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Purpose: To evaluate longitudinal associations between changes in biomechanical functions and changes in pain and activity limitations in knee OA patients treated with exercise therapy.

Methods. Data were used from a randomized controlled trial (NTR1475) in which two exercise programs of 12 weeks were compared. One hundred forty nine patients with knee OA, who completed the exercise program, were measured at baseline and at 6-, 12- and 38-week follow-up. Generalized Estimating Equations (GEE) analyses were used to determine longitudinal associations of changes in biomechanical functions (upper leg muscle strength, knee joint proprioceptive accuracy, self-reported knee instability and knee flexion and extension range of motion) with changes in pain severity (numeric rating scale) and activity limitations (WOMAC, physical function and Get up and go test) over time. Univariable and multivariable associations, analyzing all biomechanical functions together, were performed.

Results. Improvements in upper leg muscle strength (both quadriceps and hamstrings strength) and self-reported knee stability were longitudinally associated with outcome of exercise therapy, i.e. improvements in pain and activity limitations, while improvements in proprioceptive accuracy or knee range of motion were not.

Conclusions. Muscle strengthening and knee stabilization were consistently associated with outcome of exercise therapy in knee OA patients. These findings provide better insight in underlying biomechanical mechanisms of exercising in OA, which may help optimizing exercise effects.

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MANAGING CHRONIC KNEE SYMPTOMS: "WE'RE ALL LOOKING FOR SOLUTIONS"

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Purpose: The prevalence of osteoarthritis (OA) increases with age and as a result, much of the focus of OA has been on older adults. However, the first signs of OA begin in the fourth or fifth decade or even sooner. The estimated incidence of OA increases exponentially in adults aged 20-50 years and there is also evidence that OA is progressing to severe disease in people of younger ages as demonstrated by a 311% increase in the number of total knee replacements in 45-54 year olds. To date, policy efforts and interventions have focused largely on older adults and end stage disease. There is an opportunity for earlier intervention in the working age population to support management of knee symptoms or even halt or delay progression of OA and its concomitant morbidity. Currently, there is inadequate knowledge about younger adults with knee symptoms to target their needs with interventions. We aimed to explore how people aged 35-65 years manage their knee symptoms including how they make decisions about management.

Methods: The research design was qualitative, using grounded theory methods. We included individuals aged 35-65 who self-reported a diagnosis of OA or reported knee symptoms (i.e. pain, aching or stiffness) on most days of the past month. Purposive sampling was used, in particular seeking variation in age and sex. Data were collected using focus groups; participants were organized into focus groups based on two age groups (35-49 years and 50-65 years). All focus groups were audio recorded and transcribed verbatim. Data were analyzed using

a constant comparative method. The three main steps in analysis were open coding, axial coding and progressively conceptualizing and categorizing the data.

Results: Six focus groups were conducted with 41 participants. The mean age was 50.9 years (range 38-65 years) and 63.0% were female. Our analysis identified three main themes. 1. *The Work of Managing Knees: Tactical Responses and Long Term Solutions:* Participants made considerable efforts to try a range of strategies to manage their knee symptoms (e.g exercise, weight loss, medications, diet). They also described adaptations in their daily life, such as modifications or restriction of activities. While some strategies were used to address immediate symptoms, participants were also interested in a longer term solution which would fix the problem or delay progression. 2. *The Work of Decision Making:* Participants described how they made decisions about management of their knee symptoms. Their actions included consulting others, researching available options, evaluating the trustworthiness of information and then using trial and error. 3. *The Work of Navigating Health Care:* Participants' experiences indicated that navigating the health care system added to the work of managing their knees. They commonly expressed perceptions that the health care system didn't offer much for them. This resulted in expressions of frustration, particularly for younger adults. These categories are inextricably interwoven into a core category, *Working Hard but Still Seeking Solutions.* Participants' accounts suggest that people are making efforts to manage their knee problems and, in many cases, are still seeking better solutions for their knee symptoms.

Conclusions: We found that people with knee symptoms are making considerable efforts to learn about and execute a range of management strategies even at earlier ages and stages of disease, often with little support as they navigate through the health care system. These findings suggest there is opportunity for earlier intervention to provide support for people with knee symptoms to ensure people are engaging in best practices for their knee that are likely to make a difference in the short and long term.

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A SYSTEMATIC REVIEW OF THE LITERATURE ON BEST PRACTICE AND QUALITY OF CARE FOR PATIENTS WITH OSTEOARTHRITIS IN THE SETTING OF DIABETES OR CARDIOVASCULAR DISEASE

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Purpose: The management of osteoarthritis (OA) is challenging in patients who also have other medical conditions, which may be perceived as precluding the safe use of OA therapies. We conducted a systematic review of the literature to identify and evaluate studies that addressed best practice or quality of OA care in the setting of diabetes (DM) and/or cardiovascular disease (CVD).

Methods: Two reviewers independently reviewed titles and abstracts of publications identified via a comprehensive search of electronic databases (MEDLINE, EMBASE, and CINAHL) between January 2000 and February 2011 and citation lists. Articles addressing the management of OA in the presence of DM or CVD (or vice versa) were included.

Results: 8334 articles were identified through the search process, 41 were selected for full-text review and 32 were included after discussion. Only 10 of the 32 identified studies (31%) discussed strategies to improve OA management in the setting of comorbid DM and/or CVD. Five studies recommended cautious prescribing of non-steroidal anti-inflammatory drugs (NSAIDs) and cyclo-oxygenase (COX)-2 inhibitors in patients with CVD or CV risk factors. One study recommended naproxen for treatment of OA in the setting of DM and CVD; another recommended acetaminophen with or without codeine in the setting of hypertension (HTN). Three studies recommended only non-pharmacological approaches. Six of 32 studies (19%) documented pharmacological under-treatment of one condition in the presence of another (use of NSAIDs and overall treatment for OA in CVD/DM; treatment of HTN in OA). 3 studies showed no differences in prescribing patterns. Eight studies (25%) documented a negative impact of OA on outcomes for CVD/DM (recovery from stroke, hospitalization for congestive heart failure and physical activity/self-management). Three qualitative studies identified comorbid OA as a barrier to care for CVD/DM. Three studies documented the non-applicability of single-disease clinical practice guidelines to the management of patients with multiple conditions, including OA guidelines in the setting of CVD/DM. Only one study evaluated the influence of either DM or CVD on quality of care for

OA using established quality indicators. In 90 individuals with OA, the mean OA-specific quality score was 42.6% (the proportion of recommended care received) compared with an overall mean quality score of 54.9% for all conditions combined. No study provided evidence-based recommendations for OA management in individuals with comorbid DM or CVD.

Conclusions: Despite the high co-prevalence of DM and CVD in people with painful OA, and the documented under-treatment of OA in the presence of these comorbidities, there is little information on best practice for the management of OA in the setting of other common chronic conditions. Evidence-informed practice recommendations are urgently needed to support the care of this group of patients.

490 HIP JOINT SPACE AND DISABILITY

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Purpose: Osteoarthritis is often characterized by decreasing joint space. In the hip, osteoarthritis is often a contra-indication for hip arthroscopy. The purpose of this study was to determine if a specific joint space of the hip was associated with disability in patients with hip pain. We hypothesized that decreasing joint space would lead to increasing disability and decreased health status.

Methods: Joint space measurement of the hip were prospectively collected on a cohort of 813 patients with an average age of 35 (range 18 to 69). All patients were seeking treatment for hip pain and completed a questionnaire documenting WOMAC scores (disability), and health status (SF12) physical component (PCS) and mental component (MCS). Patients younger than 18 years of age were excluded. Hip joint space was measured at the lateral edge, middle soursil, and above the fovea of the hip.

Results: Descriptive statistics for all variables are shown in Table 1. Joint space measurement at each of the 3 areas did not correlate with disability or health status. Patient age did correlate with lateral joint space ($\rho = -0.112; p = 0.001$) and disability ($\rho = 0.161; p = 0.0001$). Patients with 2mm or less of lateral joint space had significantly lower SF12 PCS (38 vs 43; $p = 0.024$) and higher (more disability) WOMAC scores (32 vs 25; $p = 0.049$). These differences were not seen for 2.5mm or 3mm lateral joint spaces. No significant differences in health status or disability were seen for middle or foveal joint space at 2mm or less, 2.5 mm or less, or 3mm or less.

Conclusions: This study demonstrated that joint space measured at the lateral edge of the hip is associated with increased disability and decreased health status. Previous studies have shown that 2mm or less of joint space is a predictor of failed treatment and our results show that 2mm or less in the lateral edge of the joint is also associated with decreased postoperative status. This study supports use of 2mm or less of joint space in the hip as a predictor of increased disability.

Table 1
Descriptive statistics

| | Mean | Minimum | Maximum |
|----------------------|------|---------|---------|
| Joint Space Lateral | 3.9 | 0.7 | 9.9 |
| Joint Space Anterior | 3.6 | 0.4 | 8.8 |
| Joint Space Foveal | 3.7 | 0.6 | 8.0 |
| SF12-PCS | 42.6 | 18.6 | 63.9 |
| SF12-MCS | 52.5 | 17.9 | 69.2 |
| WOMAC | 25.1 | 0 | 91 |

491 HISTORY OF KNEE INJURY IS ONLY WEAKLY ASSOCIATED WITH KNEE STRUCTURAL CHANGE IN MIDDLE OR OLDER AGED ADULTS

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Purpose: History of knee joint injury is widely accepted as a contributory factor in the development of osteoarthritis (OA) but despite the abundance of available literature showing the association between

history of knee injury and OA, there are still some deficiencies in our understanding of the exact mechanism. Firstly, it's not clear whether it is the injury to the knee joint which causes OA or the subsequent surgery. Secondly, it is unclear how different structures comprising the knee joint are affected by injury.

The aim of this study is to describe the association between history of knee injury and knee structural changes which represent osteoarthritis of the knee joint using MRI in a randomly selected older population and a conveniently sampled middle aged population.

Methods: This study included two samples: the Tasmanian Older Adult Cohort (TASOAC) Study (n=430; mean age 63.0 years, range 51 - 79 years; 51% female) and the Knee Cartilage Volume (KCV) Study (n=372; mean age 45.0 years, range 26-61 years; 57.5% female). 1.5 T MRI scans of the right knee at baseline was performed in both studies to measure bone marrow lesions (BMLs), cartilage volume, tibial bone area, cartilage defects, and meniscal pathology. History of knee injury was assessed using a self-administered questionnaire. The association between knee injury and knee structures was determined using multiple linear and logistic regression models. Multivariable models were initially adjusted for age, sex and body mass index and further adjusted for history of knee joint surgery.

Results: In middle aged adults, cartilage volume ($\beta = 1280 \text{ mm}^3$, $p = 0.017$) and tibial bone area ($\beta = 278 \text{ mm}^2$, $p < 0.001$) were significantly higher in those with knee injury in unadjusted analysis but these associations did not persist after adjustment. In older adults, cartilage defects at medial tibial, lateral tibial and lateral femoral sites (OR 1.9-2.7, all $p < 0.05$) and presence/absence of BMLs (OR 2.1, $p = 0.039$) showed a significant association with knee injury in unadjusted analysis. In adjusted analysis these associations remained significant in the case of cartilage defects (OR 1.9-2.6, $p < 0.05$) but became non-significant for BMLs. Meniscal tears and extrusions showed no significant associations in either of the two cohorts.

Conclusion: Contrary to popular belief, history of knee injury is only weakly associated with knee structural changes in either a middle aged or older adult population, apart from cartilage defects in older adults. This suggests that most structural change in the knee is atraumatic.

492 CHANGE IN FUNCTIONAL STATUS OF TOTAL JOINT REPLACEMENT CANDIDATES WITH OSTEOARTHRITIS

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Purpose: The objectives of this study were to investigate the physical and physiological rates of decline of individuals with joint osteoarthritis (OA) while waiting for total joint replacement (TJR) and to identify how the perceived need for surgery (PNS) might influence patient's decision to have surgery.

Methods: 134 participants were referred for elective TJR. All participants were deemed appropriate candidates for TJR according to the Western Canada Waiting List criteria. However, only 92 of the participants had surgery (group A) while 42 did not undergo surgery (group B). Participants self selected their decision to undergo surgery. Individuals were assessed using the Western Ontario McMaster University questionnaire (WOMAC), 6-Minute-Walk test (6MWT), Timed-Up And Go test (TUG), isokinetic strength test and aerobic capacity test. Subjects were tested at the following time points, at baseline, at 3 months, at 6 months, pre-operatively and post-operatively.

Results: An independent T-test compared differences between groups' characteristics, and a univariate analysis of variance investigated whether the objective measures of function changed with time. It was observed that group A indicated a significant ($p < .0001$) decline of 39.12% in WOMAC-total score, a significant ($p < .0001$) increase of 48% in WOMAC-pain score, and a significant ($p < .0001$) decline of 35.5% in 6MWT between baseline and pre-operative time. However, at 4 months post-operatively these individuals indicated a significant ($p < .008$) 7.63% decrease in BMI, a significant ($p < .0001$) 68.5% improvement in WOMAC-total score, a significant ($p < .0001$) 73.8% reduction in WOMAC-pain score and a significant ($p < .0001$) 77% increase in 6MWT. The rates of decline from groups B were not significant over time and 90% of the individuals from group B indicated not enough pain or limitation to undergo surgery at baseline. However, nearly after one year follow up 53.4% of the individuals from group B significantly ($p < .0001$) indicated enough pain or limitation to undergo surgery.

Conclusion: The individuals from group A had a significantly higher rate of deterioration, while the ones from group B revealed better