040 INJURIES ARE NEGATIVELY ASSOCIATED WITH TEAM PERFORMANCE IN PROFESSIONAL CRICKET

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Background A negative association between injuries and team success has been demonstrated across a number of sports, but the nature of this association in professional cricket teams is currently unclear.
Objective To examine the relationship between injuries and team success in professional cricket.
Design A retrospective analysis of all match time-loss injuries and County Championship point tallies for nine seasons (from 2010 – 2018 inclusive).
Setting Eighteen First-Class County Cricket (FCCC) cricket teams in England and Wales.
Patients (or Participants) Professional male senior first-team cricketers registered to one of the eighteen clubs (mean n = 507 players/season).
Interventions (or Assessment of Risk Factors) Two injury measures were assessed for within-team (linear mixed model) and between-team (correlation) effects; match time-loss injury incidence and burden, to account for both the frequency and severity (days lost from competition and practice) of injuries.
Main Outcome Measurements County Championship league points tally was used as the measure of team success.
Results A moderate negative correlation was found between injury burden and team performance (r = -0.36; 90% CI: -0.7 to 0.1; *likely negative*). A reduction in match injury incidence of two match time-loss injuries per 1,000 days of play within a team (90% CI 1.4 to 3.0; *possibly negative*), or a reduction in match injury burden of 74 days per 1,000 days of play (90% CI 50.2 to 109.0; *possibly negative*) in any given season was associated with the smallest worthwhile change in County Championship points (+13 points) for Division 1, but not for Division 2.
Conclusions Moderate reductions in injury burden potentially have worthwhile effects on performance for a domestic cricket team in the County Championship Division 1.

041 RISK FACTORS FOR DOMINANT SHOULDER INJURY IN ELITE FEMALE AUSTRALIAN CRICKET PLAYERS: A PROSPECTIVE STUDY

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Background In elite Australian cricket, shoulder injuries account for 11% of all injuries and 5.8% of all time-loss injuries in female players. However, even with over 400,000 females participating in cricket within Australia there are no studies exploring the risk factors for shoulder injury.
Objective Examine the risk factors for dominant shoulder injury in elite female cricketers during the 2017–2018 season.
Design Prospective cohort study.
Setting Australian national cricket league.
Participants A total of 115 elite, female cricketers were included with a mean (SD) age of 26.0(4.4) years. 39 players had missing data for some pre-season risk factors; however, all players were monitored for injury throughout the entirety of the 2017–2018 season.
Assessment of Risk Factors Univariate and multivariate logistic regression determined the relationship between aerobic fitness and musculoskeletal screening tests with incidence of dominant shoulder injury.
Main Outcome Measurements Pre-season aerobic fitness, musculoskeletal screening tests (shoulder range of motion, shoulder strength, hip strength, scapula dyskinesis, hypermobility and combined elevation) and dominant shoulder injury requirirng modification of throwing were recorded.
Results Fourteen players developed dominant shoulder injuries however as two resulted from trauma these were excluded so 12 injuries proceeded to analysis. Univariate analysis revealed shoulder internal rotation: external rotation (IR:ER) strength ratio (OR=1.84, p=0.01), back foot hip abduction strength (OR=0.973, p=0.049) and back foot hip adduction: abduction strength ratio (OR=1.44, p=0.047) were significantly associated with injury. Only shoulder IR:ER strength ratio remained significant (p=0.016) in the multivariate logistic regression model with a 79% increased risk of shoulder injury for every 0.1 ratio increase.
Conclusions This study identified that within elite female cricketers, a shoulder IR:ER strength ratio of greater than 1.00 is the strongest risk factor for developing shoulder injury. Therefore, injury risk reduction programs in elite female cricketers which focus on keeping the shoulder IR:ER strength ratio closer to 1:1 may assist to minimise shoulder injury burden.

042 CHANGE OF DIRECTION BIOMECHANICS AND THE RISK FOR NON-CONTACT KNEE INJURIES IN YOUTH BASKETBALL AND FLOORBALL PLAYERS

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Background Studies investigating biomechanical risk factors for knee injuries in sport specific tasks are needed.
Objective To investigate association between change of direction (COD) biomechanics and knee injury risk among youth team sports.
Design Prospective cohort study.
Setting Youth basketball and floorball.
Participants 258 female and male players (aged 12–21).
Assessment of Risk Factors COD biomechanics were analysed using 3D-motion analysis. The COD test consisted of a quick

ball pass before and after a high-speed 180° pivot turn on the force plates.

Following variables were analysed

Peak vertical ground reaction force (N/kg), peak trunk lateral flexion angle (degree), peak knee flexion angle (degree), peak knee valgus angle (degree), peak knee flexion moment (Nm/kg), peak knee abduction moment (Nm/kg), and peak knee internal and external rotation moments (Nm/kg). Mean of three trials was used. Injuries and exposure were registered for 12 months.

Main Outcome Measurements New acute non-contact knee injury.

Results The complete data was obtained from 109 female and 149 male basketball (n=130) and floorball (n=128) players. A total of 18 new non-contact knee injuries were registered (0.3 injuries/1000 h of exposure). Female players sustained 14 knee injuries and male players 4. A higher rate of knee injuries was observed in females compared with males (incidence rate ratio 6.2, 95% CI 2.1–21.7). Eight ACL injuries were registered (all in female players). Females displayed significantly larger peak knee valgus angles compared with male (mean for female and male, respectively: 13.9 and 2.0 degree). No significant associations between biomechanical variables and knee injury risk were found.

Conclusions Female players were at increased risk of knee and ACL injury compared with males. Female players performed the 180-degree pivot turn with significantly larger knee valgus compared with male. However, none of the investigated variables were associated with knee injury risk in youth basketball and floorball players.

043 INJURY BURDEN DIFFERS CONSIDERABLY BETWEEN SINGLE TEAMS FROM GERMAN PROFESSIONAL MALE HANDBALL: SURVEILLANCE OF THREE CONSECUTIVE SEASONS

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Background Although high injury prevalences and incidences for professional handball were reported, longitudinal analysis of injury burden remain rare.

Objective Analysis of the injury data of the national statutory accident insurance (VBG) for the two highest divisions in German professional male handball over three consecutive seasons regarding interseason, inter-division and inter-team differences of injury burden.

Design Prospective observational open cohort study over the seasons 2014/2015, 2015/2016 and 2016/2017.

Setting German professional male handball (Handball Bundesliga=HB, 2. Handball Bundesliga=HB2).

Patients (or Participants) All first and second division handball players who played at least one competitive club match within the seasons 2014/15 (n=808), 15/16 (n=757) and 16/17 (n=758) were included.

Interventions (or Assessment of Risk Factors) Analysis of all injuries that were registered by clubs or physicians with the German statutory accident insurance for professional athletes (VBG) as part of occupational accident reporting and that led to time loss and/or to medical attention.

Main Outcome Measurements Inter-team comparisons were calculated using the following formula: 'Cumulative injury burden resulting from mandatory reportable injuries (≥4 days) per team-season/number of competitive matches per team-season'.

Results Every German professional handball player missed on average (cumulative) 28.7 days per season due to injuries. The total burden equalled 66,597 days of absence (HB: 31,247, HB2: 35,350). The mean injury burden per competitive match over the three observed seasons for all HB teams ranged from 12.5 to 14.2 days of absence with individual rates ranging from 4.3 to 28.8 (2014/2015), 2.1 to 27.5 (2015/2016) and 2.3 to 33.6 (2016/2017). For HB2 teams the mean burden ranged from 13.3 to 14.6 days of absence per competitive match, with individual rates ranging from 3.0 to 25.1 (2014/2015), 2.5 to 30.0 (2015/2016) and 0.9 to 35.7 (2016/17).

Conclusions These wide ranges indicate that a reduction in the injury burden seems generally possible and that some teams and coaching staffs are more successful concerning their preventive (coach, medical and therapeutic specific) player support.

044 EVALUATION OF BODY CHECKING POLICY FOR INJURY PREVENTION IN NON-ELITE ADOLESCENT ICE HOCKEY PLAYERS

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Background Body checking is associated with an increased risk of injury and concussion in Pee Wee (ages 11–12) and non-elite (lower 70% by division of play) Bantam (ages 13–14) ice hockey players. This research informed local and provincial policy changes disallowing body checking in non-elite Midget (ages 15–17).

Objective To evaluate the rate ratios of game-related injury and concussion in non-elite Midget players following policy change disallowing body checking in games compared with similar leagues still allowing body checking.

Design Prospective cohort.

Setting Community ice hockey rinks.

Participants Non-elite Midget ice hockey players from 44 teams (453 player-records) where policy disallowed body checking in the lower 70% of divisions of play, and 52 teams (674 player-records) from similar divisions where policy