

videotaped and analysed with a validated observation system allowing quantification of the intensity of physical contacts (PC). Five levels of intensity were coded. Level 1 represents the lowest intensity, and level 5 the highest. Different types of PC such as slashing and hooking were also observed. Multivariate Poisson's regression analyses were performed to compare games between the two cohorts. The results provided a body contact incidence rate per team game. Rates were adjusted for the game period, rink zone, and score difference.

**Results** A total of 5,610 incidences of body contact with the trunk and 3,429 other types of body contact were observed. Very light intensity (Level 1) trunk contact was more frequent in Québec City (adjusted incidence RR [ARR]: 1.71; 95% CI: 1.28–2.29). Hooking (ARR: 2.18; 95% CI: 1.42–3.32) and slashing (ARR: 3.35; 95% CI: 1.31–8.58) were more frequent in Calgary. Body contacts were made more often by defensive players (ARR: 1.28; 95% CI: 1.03–1.58) and on puck carriers (ARR: 1.47; 95% CI: 1.02–2.12) in Calgary.

**Conclusions** Results suggest that players' behaviours differ between players in leagues in which BC was permitted at age 11 compared to leagues in which BC was delayed until age 13.

#### 747 THE INCIDENCE OF STRESS FRACTURES IN AMERICAN COLLEGIATE ATHLETES

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**Background** Stress fractures are common sports-related injuries; female and endurance athletes are known to be at a higher risk than the general athlete population. There are thousands of collegiate athletes in the United States competing in high-impact sports, but no large study has been conducted to determine the incidence of stress fractures in this population. Our objective was to calculate the incidence of stress fractures in National Collegiate Athletic Association athletes and investigate epidemiological trends in specific subgroups of athletes.

**Methods** Data were analysed from the NCAA Injury Surveillance Program from 2009–2010 to 2014–2015 academic years.

**Results** A total of 747 stress fractures resulting in time loss were reported during 18,054,757 athletic exposures (AE) for an overall rate of 0.53/10,000 AE (95% CI: 0.50, 0.57). The rate of fracture was higher overall among female athletes (RR = 2.06; 95% CI: 1.71, 2.47). Female cross country runners had higher fracture rates than males runners (RR = 1.77; 95% CI: 1.05, 2.98), but this was also noted in female versus male soccer (RR = 1.69; 95% CI: 1.09, 2.63) and basketball (RR = 1.69; 95% CI: 1.26, 2.28) players. The pre-season rate was larger than the regular/post-season rate (RR = 3.27; 95% CI: 2.83, 3.78). The most common stress fracture locations were the metatarsals (38.8%, N = 290), tibia (20.7%, N = 155), and the lower back/lumbar spine/pelvis (13.4%, N = 100) and 22.5% (N = 165) of stress fractures were recurrent.

**Conclusion** Females had higher fracture rates of stress fractures than males; but future work needs to focus on improved screening tools for female athletes for all sports as our results found a gender disparity in additional sports from the well-known cross-country athletes. A fifth of fractures are recurrent, potentially

highlighting the need to reassess post-injury return to play policies.

#### 748 IMPLEMENTING MAJOR LEAGUE BASEBALL'S NEW HEALTH AND INJURY TRACKING SYSTEM (HITS)

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**Background** In 2010, Major League Baseball (MLB) and the Major League Baseball Players Association reached an agreement on an electronic medical records and injury tracking system. One goal of the system was to identify and monitor injury trends to better optimise player health and safety.

**Methods** Development of the surveillance system, HITS (Health and Injury Tracking System) database involved reviewing existing sports injury surveillance systems, consulting with the certified athletic trainers who record player injuries and illnesses, as well as experts who had experience with existing sports databases, and team physicians.

**Results** HITS includes all players from the Major and Minor Leagues rather than a sample of players from certain teams. The HITS system has a unique identifying number for each player; thus, data can be deterministically linked across various databases. Linking the data allows for investigation of injuries with regard to other key measures of exposure such as pitch count and number of hits, surgical outcomes data, personnel records to calculate cost data, and demographic data. Events included in HITS are any injury or physical complaint sustained by a player that affects or limits participation in any aspect of baseball-related activity, such as a game, practice, or warm up. Analysis of the HITS data has explored leading body parts injured during play including the hamstring, knee, shoulder, and head; select positions such as catchers; and key activities such as sliding.

**Conclusions** The implementation of HITS has advanced sports injury research overall and professional baseball research in particular. The richness of HITS is unprecedented and creates an opportunity to identify and monitor injury trends in baseball, and conduct epidemiologic research to better understand player risk, and optimise player health and safety through possible rules changes, equipment modifications, or medical education.

#### 749 INJURY INCIDENCE AND LOCATION OF ACUTE INJURIES AT A NATIONAL LEVEL IN SEVEN POPULAR SPORT

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**Background** Acute injuries in sports are still a problem and the aetiology of injuries in different sports, at a national level, are limited. The aim of the study was to describe the body location of acute injuries in seven sports, which has previously been identified as high-risk sports with respect to incidence of acute injury and severity of injuries, at a national level.

**Methods** An epidemiological study was performed using insurance data between years 2006–2013. Sports was motorcycle,

handball, ice hockey, football, floorball, basketball and automobile sports. The sport federations had their mandatory accidental insurance in the insurance company. The total numbers (no) of licensed athletes in each sport was provided from the Swedish Sports Confederation. Injury incidence as well as the proportion of injuries, at each body location was calculated. Severity of an injury was described as the degree of “permanent medical impairment” (PMI).

**Results** Highest injury incidence was in motorcycle and handball, followed by ice hockey, football, floorball, basketball and automobile sports. Lower limb was the most injured body location in all sports except in automobile sports (head/neck), motorcycle and ice hockey (upper limb). The proportion of lower limb injuries was higher for females in all sports. PMI was generally located in the lower limb but in motorcycle and automobile sports the upper limb was more prone to PMI. The most severe injuries was in motorcycle and automobile sports and located in the head/neck region.

**Conclusions** Popular sports with numerous of athletes and acute injuries must be the target for prevention actions at a national level. Lower limb were the most frequent injured body locations. The most severe PMI was in the head/neck location. Further studies should focus on more detailed information on injury types, anatomical locations and injury mechanisms to understand how to prevent these injuries and achieve greater safety in sport.

#### 750 THE EFFECT OF BODY CHECKING POLICY CHANGE ON CONTACT MECHANISMS IN 11–12 YEAR OLD ICE HOCKEY PLAYERS

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**Background** Hockey Canada’s evidence-based body checking (BC) policy change (2013) was informed by evidence that policy allowing BC in Pee Wee (11–12 year old) ice hockey players resulted in a >3-fold increased risk of injury and concussion compared with leagues where BC was not allowed.

**Objective** To compare the frequency of type and intensity of physical contacts (PC) and head contact in elite (upper 30%) Pee Wee ice hockey games in leagues not allowing BC (2013–2014) compared with leagues allowing BC (2007–2008) using video analysis.

**Methods** Ten elite games pre-policy change (2007–2008) and 11 elite games post-policy change (2013–2014) were video recorded and analysed using a validated methodology to compare the frequency of type (trunk and other types of PC with limb/head/stick) and intensity (trunk contacts – level 1–5 intensity) of PC and head contact. Incidence rate ratios (IRR) were estimated using Poisson regression controlling for clustering by game) to compare PC before and after the BC policy change.

**Results** A total of 4409 trunk PCs and 2623 other PCs were observed. The total number of trunk PCs (IRR = 0.97, 95% CI: 0.83–1.14) and other contacts (IRR = 0.87, 95% CI: 0.59–1.29) did not change post-policy change. High intensity contacts (levels 4 and 5) were less frequent post-policy change (IRR<sub>4</sub> = 0.13, 95% CI: 0.09–0.19 and IRR<sub>5</sub> = 0.13, 95% CI: 0.07–0.26) and low intensity contacts (level 2) increased (IRR<sub>2</sub> = 1.47, 95% CI: 1.21–1.79). Limb PCs decreased in 2013–14 (IRR = 0.48, 95%

CI; 0.33–0.71) and there was no difference for head contacts (IRR = 0.81, 95% CI; 0.51–1.30).

**Conclusions** There were no significant differences in total number of PC by study year. However, the incidence of high intensity (level 4–5) PCs decreased post-policy change. There was no significant difference in direct head contact or total number of other contacts. This will inform the development and evaluation of injury prevention and skill training strategies in youth ice hockey.

## Safety Management

Post Tue 2.15

#### 751 TEXTING AND WALKING: A CONTROLLED FIELD STUDY OF CROSSING BEHAVIOURS AND INATTENTIONAL BLINDNESS IN TAIWAN

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**Objective** The paper investigates the effects of phone use (talking, texting, and listening to music) on the street-crossing behaviours of pedestrians and their inattentive blindness in Taiwan.

**Background** Recent handsets with touchscreens, as well as more advanced features including multimedia, and mobile applications (apps), exacerbate problems relating to cognitive distraction and reduced situation awareness.

**Method** A controlled field study using video cameras was conducted for observing pedestrians crossing behaviours (e.g., crossing time, sudden stops, looking both ways before crossing, disobeying traffic signals). Pedestrians were classified into two groups: experimental group (talking, texting, listening to music) and control group (no phone use). Pedestrians’ inattentive blindness was examined by evaluating whether they saw an unusual object (i.e., a clown) nearby.

**Results** The results indicate that the proportions of unsafe crossing behaviours (e.g., sudden stops, disobeying traffic signals, not looking both ways before crossing) were higher among distracted individuals and more pronounced among those using instant-messaging apps. These instant-message app users were the least likely to see the clown, and music listeners were the least likely to hear the horn that the clown was honking. Contributing factors to unsafe behaviours include being a student, having a phone screen of 5 in. or larger, and having un-limited 3G Internet access.

**Conclusions** Texting message via apps was the leading factor on unsafe crossing behaviours of pedestrians and their inattentive blindness.

#### 752 PRIORITY ISSUES; SAFETY GUIDANCE TO PREVENT HEALTH PROBLEMS CAUSED BY POST NUCLEAR ACCIDENT RADIATION

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**Background** In 2011, following the nuclear accident in Fukushima, there were concerns about radiation. In particular, the complicated information related to air and soil, water and food. A great deal of confusing information can easily be found on the