Concussions in Ice Hockey

Michael J. Stuart MD
Professor of Orthopedic Surgery, Mayo Clinic
Chief Medical Officer, USA Hockey
Medical Committee, IIHF

- Sports concussion risk and/or recognition is escalating
- 4x increased risk of a 2nd concussion
- Repeated concussions = increased severity & cumulative damage
- Youth & women are at higher risk
• Reduction of concussion risk, severity & consequences requires a collaborative effort from medicine, psychology, sport science, coaching, engineering, officiating, manufacturing, & community partners.
ICE HOCKEY SUMMIT:
ACTION ON CONCUSSION
October 19-20, 2010

Joint Sponsors

USA Hockey
International Ice Hockey Federation (IIHF)
Hockey Equipment Certification Council (HECC)
Ontario Neurotrauma Foundation (ONF)

Appreciation to Team Wendy
&
our Johannson-Gund Endowment
Outside the Skull Perspective

• NHL: Video analysis project
  ✓ 60% due to direct blows to head
  ✓ 75% don’t have or just released the puck
  ✓ 78% shoulder and elbow

➤ Focus should be on eliminating behaviors
Translation of Science to Prevention

- Open-ice, unanticipated & illegal collisions result in higher linear & rotational acceleration
- Teach youth players technical skills & heighten awareness of imminent collisions
- Athletes/coaches must conform to rules
- Officials consistently enforce rules

Guide policy change
Inside the Skull Perspective

• The Pediatric Brain
  ✓ Developmental stage, susceptibility, reporting & recovery differ
  ✓ Adult caretakers must report symptoms & ensure treatment compliance
  ✓ Need developmentally-specific approach to assessment & management of the pediatric athlete

  ➢ Focus on the youth athlete AND student

Gerald Gioia PhD
Inside the Skull Perspective

• **Chronic Traumatic Encephalopathy (CTE)**
  - Diffuse neurodegenerative syndrome associated with repeated concussions that affects the brain & spinal cord with distinct pathological changes
  - Begins mid-life, dementia, Parkinsonism, gait & speech disorder

  ➤ **Can early markers make the diagnosis & facilitate prevention or treatment?**

Ann McKee MD
The Science of Evaluation

• Sideline Evaluation of Concussion

✓ History, examination, symptom scale, cognitive function, balance & coordination
✓ “When in doubt, sit them out”
✓ Next day follow-up

➢ Improving detection requires education of health care providers, coaches, players & parents
Neurocognitive Testing

• Integrating Assessment & Return to Play

✓ 4% repeat concussion- 79% within 10 days

✓ NO SAME DAY RETURN TO PLAY!

✓ Progressive exercise & cognitive challenge = a longer symptom-free waiting period

➢ Return to play decisions are complex → ultimate decision based on clinical judgment

Stan Herring MD
Neurocognitive Testing

• Neuropsychological Testing in Youth
  ✓ Players hide symptoms
    (50% experience → only 10% report)
  ✓ Recovery is prolonged- student athlete should be asymptomatic after vigorous exertion & have normal cognitive testing

➤ Athletes/students must be rested: cognitively & physically
Equipment and Facilities

• Evaluation of Hockey Helmets
  ✔ Difficult to measure their effect in ice hockey
  ✔ Helmets do what they were designed for: reduce skull fracture & hematoma
  ✔ Facial protection: no reduced concussion risk, but *may reduce severity*

➢ Helmets can’t prevent diffuse axonal injury secondary to angular or rotational acceleration

P. David Halstead
Pat Bishop PhD
Equipment and Facilities

• Ice Surface Size & Mouthguards
  ✓ ↓ injuries & player-player contacts on larger ice surfaces
  ✓ Mouthguards: no evidence of concussion risk reduction
  ✓ Need to assess newer products that tout efficacious laboratory results

➢ Well designed clinical studies needed to demonstrate the benefits

Brian Benson MD PhD
Psychosocial Factors

- **Hockey Education Program (HEP)** - behavioral modification program with outcome data
  - incorporates Fair Play rules
- **Play it Cool** - interactive web-based
  - injury awareness programs promote skill development, coaching excellence, prevention strategies

Implement more broadly across USA & Canada

Aynsley Smith RN, PhD
William Montelpare PhD
Physical Factors

• Checking vs. Non-Checking Leagues
  ✓ 3x increased risk of concussion & severe concussion in Pee Wee leagues that allow body checking
  ✓ Intensity (not rate) of physical contacts greater
  ✓ No difference in practice injury rates

Delaying body-checking until Bantam has a clear & measurable benefit

Carolyn Emery PhD, PT
Physical Factors

• Gender Differences in Concussion
  ✓ Women’s ice hockey has the highest concussion rate among NCAA athletes
  ✓ Concussion outcomes are worse in women
  ✓ More research required to explain difference
  ✓ Cultural, hormonal, structural?

➢ Prevention strategies & return to play guidelines need to reflect gender-specific factors

Doug Stacey MSc, BHScPT
Jim Johnson - NHL Player

“I am the guy, blinded by flashing lights, who went to school to pick up my daughter & returned home without her.”

- Importance of educating coaches & players can’t be overestimated
- Coaches/athletic trainers should set standards, expectations & guidelines with players/parents at beginning of the season
- An educational video from USA Hockey would be a powerful tool
Kerry Fraser - NHL Referee

- Educate officials - *rules must be black & white*
- Standard of enforcement must be *uniform & consistent*
- Penalty must provide disincentive (suspension/fine)

Abuse of officials must stop!

**Rescinding a call** robs officials of confidence, results in self-doubt & a “no call” in the next game
6 PRIORITY ACTION AREAS
FORMULATED AT MAYO CONCUSSION SUMMIT 2010

DATA BASES AND METRICS
- Develop consistent definition
- Base recommendations on data
- Partner with pending legislation

EQUIPMENT AND ARENAS
- Communicate protective role equipment plays
- Share pros and cons of all helmets
- Support research for all equipment

EDUCATION AND PREVENTION
- Mandate concussion education for coaches, officials, players and parents
- Charge hockey organizations with delivering existing educational content
- Educate for behavioral and cultural change

DIAGNOSE, MANAGE
- Mandate education
- Remove players suspected of concussion
- No return to play until cleared by health care provider

RULE RECOMMENDATIONS
- Enforce head and body contact rules
- Create curriculum to teach body control for legal checking (No checking until age 13)
- Ban fighting at all levels

COMMUNICATION
- Mandate pre-season meetings
- Deliver unified, consistent message
- Develop a multi-media package
What should USA Hockey do?

Education

- **mandatory** concussion education for coaches, parents & athletes
- adapt the new **Smart Hockey** video (produced by ThinkSmart) or similar produc

**Modify to create a "USA version"**

- introduction by USA Hockey
- include USA players
What should **USA Hockey** do?

**Rule Changes & Enforcement**
- eliminate **head contact**
  *(incidental & intentional)*

**Proposal #68B**
- **Minor**: contact to the head, face or neck
- **Major/Game**: intentionally or recklessly
- **Match**: attempt to injure or deliberate injury
What should USA Hockey do?

Rule Changes & Enforcement
- delay legal body checking (boys) in games until age 13 (Bantam level)

Proposal #94B
Body Checking is prohibited in the 12 & under youth age classifications, all Girls’/Women’s age classifications and in non-check Adult classifications
Rule Changes & Enforcement

- establish a progressive, structured curriculum to teach body control, angling, anticipation, body contact & body checking skills

Body CONTACT is allowed!
What should **USA Hockey** do?

**Rule Changes & Enforcement**
- eliminate **fighting**

**Proposal #64C**
- 2\(^{nd}\) fighting major = 3 game suspension
- 3\(^{rd}\) fighting major = suspension (until a hearing is conducted)
Together... we can grow the sport & reduce concussions

**F-Communication**
1. Require annual in-person meetings for all hockey participants (including parents)
2. Create unified content & messaging
3. Develop a unified multi-media package, including robust social media presence

**D - Education**
1. Mandatory concussion education for coaches, parents and student-athletes
2. Content development
3. Physician education on concussions to athlete & parent during sports physical

**E- Rule Changes, Enforcement**
1. Head contact
2. Body checking
3. Eliminate fighting

**A- Databases**
1. Collect injury (concussion) data from well-controlled sentinel sites
2. Standardization of hockey research
3. Find a way to partner with the pending (i.e. US State legislation initiatives) to collect data

**B – Diagnosing -RTP**
1. Mandate education (Coaches during certification; Parents; Referee)
2. Remove ALL athletes suspected of having a concussion
3. No athlete with concussion can RTP until cleared by a health care provider

**C- Player Equipment**
1. Communication strategy to educate the hockey community on the role equipment
2. Helmets are one factor to reduce the risk of concussion- research must continue
3. Support protocols for testing equipment & facilities