Emory Sports Medicine
Injuries in Soccer 2018

Emergency Evaluation of
The Downed Athlete

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Marshall University School of Medicine
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High Anxiety for SM Team
Athlete Collapse

SCA with Sentinel Seizure
IS THERE A DOCTOR ON THE SIDELINE ??

- Athlete Collapse – SCA
- Commotio Cordis
- Head and Neck Trauma
- Second Impact Syndrome
- Heat Stress  EHS
- Sickle Cell Trait – Explosive Rhabdo
- Exercise Induced Asthma
- Allergic Reaction - Anaphylaxis
- Torso Trauma – Chest and Abdomen
- Limb Threatening Joint Dislocations

Top 10 Catastrophic Athlete Injuries
Downed Athlete
Worse-case Scenario??
On The Field Collapse
Worse-case Scenario??
2007 NATA Position Paper
SCA in Athletes Summit (Courson, Drezner)

- Most cases occur with Basketball, Football and Little League Baseball
- 9 to 1 Male/Female
  - Athlete Collapse – Suspect SCA
  - Sentinel Seizure awareness
- AED’s with time to shock < 4 minutes
- Coach AED certification
  - Schools need a formal Emergency Action Plan
- Rapid ACLS availability
AED’s in Sudden Cardiac Arrest

• Survival
  – Overall: 71%
  – When shock delivered onsite: 87%
  – AED onsite: 80%
  – AED brought by offsite EMS: 50%
  – Schools with EAP: 79%
  – Schools without EAP: 44%

“The single greatest factor affecting survival from SCA is the time interval from cardiac arrest to defibrillation.”

Drezner JA, et al. BJSM 2013
2010 AHA GUIDELINES

ABC now Reversed

CAB
SCA – ROSC
Survival Hospital D/C

2010 AHA Guidelines

➢ PUSH HARD

➢ PUSH FAST
SPORTS ARENA SCA
Current Best Practice

- WHEN TO SHOCK FIRST
- CPR FIRST
- CONTINUE CPR AFTER SHOCK
- TIMING OF RESCUE BREATHING
- DELAYED SCA WITH ECAST
- SCHOOL SCA **ADULTS** > ATHLETES
Head Impact
Worse-case Scenario??
International Symposia on Concussion in Sport

- First ISC  **Vienna** 2001
- Second ISC  **Prague** 2005
  Simple vs Complex, SCAT2 sideline tool
- Third ISC  **Zurich** 2008
  Removed Simple vs Complex grading,
  RTP based on progression
- Fourth ISC  **Zurich** 2012 – SCAT3, Baseline NP, BESS, enhanced MRI
- Fifth ISC – **Berlin** 2016 – SCAT 5 – RTL, “Rest”

FIFA, IOC, IIHA
Sports Concussion

- **NFL** - 2012 Independent Physician for RTP
  Media – Early Dementia, CTE
  2013 Sideline Independent Neuro Exam

- **College** – Neuro-Cognitive test Pre-Season
  Repeat Post-Injury; “Targeting” rule change,
  Medical Time Out - NATA

- **High School** - **50 States with RTP Legislation**
  Pre-Season Video, Second Impact Syndrome

- **Youth** - CDC Coach / Parent Video
  ^ In Emergency Department visits
  2015 Youth Soccer Heading restrictions USSF
Concussion in Soccer

Figure 1. Rate of Competition Concussion Injury

Rate of Competition Concussion Injury

<table>
<thead>
<tr>
<th>Sport</th>
<th>Concussions per 1,000 Exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>W. Gymnastics</td>
<td>0</td>
</tr>
<tr>
<td>Men’s Baseball</td>
<td>0.2</td>
</tr>
<tr>
<td>Women’s Volleyball</td>
<td>0.2</td>
</tr>
<tr>
<td>Women’s Softball</td>
<td>0.4</td>
</tr>
<tr>
<td>Men’s Basketball</td>
<td>0.6</td>
</tr>
<tr>
<td>Women’s Basketball</td>
<td>1.0</td>
</tr>
<tr>
<td>Women’s Field Hockey</td>
<td>1.1</td>
</tr>
<tr>
<td>Women’s Lacrosse</td>
<td>1.2</td>
</tr>
<tr>
<td>Men’s Soccer</td>
<td>1.3</td>
</tr>
<tr>
<td>Men’s Wrestling</td>
<td>1.6</td>
</tr>
<tr>
<td>Women’s Soccer</td>
<td>2.0</td>
</tr>
<tr>
<td>Men’s Ice Hockey</td>
<td>2.1</td>
</tr>
<tr>
<td>Women’s Ice Hockey</td>
<td>2.1</td>
</tr>
<tr>
<td>Men’s Lacrosse</td>
<td>2.5</td>
</tr>
<tr>
<td>Football</td>
<td>2.9</td>
</tr>
</tbody>
</table>
Soccer Concussion Contact Type

- **Player/Player contact**
- **Player/Equipment contact**
- **Player/Playing surface contact**
- **Other**

[Bar chart showing percentage of heading-related concussions caused by specific contact types for different groups (HS Boys', HS Girls', College Athletes).]
Head to Head
Head to Post
Head to Ground & Other
Soccer RTP Concussion
Soccer Concussion Symptoms

1. Headache
2. Dizziness
3. “Foggy”
4. Confusion
5. Light sensitivity
6. Noise sensitivity
USSF RTP Protocol

• Post Acute Evaluation and Management
  – Symptom free
  – Neurocognitive
  – Gradual progression
    • Symptom free x 24 hours
    • Symptoms re-emerge begin with previous step after being symptom free x 24 hours
    • Athlete should only progress to next level when instructed to by team ATC or MD
USSF RTP Protocol

• Graded RTP: Based on Prague Guidelines
  – 1. Rest until asymptomatic x 24 hrs.
  – 2. Light aerobic exercise
  – 3. Moderate intensity aerobic exercise
  – 4. Sport specific training drills (No Heading)
  – 5. Non contact training drills, including full exertion interval training
  – 6. Begin heading training steps 1&2
  – 7. Full contact training with heading steps 3&4
  – 8. Return to competition
Sports Concussion

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2015 Youth Soccer Heading restrictions USSF
Youth Soccer

➢ 50,000 High School Concussion 2010
➢ 2015 US Soccer position statement:
  Age 10 and under - **No Heading**
  Age 11-13  - Limit **Heading** in practice
Protective Equipment
Q30 Collar
Concussion Protection

- 2015-16 Saint Xavier HS Football Cincinnati
- 2016 Seton High School Girls Soccer
- Dr Julian Bailes, Chairman Neurosurgery, North Shores Hospital
- Reduce the brain slosh/slide with rapid acceleration and deceleration
- Woodpecker “Inspired”
IS THERE A DOCTOR ON THE SIDELINE??

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Top 10 Catastrophic Athlete Injuries
Sports Trauma
Athletic Trainer/ Coach Teamwork

Soccer Practice
Venue EAP

Coach

CPR AED

NATA

Athletic Trainer

ACLS

EMS
Rule of 100
Sports Trauma Management
Sports Trauma Decisions

**Rule of 100**
Initiate VS trending if:

- Pulse $> 100$
- Temperature $> 100$
- Systolic BP $< 100$
VST - Sport Trauma
EMS-ATC Focus

- Initial Vital Signs
- Rule of 100
- Vital sign Trending
  - Heat stress
  - Unconscious athlete
  - Asthma attack
- Pearls and “When to Worry”
- Sideline Gadgets
Rule of 100
Initiate VS trending if:

- Pulse > 100
- Temperature > 100
- Systolic BP < 100

VS Trending
- Serial vital signs over 30 mins
- Monitor heart rate, BP, and temp
- Response to rest, hydration, cooling, and other interventions
Sports Trauma VS Trending

Initial VS

On the field Rule of 100

VS Trending
Over 30 minutes

Rule of 100

Team Physician

ER
Heart Rate Trending

Tachycardia: Heart rate > 100

➡ Sinus Tachycardia
➡ Supra-ventricular (SVT)
➡ Ventricular (VT)

“sports tachycardia” - sinus tachycardia response from exercise
Heart rate Trending

**Sports Tachycardia Pearl**

- Sinus tachycardia from vigorous sports play improves over 15 minutes in most cases
- Persistent tachycardia is cause for concern Rule out hemodynamic instability
- Cardiac monitoring will determine if supra-ventricular or ventricular tachycardia is present
Sideline Gadgets

- Peak Flow Meter
- Digital Thermometer
- Pulse Oximetry
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Sideline Medications & Resuscitation Equipment

- Albuterol Inhaler
- Epinephrine
- Benadryl

- AED
- Bag-Valve Mask
- King Airway
Sports Trauma: Coach, EMS, Athletic Trainer Teamwork

Greenbrier Sports Performance Center

Rural High School Limited Sp Med Talent
Medical Time Out

The Kyle Group
2018 ED Sport Concussion Shift

- Most Sports Concussions without LOC
- CTE risk for repetitive sub-concussive Hits
- After First Concussion 3-6X risk second (SIS)
- Defer RTP decision
- Consider risk stratification for PPCS
- Prescribe Neuro-Cognitive testing and symptom checklist
- Offer RTL & RTA advice, Magnesium 400mg
- Expect Biomarker testing to confirm in future
# ED Discharge Checklist (GSC)

## Graded Symptom Checklist (GSC)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Time of injury</th>
<th>2-3 Hours postinjury</th>
<th>24 Hours postinjury</th>
<th>48 Hours postinjury</th>
<th>72 Hours postinjury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blurred vision</td>
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<tr>
<td>Dizziness</td>
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<tr>
<td>Drowsiness</td>
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<tr>
<td>Excess sleep</td>
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<tr>
<td>Easily distracted</td>
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<tr>
<td>Fatigue</td>
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<tr>
<td>Feel “in a fog”</td>
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<tr>
<td>Feel “slowed down”</td>
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<tr>
<td>Headache</td>
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<tr>
<td>Inappropriate emotions</td>
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<tr>
<td>Irritability</td>
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<tr>
<td>Loss of consciousness</td>
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<tr>
<td>Loss or orientation</td>
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<tr>
<td>Memory problems</td>
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<tr>
<td>Nausea</td>
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<tr>
<td>Nervousness</td>
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<tr>
<td>Personality change</td>
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<tr>
<td>Poor balance/coordination</td>
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<tr>
<td>Poor concentration</td>
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<tr>
<td>Ringing in ears</td>
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<tr>
<td>Sadness</td>
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<tr>
<td>Seeing stars</td>
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<tr>
<td>Sensitivity to light</td>
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<tr>
<td>Sensitivity to noise</td>
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<tr>
<td>Sleep disturbance</td>
<td></td>
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<tr>
<td>Vacant stare/glassy eyed</td>
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<tr>
<td>Vomiting</td>
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</tbody>
</table>

**NOTE:** The GSC should be used not only for the initial evaluation but for each subsequent follow-up assessment until all signs and symptoms have cleared at rest and during physical exertion. In lieu of simply checking each symptom present, the ATC can ask the athlete to grade or score the severity of the symptom on a scale of 0-6, where 0=not present, 1=mild, 3=moderate, and 6=most severe.
# Emergency Department Predictors

**PPCS @ 1 Month**

<table>
<thead>
<tr>
<th>Patient History</th>
<th>Emergency Dept Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age 13-18</td>
<td>5. Answer Slow in ED</td>
</tr>
<tr>
<td>2. Sex Female</td>
<td>6. BESS test tandem 4*</td>
</tr>
<tr>
<td>3. Prior Concussion</td>
<td>7. Sensitivity to noise</td>
</tr>
<tr>
<td>4. Migraine Hx</td>
<td>8. Headache</td>
</tr>
<tr>
<td></td>
<td>9. Fatigue</td>
</tr>
</tbody>
</table>

Zemek, R: *JAMA* March 8, 2016
3063 Pediatric age 5-17, 30% PPCS
Community “Best Practice”
Sports Concussion

- **Emergency Room**: Head, C-spine evaluation- ?CT
  BESS Testing, 72hr GSC at D/C
- **Pediatrician**: Review Graded Symptom Checklist
  Neuro-Cognitive testing (ImPACT)
- **School/ Coach**: Equipment check, 5 day progression
  Consult Physician RTP