (for 20–60 mins, 1–3 times a week), sometimes adding or transitioning to home practice (for 15–40 mins, 3–7 times a week) <sup>4–11</sup>	Attended low- to moderate-intensity walking classes (for 60 mins, 3 times a week) or gradually increased their step count (every day) <sup>12–15</sup>	Attended individual or group classes at a facility to strengthen their leg muscles (for 15–60 mins, 1–3 times a week) and/or did similar exercises at home (for 30 mins, 1–5 times a week) <sup>16</sup>	Attended indoor stationary cycling classes for osteoarthritis (for 40–60 mins, at least 2 times a week) <sup>17</sup>	Attended yoga classes for osteoarthritis (for 45–60 mins, once a week) with additional practice at home (for 30 mins, 4 times a week) <sup>18,19</sup>	Attended exercise classes done in a shallow pool that focused on strength, stretching, balance and/or fitness (for 20–60 mins, 2–3 times a week) <sup>20</sup>
<b>How much did it improve pain?</b>	<b>Moderate</b> improvement <sup>1</sup>	<b>Small</b> improvement <sup>1</sup>	<b>Moderate</b> improvement <sup>1</sup>	<b>Large</b> improvement <sup>21</sup>	<b>Large</b> improvement <sup>21</sup>	<b>Small</b> improvement <sup>1</sup>
<b>How much did it improve function?</b>	<b>Moderate</b> improvement <sup>1</sup>	<b>Small</b> improvement <sup>1</sup>	<b>Moderate</b> improvement <sup>1</sup>	<b>No</b> improvement <sup>1</sup>	<b>Large</b> improvement <sup>21</sup>	<b>Small</b> improvement <sup>1</sup>
<b>What were some of the side effects?</b>	Joint, foot, back, and muscle pain <sup>4–11</sup>	Falling; fracture <sup>12–15</sup>	Joint, neck, back, and groin pain; falling; fracture; aggravated varicose veins <sup>15,22–43</sup>	Joint pain <sup>17</sup>	Musculoskeletal pain <sup>1</sup>	Joint, leg, back, and muscle pain; slipping; cramping; dizziness; heart problems <sup>6,31,33,44–53</sup>
<b>How many people had serious side effects?</b>	5 in 100 people <sup>1</sup>	1 in 100 people <sup>1</sup>	2 in 100 people <sup>1</sup>	(Unknown) <sup>1</sup>	<b>None</b> <sup>1</sup>	(Unknown) <sup>1</sup>

**Caution:** The research on all of these options was low quality or very low quality<sup>1</sup>. This means that the actual effects of these options may be very different from what the research found<sup>2</sup>.

## WEIGHT LOSS PROGRAMS

### for managing knee osteoarthritis

This decision aid aims to help you and your health professional talk about weight loss programs for managing knee osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.

	DIETARY EDUCATION + DIET + EXERCISE	DIETARY EDUCATION + DIET	DIETARY EDUCATION
	<p>Guidelines give a <b>strong recommendation</b> to weight loss for people who are overweight or obese but do not give recommendations about these individual weight loss programs<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>		
What did people do?	<p>Attended group and individual classes on dietary habits with health professionals (for 60 mins, once a week)</p> <p>– and –</p> <p>Followed a personalised low-calorie meal plan with up to 2 meal replacement drinks or bars per day (every day for the period of the diet)</p> <p>– and –</p> <p>Did structured exercise at a facility (for 60 mins, 3 times a week)<sup>54</sup></p>	<p>Attended group classes on dietary habits with a health professional (for 90 mins, once a week, then once every 2 weeks)</p> <p>– alternating with –</p> <p>Followed a low-calorie diet of 6 meal replacement drinks per day (every day for 8 weeks then every day for another 4 weeks later on)<sup>55</sup></p>	<p>Attended group and individual classes on dietary habits (once a week, then once every 2 weeks, then once a month)<sup>56</sup></p>
How much weight was lost?	9% of body weight after 6 months <sup>54</sup>	11% of body weight after 12 months <sup>55</sup>	5% of body weight after 18 months <sup>56</sup>
How much did it improve pain?	<b>Moderate</b> improvement <sup>54</sup>	<b>Small</b> improvement <sup>55</sup>	<b>No</b> improvement <sup>56</sup>
How much did it improve function?	<b>Moderate</b> improvement <sup>54</sup>	<b>No</b> improvement <sup>55</sup>	<b>No</b> improvement <sup>56</sup>
What were some of the side effects?	(Unknown) <sup>54</sup>	Constipation, flatulence, dizziness, sensitivity to cold <sup>55</sup>	(Unknown) <sup>56</sup>
How many people had serious side effects?	<b>None</b> <sup>1</sup>	(Unknown) <sup>1</sup>	(Unknown) <sup>1</sup>

**Caution:** The research on weight loss programs was very low quality<sup>1</sup>. This means that the actual effects of these programs may be very different from what the research found<sup>2</sup>.

## PHYSICAL AND PSYCHOLOGICAL OPTIONS

### for managing knee osteoarthritis

This decision aid aims to help you and your health professional talk about physical and psychological options for managing knee osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.

	WALKING STICK	MASSAGE	TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION	MANUAL THERAPY	HEAT THERAPY	COGNITIVE BEHAVIOUR THERAPY
	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>
What did people do?	Used a wooden walking stick with a T-shaped handle (every day) <sup>57</sup>	Received Swedish or aroma massage from a trained practitioner or did guided self-massage (for 20–60 mins, 1 to 3 times a week) <sup>58–61</sup>	Had transcutaneous electrical nerve stimulation (TENS), which sends tingling sensations into the body through patches placed on the skin (for 20–60 mins, 2–5 days a week) <sup>62–67</sup>	Attended sessions where a trained practitioner (e.g., physiotherapist) used their hands and body to slowly and gently apply pressure to and move the knee joint (3 times a week) <sup>68,69</sup>	Put an electric heat pad on their knee (for 20 mins, 2 times a day, 5 days a week), had a digital moist heat pad put on their knee (for 20 mins, 3–4 days a week), or wore a heat-retaining knee sleeve (for at least 12 hrs a day, every day) <sup>70–72</sup>	Attended group classes on pain coping or other skills with a psychologist and/or other professional (for 45–120 mins, once a week or once every 2 weeks) <sup>73–76</sup>
How much did it improve pain?	Large improvement <sup>21</sup>	Moderate improvement <sup>1</sup>	Moderate improvement <sup>1</sup>	No improvement <sup>1</sup>	Small improvement <sup>1</sup>	Small improvement <sup>1</sup>
How much did it improve function?	Large improvement <sup>21</sup>	Moderate improvement <sup>1</sup>	Small improvement <sup>1</sup>	Moderate improvement <sup>1</sup>	No improvement <sup>1</sup>	No improvement <sup>1</sup>
What were some of the side effects?	(Unknown) <sup>57</sup>	Discomfort <sup>58–61</sup>	Skin reaction <sup>62–67</sup>	None <sup>68,69</sup>	None <sup>70–72</sup>	(Unknown) <sup>73–76</sup>
How many people had serious side effects?	(Unknown) <sup>1</sup>	(Unknown) <sup>1</sup>	None <sup>1</sup>	None <sup>1</sup>	None <sup>1</sup>	(Unknown) <sup>1</sup>

**Caution:** The research on all of these options was low quality or very low quality<sup>1</sup>. This means that the actual effects of these options may be very different from what the research found<sup>2</sup>.

## MEDICAL OPTIONS

### for managing knee osteoarthritis

This decision aid aims to help you and your health professional talk about medical options for managing knee osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.

	ORAL NSAIDS	DULOXETINE (off-label use)	CORTICOSTEROID INJECTIONS	TOPICAL NSAIDS	PARACETAMOL
	<p><b>Conditional recommendation<sup>3</sup></b></p> <p>■ ■ ■ ■ ■</p>	<p><b>Conditional recommendation<sup>3</sup></b></p> <p>■ ■ ■ ■ ■</p>	<p><b>Conditional recommendation<sup>3</sup></b></p> <p>■ ■ ■ ■ ■</p>	<p><b>Neutral recommendation<sup>3</sup></b></p> <p>■ ■ ■ ■ ■</p>	<p><b>Neutral recommendation<sup>3</sup></b></p> <p>■ ■ ■ ■ ■</p>
<b>What did people do?</b>	Took nonsteroidal anti-inflammatory drugs (NSAIDs) orally (once or twice a day) <sup>77-89</sup>	Took the drug duloxetine orally (once a day) <sup>90-92</sup>  [Note: Duloxetine is not approved for this use <sup>3</sup> ]	Had an injection of a corticosteroid into their knee joint (usually once only, sometimes once a week (for a short period) or once every 3-6 months) <sup>93-117</sup>	Applied nonsteroidal anti-inflammatory drugs (NSAIDs) in a cream or gel to their knee (2-4 times a day) <sup>84,118-123</sup>	Took the drug paracetamol orally (3-4 times a day) <sup>82,124-131</sup>
<b>How much did it improve pain?</b>	<b>Small improvement<sup>1</sup></b>	<b>Small improvement<sup>1</sup></b>	<b>Small improvement (for 4-6 weeks only)<sup>1</sup></b>	<b>Small improvement<sup>1</sup></b>	<b>Small improvement<sup>132</sup></b>
<b>How much did it improve function?</b>	<b>Small improvement<sup>1</sup></b>	<b>Small improvement<sup>1</sup></b>	<b>Small improvement (for 4-6 weeks only)<sup>1</sup></b>	<b>Very small improvement<sup>1</sup></b>	<b>Very small improvement<sup>132</sup></b>
<b>What were some of the side effects?</b>	Digestive problems (e.g., constipation, indigestion, diarrhoea); respiratory problems (e.g., infection, cold); rash; pain (e.g., joint, back); headache; ulcers; heart problems (including causing death); others <sup>77-89</sup>	Digestive problems (e.g., constipation, nausea); respiratory problems (e.g., cough, asthma); pain (e.g., joint, muscle); sweating; drowsiness; dizziness; heart rhythm problems; low sex drive; others <sup>90-92</sup>	Injection site reactions (e.g., warmth, swelling, discomfort, stiffness, fluid accumulation); pain (e.g., joint, back); nausea, cold, headache <sup>93-106,111-117</sup> . There may also be more rapid cartilage loss with repeated use <sup>3</sup> .	Digestive problems (e.g., constipation, indigestion); skin problems (e.g., rash, itching, dryness); pain (e.g., joint, back, neck); headache; respiratory problems (e.g., infection, cold, asthma); others <sup>84,118-123</sup>	Digestive problems (e.g., indigestion, nausea, diarrhoea); headache; dizziness; respiratory problems (e.g., infection, cough); pain (e.g., back, neck); abnormal liver function; others <sup>82,124-131</sup>
<b>How many people had serious side effects?</b>	<b>2 in 100 people<sup>1</sup></b>	<b>1 in 100 people<sup>1</sup></b>	<b>2 in 100 people<sup>1</sup></b>	<b>1 in 100 people<sup>1</sup></b>	<b>1 in 100 people<sup>1</sup></b>

**Caution:** The research on corticosteroid injections and paracetamol was very low quality<sup>1</sup>. This means that the actual effects of these options may be very different from what the research found<sup>2</sup>.

## TYPES OF NON-SURGICAL OPTIONS for managing hip osteoarthritis

This decision aid aims to help you and your health professional talk about types of non-surgical options for managing hip osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.  
**Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.**

	EXERCISE OPTIONS	WEIGHT LOSS PROGRAMS (if overweight or obese)	PHYSICAL + PSYCHOLOGICAL OPTIONS	MEDICAL OPTIONS
What did people do?	Attended Tai Chi, walking, muscle strengthening, stationary cycling, yoga, or water-based exercise classes	Completed weight loss programs focused on dietary education, diet, exercise, or a combination	Used a walking stick; received massage; had transcutaneous electrical nerve stimulation; or received manual therapy, heat therapy, or cognitive behaviour therapy.	Took oral NSAIDs or duloxetine (off-label use); had corticosteroid injections; applied topical NSAIDs; or took paracetamol
How much did it improve pain?	Up to a <b>large</b> improvement, depending on the option	Up to a <b>moderate</b> improvement, depending on the program (and amount of weight loss)	Up to a <b>large</b> improvement, depending on the option	Up to a <b>large</b> improvement, depending on the option
How much did it improve function?	Up to a <b>large</b> improvement, depending on the option	Up to a <b>moderate</b> improvement, depending on the program (and amount of weight loss)	Up to a <b>large</b> improvement, depending on the option	Up to a <b>small</b> improvement, depending on the option
How many people had serious side effects?	Up to 5 in 100 people (but unknown for some options)	<b>None</b> (but unknown for some programs)	<b>None</b> (but unknown for some options)	Up to 2 in 100 people
Where can I learn more?	See <b>Exercise Options for Managing Hip Osteoarthritis</b> decision aid	See <b>Weight Loss Programs for Managing Hip Osteoarthritis</b> decision aid	See <b>Physical and Psychological Options for Managing Hip Osteoarthritis</b> decision aid	See <b>Medical Options for Managing Hip Osteoarthritis</b> decision aid

**Caution:** The research on most of these options was low quality or very low quality<sup>1</sup>. This means that the actual effects of most of these options may be very different from what the research found<sup>2</sup>.

## EXERCISE OPTIONS

### for managing hip osteoarthritis

This decision aid aims to help you and your health professional talk about exercise options for managing hip osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.

	TAI CHI	WALKING	MUSCLE STRENGTHENING	STATIONARY CYCLING	YOGA	WATER-BASED EXERCISE
	Guidelines give a <b>strong recommendation</b> to land-based exercise but do not give recommendations about these individual exercises <sup>3</sup> 					<b>Conditional recommendation</b> <sup>3</sup> 
What did people do?	Attended Tai Chi classes (for 20–60 mins, 1–3 times a week), sometimes adding or transitioning to home practice (for 15–40 mins, 3–7 times a week) <sup>4–11</sup>	Attended low- to moderate-intensity walking classes (for 60 mins, 3 times a week) or gradually increased their step count (every day) <sup>12–15</sup>	Did supervised group or individual exercises at a facility to strengthen their muscles (for 45–90 mins, 1–2 times a week) and/or similar exercises unsupervised at a facility or at home (for 30–45 mins, 1–3 times a week) <sup>133–135</sup>	Attended indoor stationary cycling classes for osteoarthritis (for 40–60 mins, at least 2 times a week) <sup>17</sup>	Attended yoga classes for osteoarthritis (for 45–60 mins, once a week) with additional practice at home (for 30 mins, 4 times a week) <sup>18,19</sup>	Attended exercise classes done in a shallow pool that focused on strength, stretching, balance and/or fitness (for 20–60 mins, 2–3 times a week) <sup>20</sup>
How much did it improve pain?	<b>Moderate</b> improvement <sup>1</sup>	<b>Small</b> improvement <sup>1</sup>	<b>No</b> improvement <sup>1</sup>	<b>Large</b> improvement <sup>21</sup>	<b>Large</b> improvement <sup>21</sup>	<b>Small</b> improvement <sup>1</sup>
How much did it improve function?	<b>Moderate</b> improvement <sup>1</sup>	<b>Small</b> improvement <sup>1</sup>	<b>No</b> improvement <sup>1</sup>	<b>No</b> improvement <sup>1</sup>	<b>Large</b> improvement <sup>21</sup>	<b>Small</b> improvement <sup>1</sup>
What were some of the side effects?	Joint, foot, back, and muscle pain <sup>4–11</sup>	Falling; fracture <sup>12–15</sup>	Joint pain <sup>136–138</sup>	Joint pain <sup>17</sup>	Musculoskeletal pain <sup>1</sup>	Joint, leg, back, and muscle pain; slipping; cramping; dizziness; heart problems <sup>6,31,33,44–53</sup>
How many people had serious side effects?	5 in 100 people <sup>1</sup>	1 in 100 people <sup>1</sup>	(Unknown) <sup>1</sup>	(Unknown) <sup>1</sup>	<b>None</b> <sup>1</sup>	(Unknown) <sup>1</sup>

**Caution:** The research on all of these options was low quality or very low quality<sup>1</sup>. This means that the actual effects of these options may be very different from what the research found<sup>2</sup>.

## WEIGHT LOSS PROGRAMS

### for managing hip osteoarthritis

This decision aid aims to help you and your health professional talk about weight loss programs for managing hip osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

**Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.**

	DIETARY EDUCATION + DIET + EXERCISE	DIETARY EDUCATION + DIET	DIETARY EDUCATION
	<p>Guidelines give a <b>strong recommendation</b> to weight loss for people who are overweight or obese but do not give recommendations about these individual weight loss programs<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>		
What did people do?	<p>Attended group and individual classes on dietary habits with health professionals (for 60 mins, once a week)</p> <p>– and –</p> <p>Followed a personalised low-calorie meal plan with up to 2 meal replacement drinks or bars per day (every day for the period of the diet)</p> <p>– and –</p> <p>Did structured exercise at a facility (for 60 mins, 3 times a week)<sup>54</sup></p>	<p>Attended group classes on dietary habits with a health professional (for 90 mins, once a week, then once every 2 weeks)</p> <p>– alternating with –</p> <p>Followed a low-calorie diet of 6 meal replacement drinks per day (every day for 8 weeks then every day for another 4 weeks later on)<sup>55</sup></p>	<p>Attended group and individual classes on dietary habits (once a week, then once every 2 weeks, then once a month)<sup>56</sup></p>
How much weight was lost?	9% of body weight after 6 months <sup>54</sup>	11% of body weight after 12 months <sup>55</sup>	5% of body weight after 18 months <sup>56</sup>
How much did it improve pain?	<b>Moderate</b> improvement <sup>54</sup>	<b>Small</b> improvement <sup>55</sup>	<b>No</b> improvement <sup>56</sup>
How much did it improve function?	<b>Moderate</b> improvement <sup>54</sup>	<b>No</b> improvement <sup>55</sup>	<b>No</b> improvement <sup>56</sup>
What were some of the side effects?	(Unknown) <sup>54</sup>	Constipation, flatulence, dizziness, sensitivity to cold <sup>55</sup>	(Unknown) <sup>56</sup>
How many people had serious side effects?	<b>None</b> <sup>1</sup>	(Unknown) <sup>1</sup>	(Unknown) <sup>1</sup>

**Caution:** The research on weight loss programs was very low quality<sup>1</sup>. This means that the actual effects of these programs may be very different from what the research found<sup>2</sup>.

## PHYSICAL AND PSYCHOLOGICAL OPTIONS

### for managing hip osteoarthritis

This decision aid aims to help you and your health professional talk about physical and psychological options for managing hip osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.

	WALKING STICK	MASSAGE	TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION	MANUAL THERAPY	HEAT THERAPY	COGNITIVE BEHAVIOUR THERAPY
	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>	<p>Conditional recommendation<sup>3</sup></p> <p>■ ■ ■ ■ ■</p>
What did people do?	Used a wooden walking stick with a T-shaped handle (every day) <sup>57</sup>	Received Swedish or aroma massage from a trained practitioner or did guided self-massage (for 20–60 mins, 1 to 3 times a week) <sup>58–61</sup>	Had transcutaneous electrical nerve stimulation (TENS), which sends tingling sensations into the body through patches placed on the skin (for 20–60 mins, 2–5 days a week) <sup>62–67</sup>	Attended sessions where a trained practitioner (e.g., physiotherapist) used their hands and body to slowly and gently apply pressure to and move the hip joint (for 50 mins, 1–2 times a week), sometimes with extra movements done at home (3 times a week) <small>139,140</small>	Put an electric heat pad on their hip (for 20 mins, 2 times a day, 5 days a week) or had a digital moist heat pad put on their hip (for 20 mins, 3–4 days a week) <sup>70–72</sup>	Attended individual sessions on pain coping, relaxation, or other skills with a psychologist or other professional or did similar sessions via telephone or the internet (for 15–60 mins, 1–4 times a month) <sup>141–145</sup>
How much did it improve pain?	Large improvement <sup>21</sup>	Moderate improvement <sup>1</sup>	Moderate improvement <sup>1</sup>	Large improvement <sup>1</sup>	Small improvement <sup>1</sup>	Very small improvement <sup>1</sup>
How much did it improve function?	Large improvement <sup>21</sup>	Moderate improvement <sup>1</sup>	Small improvement <sup>1</sup>	Large improvement <sup>1</sup>	No improvement <sup>1</sup>	No improvement <sup>1</sup>
What were some of the side effects?	(Unknown) <sup>57</sup>	Discomfort <sup>58–61</sup>	Skin reaction <sup>62–67</sup>	Discomfort, muscle soreness, pain <sup>146,147</sup>	None <sup>70–72</sup>	None <sup>148–152</sup>
How many people had serious side effects?	(Unknown) <sup>1</sup>	(Unknown) <sup>1</sup>	None <sup>1</sup>	None <sup>1</sup>	None <sup>1</sup>	(Unknown) <sup>1</sup>

**Caution:** The research on all of these options was very low quality<sup>1</sup>. This means that the actual effects of these options may be very different from what the research found<sup>2</sup>.

## MEDICAL OPTIONS

### for managing hip osteoarthritis

This decision aid aims to help you and your health professional talk about medical options for managing hip osteoarthritis. It summarises the findings of scientific research so that you can make decisions that are right for you.

**Your health professional can tell you more, including how to access these or similar options and whether they are safe for you.**

	ORAL NSAIDS	DULOXETINE (off-label use)	CORTICOSTEROID INJECTIONS	TOPICAL NSAIDS	PARACETAMOL
	<p><b>Conditional recommendation<sup>3</sup></b></p> 	<p><b>Conditional recommendation<sup>3</sup></b></p> 	<p><b>Conditional recommendation<sup>3</sup></b></p> 	<p><b>Neutral recommendation<sup>3</sup></b></p> 	<p><b>Neutral recommendation<sup>3</sup></b></p> 
<b>What did people do?</b>	Took nonsteroidal anti-inflammatory drugs (NSAIDs) orally (once or twice a day) <sup>153-155</sup>	Took the drug duloxetine orally (once a day) <sup>90-92</sup>  [Note: Duloxetine is not approved for this use <sup>3</sup> ]	Had an injection of a corticosteroid into their hip joint, guided by ultrasound or x-ray imaging (once only) <sup>156-160</sup>	Applied nonsteroidal anti-inflammatory drugs (NSAIDs) in a cream or gel to their hip (2-4 times a day) <sup>84,118-123</sup>	Took the drug paracetamol orally (3-4 times a day) <sup>82,124-131</sup>
<b>How much did it improve pain?</b>	<b>Small improvement<sup>1</sup></b>	<b>Small improvement<sup>1</sup></b>	<b>Large improvement<sup>1</sup></b>	<b>Small improvement<sup>1</sup></b>	<b>Small improvement<sup>132</sup></b>
<b>How much did it improve function?</b>	<b>Small improvement<sup>1</sup></b>	<b>Small improvement<sup>1</sup></b>	<b>No improvement<sup>1</sup></b>	<b>Very small improvement<sup>1</sup></b>	<b>Very small improvement<sup>132</sup></b>
<b>What were some of the side effects?</b>	Digestive problems (e.g., constipation, indigestion, diarrhoea); respiratory problems (e.g., infection, cold); pain (e.g., joint, back); headache; heart problems; dizziness; others <sup>161-163</sup>	Digestive problems (e.g., constipation, nausea); respiratory problems (e.g., cough, asthma); pain (e.g., joint, muscle); sweating; drowsiness; dizziness; heart rhythm problems; low sex drive; others <sup>90-92</sup>	Injection site reactions (e.g., discomfort); pain (e.g., joint); deep vein thrombosis <sup>164-168</sup> . There may also be more rapid cartilage loss with repeated use <sup>3</sup> .	Digestive problems (e.g., constipation, indigestion); skin problems (e.g., rash, itching, dryness); pain (e.g., joint, back, neck); headache; respiratory problems (e.g., infection, cold, asthma); others <sup>84,118-123</sup>	Digestive problems (e.g., indigestion, nausea, diarrhoea); headache; dizziness; respiratory problems (e.g., infection, cough); pain (e.g., back, neck); abnormal liver function; others <sup>82,124-131</sup>
<b>How many people had serious side effects?</b>	<b>2 in 100 people<sup>1</sup></b>	<b>1 in 100 people<sup>1</sup></b>	<b>2 in 100 people<sup>1</sup></b>	<b>1 in 100 people<sup>1</sup></b>	<b>1 in 100 people<sup>1</sup></b>

**Caution:** The research on duloxetine, corticosteroid injections, and paracetamol was low quality or very low quality<sup>1</sup>. This means that the actual effects of these options may be very different from what the research found<sup>2</sup>.