

qualitative data from all participants confirming DART was simple to use.

Conclusion With all significant usability problems addressed DART can proceed to a randomized controlled trial assessing safety and effectiveness against a usual care comparator.

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SELECTIVE HEAD-AND-NECK COOLING ACUTELY FOLLOWING SPORTS-RELATED CONCUSSION REDUCES TIME FROM PLAY IN SWEDISH ELITE ICE HOCKEY PLAYERS

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Introduction Sports-related concussions (SRCs) are an increasingly recognized health problems and treatment options are scarce. We tested the hypothesis that immediate selective head-neck cooling shortens return-to-play (RTP) in concussed ice hockey players.

Material and Methods Over 5 seasons, 19 professional ice hockey teams were divided into 2 groups – intervention teams, where concussed players received selective head-neck cooling, and control teams using standard SRC management. Concussion was diagnosed by established criteria. A head-and-neck cooling cap-system, designed to reduce the brain temperature with a cold circulating coolant, was used. The cooling started acutely after SRC diagnosis and was used for ≥ 45 min. All players were subjected to a standardized graduated RTP protocol. Before RTP, SCAT baseline level and medical teams' clearance should be reached. The main outcome measure was time until completing the graduated rehabilitation program and RTP.

Results In the teams using cooling, 62 concussions were recorded, and 75 in the control teams. Median time to initiate cooling was 11 (range 5–30) minutes. The median time to RTP was 9 days in the cooling group, in controls 12 days ($p < 0.00001$; 95% CI: -7.0; -1.99). In players receiving selective head-neck cooling, 94% (58/62) had an RTP ≤ 3 weeks and 100% had an RTP ≤ 56 days. In controls, 71% (53/75) had an RTP ≤ 3 weeks and 87% ≤ 56 days ($p < 0.001$).

Conclusions Acute selective head- and neck cooling shortens RTP and reduces the risk of long-term absence from play in concussed ice hockey players.

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NUMEROUS TREATMENTS ARE EFFICACIOUS FOR PATELLOFEMORAL PAIN: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction Patellofemoral pain (PFP) is common and impacts health-related quality of life. Despite numerous published guidelines, understanding of intervention efficacy is limited.

Materials and Methods We registered with PROSPERO (CRD42019152252) and searched multiple databases to April 2021 and included only high-quality randomised controlled trials (RCTs) scoring >7 on the PEDro scale. We pooled methodologically homogenous pain (e.g., numerical rating scale) and function (e.g., kujala scale) data using random effects models at short-, medium- and long-term (<3 , >3 - <12 , >12 months respectively). Interventions demonstrated primary efficacy if there was a significant comparison with sham, placebo, or wait-and-see control in an adequately powered RCT ($n > 23$) or data pooling. Secondary efficacy or superiority was determined by a significant comparison to an intervention with primary efficacy. The GRADE criteria determined evidence certainty (very low to high).

Results We identified 61 high-quality RCTs involving 3,543 participants. Four interventions demonstrated primary efficacy for short-term pain and function: knee-targeted exercise (high/moderate), multi-modal physiotherapy (low/low), foot orthoses (low/absent), and lower-quadrant manual therapy (absent/moderate). Hip- and knee-targeted exercise demonstrated secondary efficacy for pain and function in the short (low/moderate), medium (moderate/moderate), and long-term (moderate/moderate). Knee-targeted exercise combined with perineural dextrose injection demonstrated secondary efficacy in the short-term (moderate/moderate). Multi-modal physiotherapy demonstrated superiority for pain and function in the short-term (very low/very low) compared to knee-targeted exercise alone.

Conclusions Wait-and-see, sham, or placebo should not be used for PFP, as several interventions have proven efficacy. Future effectiveness studies should include long-term follow-up. Our synthesis will inform a future updated best practice guide.

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SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMISED CONTROLLED TRIALS AND COHORT STUDIES OF RISK FACTORS FOR KNEE OSTEOARTHRITIS AFTER TRAUMA (OPTIKNEE)

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Introduction It is unclear why some people develop osteoarthritis after knee trauma and others don't. This study identified risk factors for osteoarthritis following knee trauma.

Materials and Methods After protocol registration, 5 databases were searched to 09–2021. RCTs and cohort studies assessing risk factors for symptomatic or structural osteoarthritis in persons with knee trauma, mean injury age ≤ 30 -years, and minimum 2-year follow-up were included. Record screening, data extraction and risk-of-bias assessment was duplicated (blinded). Meta-analyses (random effects models) estimated the odds of osteoarthritis for risk factors assessed in ≥ 4 studies. Remaining

risk factors underwent semi-quantitative synthesis. The GRADE approach for prognostic factors guided assessment.

Results Across 66 included studies, 81 unique risk factors were identified. 64% and 49% of studies had high risk-of-bias from attrition and confounding. Semi-quantitative syntheses identified limited high-quality evidence that cruciate ligament, collateral ligament, meniscal, chondral, dislocation, fracture, and multi-structure injuries increase symptomatic osteoarthritis odds. Ten risk factors for structural osteoarthritis underwent meta-analysis (sex, rehabilitation for ACL tear, ACL reconstruction (ACLR), ACLR age, ACLR body-mass-index, ACLR graft source, ACLR graft augmentation, ACLR+cartilage injury, ACLR+partial meniscectomy, ACLR+total medial meniscectomy). Very-low quality evidence suggests increased odds of structural osteoarthritis related to ACLR+cartilage injury (OR=2.31; 95%CI 1.35,3.94), ACLR+partial meniscectomy (OR=1.87; 1.45,2.42), and ACLR+total medial meniscectomy (OR=3.14; 2.20,4.48).

Conclusion Limited high-quality evidence suggests that various knee injury types (not just ACL tears) increase symptomatic osteoarthritis. Risk factor heterogeneity, low-quality evidence, and inconsistency in risk factor and osteoarthritis definition make identifying modifiable targets for preventing symptomatic post-traumatic knee osteoarthritis challenging.

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RADIOGRAPHIC ASSESSMENT OF THE PUBIC SYMPHYSIS. DEVELOPMENT AND RELIABILITY OF THE MATURING ADOLESCENT PUBIC SYMPHYSIS (MAPS) CLASSIFICATION

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Introduction Pubic-related groin pain can affect young athletes and pubic apophysitis is a potential cause of pain. We aimed to describe the maturation of the pubic symphysis in adolescent football players on x-ray.

Materials and Methods 105 anteroposterior radiographs of healthy adolescent male football players between 12 and 24 years old were used to develop the Maturing Adolescent Pubic Symphysis (MAPS) classification. Our understanding and radiological scoring of the symphyseal joint was developed in 6 rounds. The final MAPS-classification items were scored in random order by two experienced observers, blinded for the age of the participant. The inter-observer reliability was examined using weighted kappa (κ).

Results We developed a classification system with clear definitions and a pictorial atlas. We divided the joint into three regions: the superior corners, the upper and the lower regions of the joint line. The superior corners were classified as rounded, squared or beaked. The upper region of the joint line: round or straight. The lower region of the joint line: straight, diagonal, or in between. Inter-observer reliability was moderate to almost perfect: superior region: $\kappa = 0.70$ (95% CI 0.60 - 0.79), upper region of the joint line: $\kappa = 0.89$ (95% CI 0.86 - 0.92), lower region of the joint line: $\kappa = 0.65$ (95% CI 0.55 - 0.75).

Conclusion The MAPS-classification is reliable and can be used to assess the maturation of the pubic symphysis joint. Maturation starts at the superior corner, followed by ossification of the joint line from superior to inferior.

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MANAGEMENT OF GLUTEAL TENDINOPATHY: A SYSTEMATIC REVIEW WITH META-ANALYSIS OF ALL INTERVENTIONS

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Introduction Gluteal tendinopathy (GT) is a common source of hip pain with reported pain, function, quality of life being equivalent to end stage hip osteoarthritis. This systematic review aims to clarify the best management for people with GT.

Materials and Methods 9 electronic databases and the grey literature were searched from inception to March 2021. High-quality, randomised controlled trials of any intervention for GT were included. The PEDro scale was used for quality assessment, with risk of bias assessed using the Cochrane Risk of Bias tool 2.0.

Results Meta-analysis of four studies of exercise and education (EDX) for pain and function demonstrated that EDX has a large effect on pain outcomes in the short term (SMD 0.95, 95% CI 0.58, 1.33), medium effect in the medium term (SMD 0.60, 95% CI -0.21, 0.96) and a small effect on in the long term (SMD 0.46, 95% CI 0.10, 0.81). EDX has a large effect on functional outcomes in the short term (SMD 0.91, 95% CI 0.53, 1.28), medium effect in the medium term (SMD 0.79, 95% CI 0.42, 1.16) and a small effect in the long term (SMD 0.41, 95% CI 0.05, 0.76).

Conclusion Education and exercise has a positive impact on pain levels and function at every time point. Education and exercise interventions should form part of GT management.

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PIVOTING IN A PANDEMIC: OPPORTUNITIES FOR INJURY SURVEILLANCE USING VIDEO ANALYSIS IN SPORT

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Introduction Prospective cohort studies represent the gold standard in injury surveillance. However, these methods require longitudinal monitoring and are highly resource intensive. We describe the use of video-analysis to inform injury prevention where no other surveillance data is available.

Materials and Methods Forty-eight female varsity rugby union matches were analysed through video-analysis. A three-stage approach to informing injury prevention included match event coding, suspected injury and concussion analysis, and tackle