

# Exploring Views of Orthopaedic Surgeons, Rheumatologists, and General Practitioners About Osteoarthritis Management

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## Research article

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# Abstract

**Background:** Delivery of recommended treatments for hip and knee osteoarthritis (OA) is known to be discordant with guideline recommendations. However, professional opinions related to OA management across medical and surgical disciplines are not well understood. The aim of this study was to explore the views of medical professionals about management of hip and knee OA.

**Methods:** Qualitative study. Semi-structured individual interviews were conducted with orthopaedic surgeons, rheumatologists and general practitioners routinely involved in the management of OA. Interviews were audiotaped, transcribed, member-checked, coded and thematically analysed.

**Results:** Fifteen medical professionals were interviewed. Three main themes were: (i) recognition of the importance of non-surgical management of hip and knee OA, focussed on exercise-therapy, weight management and analgesia, (ii) joint replacement being considered the 'last resort' for end stage disease not responding to non-surgical management, and (iii) determination of management 'success' through patient perceptions was more common than the use of validated instruments. Views on management broadly converged across disciplines, except for the role of joint replacement, considered an adjunct in the overall management of OA by rheumatologists, and as a definitive cure by orthopaedic surgeons.

**Conclusions:** Aligning with current guidelines, medical professionals recognised the importance of non-surgical management focussed on exercise-therapy for hip and knee OA, and concurred that joint replacement surgery should be a last resort. A focus on patient education was less prominent, which along with implementation of validated outcome measures in routine medical practice, may require greater health system support.

## Background

Clinical practice guidelines for hip and knee osteoarthritis (OA) recommend patient education, an active lifestyle and behavioural interventions including exercise-therapy and weight loss management as first line treatments [1–3]. Pharmacological therapies and other passive therapies, such as manual therapy, may be required as second line treatment if there is not an adequate improvement in symptoms and/or function [4]. Most of these interventions can be provided by general practitioners, or via referral to allied health professionals including physiotherapists. Rheumatologists may also be required to assist with patient management, particularly in the presence of comorbidities which is a common feature of OA [5]. Hip and knee replacement surgery may be indicated as third-line treatment in the case of severe joint disease, and referral to an orthopaedic surgeon is indicated where there is little improvement after appropriate first and second line management [6].

In practice, the delivery of recommended treatments for hip and knee OA is known to be discordant with guideline recommendations [7, 8]. Strongly recommended treatments, such as exercise-therapy and weight loss, are commonly under-utilised by people with hip and knee OA [8]. An Australian study has shown that only 56% of people with hip or knee OA had previously tried muscle strengthening exercises

and 38% had never tried weight loss [9]. The prevalent referral for, and use of, treatments that are not recommended in guidelines is also concerning [10]. In the USA between 2007 and 2014, opioids were prescribed for 13% of patients with hip OA and 16% of patients with knee OA [11]. Based on prescribing trends, opioid prescriptions for OA in Australia are expected to almost triple over the period 2015/16-2030/31 [12].

A variety of factors may explain current evidence-to-practice gaps in the management of hip and knee OA at patient, provider, and health service levels. Patient-related barriers include treatment costs, misinformed beliefs, and motivation [13–15]. Health professional-related barriers include knowledge and skills gaps [16–18]. Health service-related barriers include inadequate clinical practice guideline dissemination; and limited capacity of public and private healthcare services to implement recommendations [7]. Currently, similarities and differences in opinions related to OA management across medical disciplines are not well understood. Previous qualitative evidence of medical professionals' opinions regarding overall OA management [19–22] has sought opinions of only one discipline [19, 20] or involved opinions on specific decision aid tools or interventions to aid management [21, 22]. Understanding any concordance or discordance between medical professional's views on overall management of OA could inform development of resources to support professional learning, and foster optimal communication for the interdisciplinary care for OA.

This qualitative study aimed to explore the opinions of medical professionals about management of hip and knee OA, across three disciplines commonly involved in contemporary OA management.

## **Methods**

### **Study design**

A qualitative study involving individual semi-structured interviews with medical professionals was conducted. The data reported in this paper are drawn from a larger qualitative study exploring patient and medical professional perceptions of the barriers and facilitators around referral to non-surgical OA management programs [23]. The consolidated criterion for reporting qualitative research checklist (COREQ) was used for study reporting [24]. Ethics approval was obtained from the Cabrini Human Research Ethics Committee (reference number 02-22-01-18) in compliance with the Helsinki declaration. All participants provided written informed consent prior to the interviews.

### **Participants**

Medical professionals were eligible to participate in the study if they were: (i) a registered orthopaedic surgeon, rheumatologist or general practitioner; and (ii) currently involved in managing patients presenting with hip and/or knee OA. Based on existing clinical networks, a convenience sample of 15 medical professionals meeting these criteria and working at private and/or public hospitals or medical practices in metropolitan Melbourne were recruited and provided consent to participate in the study.

## **Data collection**

Individual semi-structured interviews that explored opinions related to OA management, and barriers and facilitators to management and referral to non-surgical management programs was previously published [23] and included in Supplementary Table 1. The current qualitative analysis only examined opinions related to the management of OA, with open-ended questions and prompts used to ensure participants' opinions were elicited. Data collection was undertaken until data saturation was achieved, at which point it was noted that no new themes were emerging [25].

The interviewer (JS), a registered physiotherapist of 9 years' experience, worked in the same clinical network as most of the medical professionals interviewed in this study. Each interview was conducted either at the health service or a medical practice, audiotaped, transcribed verbatim, and reviewed line-by-line by the interviewer. The interviewer received training in qualitative interviewing techniques from an experienced qualitative researcher (IA). Member-checking was also undertaken, providing each participant an opportunity to review their transcript for accuracy, and this process did not result in any significant changes to the content of the transcripts.

## **Data analysis**

Qualitative analysis of interview data commenced with a close review of each transcript by three researchers (JW, CB, IA). Second, an inductive thematic analysis [26] was used to code the interview data. This was supported by NVivo software (QSR International Ptd Ltd, Melbourne, Australia) with one researcher (CB) conducting the initial coding, and a second researcher (IA) independently coding a random sample of 50% of the interview data. Emergent themes were discussed between three researchers until a consensus was reached. The three researchers (JW, CB, IA) were experienced physiotherapists (range 14 to 22 years' experience) and researchers (range 1 to 11 years' post PhD), and all had previous experience in qualitative data analysis.

# **Results**

## **Participant characteristics**

Fifteen medical professionals (6 orthopaedic surgeons, 4 rheumatologists and 5 general practitioners) were interviewed. The average length of the whole interview was 20 minutes (range 14 to 30 minutes). Participants had an average age of 52 years (SD 12) and 25 years of clinical experience (SD 15). Table 1 reports the demographic and employment characteristics of the participants.

Table 1  
Participant demographics

Variable	n = 15
Profession, n (%)	5 (33)
GP	4 (27)
Rheumatologist	6 (40)
Orthopaedic surgeon	
Age (years), mean (SD)	52 (12)
Female, n (%)	1 (7)
Years practicing, mean (SD)	25 (15)
GP	32 (15)
Rheumatologist	22 (14)
Orthopaedic surgeon	15 (10)
Current volume of management of hip and knee OA, mean (SD)	
High volume <sup>a</sup>	13 (87)
Low volume	2 (13)
Work setting for orthopaedic surgeons and rheumatologists, n %	8 (80)
Both private and public	2 (20)
Private only	0 (0)
Public only	
OA = osteoarthritis; GP = general practitioner; <sup>a</sup> high volume included following examples of responses – ‘all or majority of practice’, ‘a lot’, ‘daily’, ‘75 to 90%’, ‘at least 30–40 patients per week’	

## **Themes**

Three main themes were identified: (i) recognition of the importance of non-surgical management of hip and knee OA, focussed on exercise-therapy, weight management, and analgesia; (ii) joint replacement being considered the ‘last resort’ for end stage disease not responding to non-surgical management; and (iii) determination of management ‘success’ through patient perceptions rather than the use of validated instruments.

*(i) Recognition of the importance of non-surgical management of hip and knee OA, focussed on exercise-therapy, weight management, and analgesia*

All participants considered that non-surgical management, particularly exercise-therapy and analgesia, was important for patients with hip and knee OA and should be provided before considering surgery. The perceived value was summed up by one rheumatologist:

*"Critical, critical. And by that, I don't mean just medications and injection. I think strength training in particular is something that's very underutilised."*

*Rheumatologist (P2)*

Non-surgical management was broadly interpreted to incorporate tailored treatment options, guided by both clinical symptoms and radiological features. Treatments considered to be important included encouragement to self-manage, improve lifestyle and keep mobile, activity modification (commonly reported by orthopaedic surgeons), physiotherapy, exercise-therapy, weight management, analgesia (including injections), heat/ice/compression (for acute exacerbations), glucosamine despite acknowledging no evidence of efficacy, manual therapy, use of gait aids and braces, and management of mental health.

*"I usually like people to modify their activities, I like them to lose weight, I like them to stop running, jogging, and doing activities that stir things up."*

*Orthopaedic surgeon (participant 4)*

The most valuable components of non-surgical management were perceived to be exercise-therapy, weight management and analgesia. Exercise-therapy was considered important for varying reasons, including providing more muscular support for joints, improving confidence about activities and mobility, and the potential to facilitate positive surgical outcomes. Weight management was considered important by all medical professionals interviewed, yet challenges in achieving weight loss were acknowledged. Most medical professionals discussed the regular provision of patient education, with a few medical professionals discussing the role of education as an important component of management. Several medical professionals also recognised that education can be challenging to deliver effectively due to time constraints (e.g. general practice consultations) and patient language barriers.

*"I'll probably do education as part of an ongoing thing from visit to visit without actually focusing on it."*

*General practitioner (participant 12)*

Simple analgesia was considered important to control pain and keep people mobile. Paracetamol was preferred over anti-inflammatories due to being safer, but anti-inflammatories were suggested to produce better results. Medical professionals typically recommended avoiding opioids where possible. Cortisone injections played a common role in management, particularly if surgery was not considered appropriate, to achieve short term improvement in symptoms (e.g. before travelling), for the treatment of acute exacerbations and based on patient preference. Other injectables such as hyaluronic acid and platelet rich plasma were commonly used or trialled despite participants being aware that these treatments lacked evidence of effectiveness.

*“Steroid injection of knees, I occasionally do. It’s just analgesia of various kinds. Sometimes if they request platelet-rich plasma or Synvisc or – what’s the other one? Stem cells, etcetera. I generally discourage them and left it up to the patient.” Rheumatologist (participant 15)*

*(ii) Joint replacement being considered the ‘last resort’ for end stage disease not responding to non-surgical management*

Joint replacement was perceived by participants to be important for people with severe, end stage OA. It was a common view that joint replacement should be offered to address severe pain and/or disability for people who were not responding to appropriate non-surgical management.

When considering the appropriateness of joint replacement surgery, surgeons considered a range of factors including age and fitness for surgery, patient willingness to undergo surgery, expectations about the outcome from surgery, and likelihood of post-operative complications. For example, one orthopaedic surgeon’s view was that younger patients with higher function were less likely to be satisfied with a joint replacement and consequently emphasised the importance of ensuring appropriate non-surgical options were appropriately trialled before surgery was offered.

*“So the younger you are when you have a knee replacement and the more function you’ve got when you have a knee replacement, the less likely you are to love the knee replacement ‘cause it’s an artificial knee.” Orthopaedic surgeon (participant 6)*

Divergent opinions between rheumatologists and orthopaedic surgeons regarding the role of joint replacement surgery were evident. Two rheumatologists referred to joint replacement surgery as an ‘adjunct’ treatment, with a role in the overall management of OA, while two orthopaedic surgeons considered that joint replacement was the ‘ultimate surgery’ and a ‘definitive cure’ in cases of severe disease. Surgeons also discussed the appropriateness of other surgical procedures for knee OA including osteotomies, patellofemoral joint replacements and arthroscopy. It was the view of some orthopaedic surgeons that osteotomies may have a role in knee OA management for younger patients to help prevent OA progression, that patellofemoral surgery was a difficult procedure and may not help, and knee arthroscopy was not a useful procedure for OA.

*(iii) Determination of management ‘success’ through patient perceptions rather than use of validated instruments*

Most participants relied on the patient’s overall perception of improvement in symptoms, function, physical activity and satisfaction to determine treatment success, rather than the use of validated, disease specific outcome instruments. Only one orthopaedic surgeon and one rheumatologist reported using patient-reported outcome measures to assist in decision making about surgery and to judge treatment success.

*“Happy patients, pretty simple.” Orthopaedic surgeon (participant 4)*

*“Oh, they’ll tell me if they’re better or not.” General practitioner (participant 7)*

Common considerations for treatment success included pain levels, activity, subjectively reported quality of life, individual goals or overall satisfaction with care. Activity examples included walking distance, ease of using stairs, work, travel, the ability to provide care to others and to look after themselves.

## Discussion

This study provides unique insight into similarities and differences in opinions related to hip and knee OA management across relevant medical disciplines, including orthopaedic surgeons, rheumatologists and general practitioners. As a positive finding, all 15 experienced medical professionals interviewed in this study valued the importance of non-surgical management, especially exercise-therapy, analgesia, weight management and education, and considered surgical management as a last resort. However, a key indicator of treatment success from most participants was patient perception of improvement and satisfaction, and not validated patient-reported outcome measures. Diverging opinions regarding the role of joint replacement, albeit acknowledged by all participants as a final treatment step, likely reflects the different perspectives of the medical specialities. These findings support health professional learning, and encourage communication between all members of the treating team for the optimal interdisciplinary care for people with OA.

The perceived importance of non-surgical treatments for hip and knee OA, including exercise-therapy and weight management, aligns with recommendations across international clinical practice guidelines [1–3]. However, some medical professionals interviewed in this study considered that exercise-therapy and weight management were interventions not particularly ‘done well’ from a holistic health service perspective. This is consistent with reported breakdowns in the translation of guideline recommendations to clinical practice [7] and the limited resources for clinicians and patients to access, particularly for non-insured patients within the public health system [14]. Implementing strategies and supports to overcome barriers, and to leverage facilitators, in order to facilitate recommended treatments is needed. International initiatives to develop and implement guideline-based non-surgical OA management programs [27–29] provide an accessible treatment option and are beginning to help bridge these evidence-to-practice gaps, but more health system reform may also be needed to improve funding and enhance accessibility for patients [30].

Provision of patient education, which is known to be an important first line OA treatment for enhancing understanding about OA and its optimal management [1–3], was raised by most participants and implies this is considered an important component of routine care. However, patient education was rarely emphasised as a focus of treatment, and delivering effective patient education was considered challenging by participants due to time constraints within medical consultations. Educational interventions align closely with the skill set and scope of practice of allied health professionals (such as physiotherapists), who could play a greater role in shared education delivery, in conjunction with their medical colleagues. Additionally, educational interventions that focus specifically on behavioural change

(e.g. motivational interviewing, cognitive behavioural therapy), can be used to support optimal management by encouraging participation in exercise-therapy and engagement with weight management strategies for this population [31].

General practitioners, rheumatologists and surgeons in this study typically recommended medical and surgical management that is consistent with contemporary clinical guidelines such as the judicious use of non-steroidal anti-inflammatories, with avoidance of opioids and knee arthroscopy [1, 3, 32]. One pharmacological treatment that was commonly viewed favourably by medical professionals in this study was cortisone injections. This was recommended with certainty and perceived short term benefit, without consideration that it might be harmful to cartilage health [33]. Some study participants also used non-recommended interventions while recognising a lack of evidence to guide clinical practice with certainty (e.g. platelet rich plasma injections) or known limited efficacy (e.g. paracetamol, glucosamine). Surgical procedures such as osteotomies were also considered to have a role in management of younger patients by some of the orthopaedic surgeons despite a lack of evidence suggesting a need for research related to these treatments [34]. Uncertain evidence commonly exists for OA treatments and presents challenges for health professionals, requiring good communication skills to assist their patients to make the best treatment decisions consistent with their patients' contextual and environmental factors [35].

There was limited use of validated patient-reported outcome measures (PROMs) to evaluate the success of treatment, despite a mounting international push to adopt the use of these tools in clinical practice [36]. PROMs can be used to monitor patient progress following treatment, facilitate patient-clinician communication, inform shared decision making and patient centred care, and support interdisciplinary communication between health professionals [36, 37]. However, most of the medical professionals interviewed in this study based their determination of treatment success on their patient's overall perception of improvement and satisfaction, rather than PROMs, possibly reflecting beliefs that integrating PROMs in clinical practice can be challenging [36]. While our findings indicate a need to support medical professionals to implement routine PROMs into clinical practice, some health services prioritise collection of PROMs to evaluate surgical interventions for hip and knee osteoarthritis [38]. Also, a pilot implementation of PROMs data collection was recently undertaken by the Australian Orthopaedic Association National Joint Replacement Registry [39]. As this pilot is implemented nationally [39], orthopaedic surgeons may become more comfortable with embedding collection of PROMs within their practice.

Consistent with clinical guideline recommendations [1, 2], all medical professionals in this study considered joint replacement surgery to be the last resort, and only following an appropriate trial of non-surgical management. An interesting finding was that joint replacement was considered as an 'adjunct' in the overall management of OA by rheumatologists, compared to a 'definitive cure' by orthopaedic surgeons. This divergent view may be explained by different training and clinical experiences for the two medical specialities. Replacement of osteoarthritic joint surfaces may be perceived as the 'definitive cure' for management of end-stage OA by surgeons due to superior benefits for pain, function and quality of life compared to non-surgical care alone [40, 41]. However, from a rheumatologist perspective, joint

replacement may be considered an ‘adjunct’ for the holistic management of the patient with OA, with their broader focus on the whole person’s health [42]. While joint replacement demonstrates benefits to joint pain and quality of life [41, 43], it may not address conditions associated with their OA such as systemic inflammation [44], poor cardiovascular health [45], low levels of physical activity [46], and complications from surgery may arise.

A key strength of this study was its focus on key stakeholder views from three clinical disciplines that routinely provide OA care in both primary care and speciality settings. Robust qualitative research methods were used (including member checking of transcripts and independent data review), and the interview schedule was developed by an experienced research team with longstanding clinical experience in OA management. A limitation of this study is, by its nature, that qualitative research has limited generalisability beyond the study sample, but rather it is used to generate detailed personal perspectives that cannot be obtained through quantitative methods. We also acknowledge the possibility of responder bias, whereby participants with greater knowledge of contemporary evidence and clinical guidelines may have been more likely to participate in the study.

## **Conclusion**

Aligning with current guidelines, medical professionals recognised the importance of non-surgical management focussed on exercise-therapy for hip and knee OA, and concurred that joint replacement surgery should be a last resort. A focus on patient education was less prominent, which along with implementation of validated PROMs in routine medical practice may require greater health systems support. These findings support health professional learning, and encourage communication between all members of the treating team for the optimal interdisciplinary care for people with OA.

## **Abbreviations**

OA

Osteoarthritis; PROMs–patient-reported outcome measures

## **Declarations**

### **Ethics approval and consent to participate**

Ethics approval was obtained from the Cabrini Health Human Research Ethics Committee (reference number 02-22-01-18) in compliance with the Helsinki declaration. All participants provided written informed consent.

### **Consent for publication**

Not applicable

## **Availability of data and material**

Interview data from this study are not available for sharing given potential confidentiality implications associated with smaller participant samples and consistent with current ethical approvals.

## **Competing interests**

All authors declare that they do not have any real or potential conflict of interest.

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## **Authors' contributions**

JW made a substantial contribution to the conception and design of the study, data analysis, interpretation of data, drafting and revising the manuscript. IA made a substantial contribution to the conception and design of the study, data analysis, interpretation of data and revising the manuscript. NB made a substantial contribution to the conception and design of the study, interpretation of data and revising the manuscript. JK made a substantial contribution to interpretation of data and revising the manuscript. JS made a substantial contribution to the conception of the study, acquisition of interview data, interpretation of data and revising the manuscript. KY made a substantial contribution to the conception of the study, interpretation of data and revising the manuscript. SJ made a substantial contribution to the conception of the study, interpretation of data and revising the manuscript. AT made a substantial contribution to the interpretation of data and revising the manuscript. CB made a substantial contribution to the conception and design of the study, data analysis, interpretation of data and revising the manuscript. All authors read and approved the version of the manuscript submitted and agreed both to be personally accountable for the author's own contributions and to ensure that questions related to accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, and the resolution documented in the literature.

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## **References**

1. The Royal Australian College of General Practitioners. Guideline for the management of knee and hip osteoarthritis, second edition, 2018. Available from URL:

- <https://www.racgp.org.au/download/Documents/Guidelines/Musculoskeletal/guideline-for-the-management-of-knee-and-hip-oa-2nd-edition.pdf>. (Accessed 15 May 2020).
2. National Institute for Health and Care Excellence. Osteoarthritis: care and management, 2014. Available from URL: <https://www.nice.org.uk/guidance/cg177>. (Accessed April 14, 2020).
  3. Bannuru RR, Osani MC, Vaysbrot EE, Arden NK, Bennell K, Bierma-Zeinstra SMA, et al. OARSI guidelines for the non-surgical management of knee, hip, and polyarticular osteoarthritis. *Osteoarthritis Cartilage*. 2019;27:1578-89.
  4. Roos EM, Juhl CB. Osteoarthritis 2012 year in review: rehabilitation and outcomes. *Osteoarthritis Cartilage*. 2012;20:1477-83.
  5. Muckelt PE, Roos EM, Stokes M, McDonough S, Grønne DT, Ewings S, et al. Comorbidities and their link with individual health status: A cross-sectional analysis of 23,892 people with knee and hip osteoarthritis from primary care. *JOC*. 2020;10:1-11.
  6. Victorian Model of Care for Osteoarthritis of the Hip and Knee, 2018. Available from URL: [https://www.msk.org.au/wp-content/uploads/2018/07/MoC\\_Final-report.pdf](https://www.msk.org.au/wp-content/uploads/2018/07/MoC_Final-report.pdf). (Accessed 3 June 2020).
  7. Nelson AE, Allen KD, Golightly YM, Goode AP, Jordan JM. A systematic review of recommendations and guidelines for the management of osteoarthritis: the chronic osteoarthritis management initiative of the US bone and joint initiative. *Semin Arthritis Rheum*. 2014;43:701-12.
  8. Allen KD, Golightly YM, White DK. Gaps in appropriate use of treatment strategies in osteoarthritis. *Best Pract & Res Clin Rheumatol*. 2017;31:746-59.
  9. Hinman RS, Nicolson PJA, Dobson FL, Bennell KL. Use of nondrug, nonoperative interventions by community-dwelling people with hip and knee osteoarthritis. *Arthritis Care Res*. 2015;67:305-9.
  10. Deveza LA, Hunter DJ, Van Spil WE. Too much opioid, too much harm. *Osteoarthritis Cartilage*. 2018;26:293-5.
  11. DeMik DE, Bedard NA, Dowdle SB, Burnett RA, McHugh MA, Callaghan JJ. Are we still prescribing opioids for osteoarthritis? *J Arthroplasty*. 2017;32:3578-82.
  12. Ackerman IN, Zomer E, Gilmartin-Thomas J-M, Liew D. Forecasting the future burden of opioids for osteoarthritis. *Osteoarthritis Cartilage*. 2018;26:350-5.
  13. Dobson F, Bennell KL, French SD, Nicolson PJ, Klaasman RN, Holden MA, et al. Barriers and facilitators to exercise participation in people with hip and/or knee osteoarthritis: synthesis of the literature using behavior change theory. *American J Phys Med Rehabil*. 2016;95:372-89.
  14. Ackerman IN, Livingston JA, Osborne RH. Personal perspectives on enablers and barriers to accessing care for hip and knee osteoarthritis. *Physical Ther*. 2016;96:26-36.
  15. Hurley M, Dickson K, Hallett R, Grant R, Hauari H, Walsh N, et al. Exercise interventions and patient beliefs for people with hip, knee or hip and knee osteoarthritis: a mixed methods review. *Cochrane Database Syst Rev*. 2018;4:CD010842.

16. Egerton T, Diamond L, Buchbinder R, Bennell K, Slade SC. A systematic review and evidence synthesis of qualitative studies to identify primary care clinicians' barriers and enablers to the management of osteoarthritis. *Osteoarthritis Cartilage*. 2017;25:625-38.
17. Selten EM, Vriezekolk JE, Nijhof MW, Schers HJ, van der Meulen-Dilling RG, van der Laan WH, et al. Barriers impeding the use of non-pharmacological, non-surgical care in hip and knee osteoarthritis: the views of general practitioners, physical therapists, and medical specialists. *J Clinical Rheumatol*. 2017;23:405-10.
18. Briggs AM, Houlding E, Hinman RS, Desmond LA, Bennell KL, Darlow B, et al. Health professionals and students encounter multi-level barriers to implementing high-value osteoarthritis care: a multi-national study. *Osteoarthritis Cartilage*. 2019;27:788-804.
19. Egerton T, Nelligan R, Setchell J, Atkins L, Bennell KL. General practitioners' perspectives on a proposed new model of service delivery for primary care management of knee osteoarthritis: a qualitative study *BMC Fam Pract*. 2017;18.
20. Li CS, Pathy R, Adili A, Avram V, Barasi MA, Mundi R, et al. Is the treatment gap in knee osteoarthritis real? A qualitative study of surgeons' perceptions. *J Long Term Eff Med Implants*. 2013;23:223-40.
21. Bunzli S, Nelson E, Scott A, French S, Choong P, Dowsey M. Barriers and facilitators to orthopaedic surgeons' uptake of decision aids for total knee arthroplasty: a qualitative study. *BMJ Open*. 2017;7:e018614.
22. Alami S, Boutron I, Desjeux D, Hirschhorn M, Meric G, Rannou F, et al. Patients' and practitioners' views of knee osteoarthritis and its management: a qualitative interview study. *PLoS One*. 2011;6:e19634.
23. Wallis J, Ackerman I, Brusco N, Kemp J, Sherwood J, Young K, et al. Barriers and enablers to uptake of a contemporary guideline-based management program for hip and knee osteoarthritis: a qualitative study. *Osteoarthritis Cartilage Open*. 2020 (in press).
24. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. 2007;19:349-57.
25. Guest G, Bunce A, Johnson L. How many interviews are enough? An experiment with data saturation and variability. *Field Methods*. 2006;18:59-82.
26. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res in Psychology*. 2006;3:77-101.
27. GLA:D® International network. Available from URL: <https://gladinternational.org/>. (Accessed 10 May 2020).
28. Enabling Self-Management and Coping with Arthritic Pain using Exercise. Available from URL: <https://escape-pain.org/>. (Accessed 12 July 2020).
29. Jönsson T, Eek F, Dell'Isola A, Dahlberg LE, Ekvall Hansson E. The Better Management of Patients with Osteoarthritis Program: Outcomes after evidence-based education and exercise delivered nationwide in Sweden. *PloS one*. 2019;14:e0222657.
30. Caneiro JP, Roos EM, Barton CJ, O'Sullivan K, Kent P, Lin I, et al. It is time to move beyond 'body region silos' to manage musculoskeletal pain: five actions to change clinical practice. *BJSM*.

2020;54.

31. Hinman RS, Lawford BJ, Campbell PK, Briggs AM, Gale J, Bills C, et al. Telephone-delivered exercise advice and behavior change support by physical therapists for people with knee osteoarthritis: protocol for the telecare randomized controlled trial. *Physical Ther.* 2017;97:524-36.
32. Osteoarthritis of the Knee Clinical Care Standard. Available from URL: <https://www.safetyandquality.gov.au/publications-and-resources/resource-library/osteoarthritis-knee-clinical-care-standard>. (Accessed 5 June 2020).
33. McAlindon TE, LaValley MP, Harvey WF, Price LL, Driban JB, Zhang M, et al. Effect of intra-articular triamcinolone vs saline on knee cartilage volume and pain in patients with knee osteoarthritis: a randomized clinical trial. *JAMA.* 2017;317:1967-75.
34. Brouwer RW, Huizinga MR, Duivenvoorden T, van Raaij TM, Verhagen AP, Bierma-Zeinstra SM, et al. Osteotomy for treating knee osteoarthritis. *Cochrane Database Syst Rev.* 2014.
35. Bunzli S, O'Brien P, Ayton D, Dowsey M, Gunn J, Choong P, et al. Misconceptions and the acceptance of evidence-based nonsurgical interventions for knee osteoarthritis. A qualitative study. *Clin Orthop Relat Res.* 2019;477:1975-83.
36. Ackerman IN, Cavka B, Lippa J, Bucknill A. The feasibility of implementing the ICHOM standard set for hip and knee osteoarthritis: a mixed-methods evaluation in public and private hospital settings. *JPRO.* 2018;2:32.
37. Snyder CF, Aaronson NK, Choucair AK, Elliott TE, Greenhalgh J, Halyard MY, et al. Implementing patient-reported outcomes assessment in clinical practice: a review of the options and considerations. *Qual of Life Res.* 2012;21:1305-14.
38. Tew M, Dalziel K, Clarke P, Smith A, Choong PF, Dowsey M. Patient-reported outcome measures (PROMs): can they be used to guide patient-centered care and optimize outcomes in total knee replacement? *Quality of Life Res.* 2020;1-11.
39. AOANJRR PROMs Pilot Report, 2020 Available at: <https://aoanjrr.sahmri.com/proms-pilot-report>. (Accessed 5 June 2020).
40. Skou ST, Roos EM, Laursen MB, Rathleff MS, Arendt-Nielsen L, Rasmussen S, et al. Total knee replacement and non-surgical treatment of knee osteoarthritis: 2-year outcome from two parallel randomized controlled trials. *Osteoarthritis Cartilage.* 2018;26:1170-80.
41. Learmonth ID, Young C, Rorabeck CT. The operation of the century: total hip replacement. *Lancet.* 2007;370:1508-19.
42. What is a Rheumatologist? Australian Rheumatology Association. Available from URL: <https://rheumatology.org.au/patients/what-is-a-rheumatologist.asp>. (Accessed 3 June 2020).
43. Skou ST, Roos EM, Laursen MB, Rathleff MS, Arendt-Nielsen L, Simonsen O, et al. A randomized, controlled trial of total knee replacement. *New Eng J Med.* 2015;373:1597-606.
44. Goldring MB, Otero M. Inflammation in osteoarthritis. *Curr Opin Rheumatol.* 2011;23:471-8.

45. Nüesch E, Dieppe P, Reichenbach S, Williams S, Iff S, Jüni P. All cause and disease specific mortality in patients with knee or hip osteoarthritis: population based cohort study. *BMJ*. 2011;342.
46. Harding P, Holland AE, Delany C, Hinman RS. Do activity levels increase after total hip and knee arthroplasty? *Clin Ortho Rel Res*. 2014;472:1502-11.

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