

# **An Update on PPE & Common Sports Medicine Problems in the Pediatric Office**

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# Objectives

- Provide patient guidance on participation in organized sports for athletes with prior chronic disease/condition(s)
- Provide patient guidance on participation in organized sports for athletes with single paired organs
- Provide patient guidance on participation in organized sports for athletes with prior concussion
- Identify findings that warrant follow-up, diagnostic studies, and/or referral

# Objectives of the PPE

- Primary
  1. Screen for life threatening or disabling conditions
  2. Screen for conditions that predispose one to injury or illness
  3. Meet administrative requirements
- Secondary
  1. Determine general health
  2. Entry point to healthcare for adolescents
  3. Provide opportunity to initiate discussions

# PPE

## PREPARTICIPATION PHYSICAL EVALUATION

5th Edition

American Academy of Family Physicians  
American Academy of Pediatrics  
American College of Sports Medicine  
American Medical Society for Sports Medicine  
American Orthopaedic Society for Sports Medicine  
American Osteopathic Academy of Sports Medicine

American Academy  
of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN



# PPE

## PREPARTICIPATION PHYSICAL EVALUATION

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# PREPARTICIPATION PHYSICAL EVALUATION HISTORY FORM

(Note: This form is to be filled out by the patient and parent prior to seeing the physician. The physician should keep this form in the chart.)

Date of Exam \_\_\_\_\_  
Name \_\_\_\_\_ Date of Birth \_\_\_\_\_  
Sex \_\_\_\_\_ Age \_\_\_\_\_ Grade \_\_\_\_\_ School \_\_\_\_\_ Sports \_\_\_\_\_

**Medicines and Allergies:** Please list all of the prescription and over-the-counter medicines and supplements (herbal and nutritional) that you are currently taking.

Do you have any allergies? ☐ Yes ☐ No If yes, please identify specific allergy below.  
☐ Medicines ☐ Pollens ☐ Food ☐ Stinging Insects

Explain "Yes" answers below. Circle questions you don't know the answers to.

GENERAL QUESTIONS	Yes	No	MEDICAL QUESTIONS	Yes	No
1. Has a doctor ever denied or restricted your participation in sports for any reason?			26. Do you cough, wheeze, or have difficulty breathing during or after exercise?		
2. Do you have any ongoing medical conditions? If so, please identify below: <input type="checkbox"/> Asthma <input type="checkbox"/> Anemia <input type="checkbox"/> Diabetes <input type="checkbox"/> Infections Other: _____			27. Have you ever used an inhaler or taken asthma medicine?		
3. Have you ever spent the night in the hospital?			28. Is there anyone in your family who has asthma?		
4. Have you ever had surgery?			29. Were you born without or are you missing a kidney, an eye, a testicle (males), your spleen, or any other organ?		
<b>HEART HEALTH QUESTIONS ABOUT YOU</b>	Yes	No	30. Do you have groin pain or a painful bulge or hernia in the groin area?		
5. Have you ever passed out or nearly passed out DURING or AFTER exercise?			31. Have you had infectious mononucleosis (mono) within the last month?		
6. Have you ever had discomfort, pain, tightness, or pressure in your chest during exercise?			32. Do you have any rashes, pressure sores, or other skin problems?		
7. Does your heart ever race or skip beats (irregular beats) during exercise?			33. Have you had a herpes or shingles skin infection?		
8. Has a doctor ever told you that you have any heart problems? If so, check all that apply: <input type="checkbox"/> High blood pressure <input type="checkbox"/> A heart murmur <input type="checkbox"/> High cholesterol <input type="checkbox"/> A heart infection <input type="checkbox"/> Kawasaki disease <input type="checkbox"/> Other: _____			34. Have you ever had a head injury or concussion?		
9. Has a doctor ever ordered a test for your heart? (For example, ECG/ECG, echocardiogram)			35. Have you ever had a hit or blow to the head that caused confusion, prolonged headache, or memory problems?		
10. Do you get lightheaded or feel more short of breath than expected during exercise?			36. Do you have a history of seizure disorder?		
11. Have you ever had an unexplained seizure?			37. Do you have headaches with exercise?		
12. Do you get more tired or short of breath more quickly than your friends during exercise?			38. Have you ever had numbness, tingling, or weakness in your arms or legs after being hit or falling?		
<b>HEART HEALTH QUESTIONS ABOUT YOUR FAMILY</b>	Yes	No	39. Have you ever been unable to move your arms or legs after being hit or falling?		
13. Has any family member or relative died of heart problems or had an unexpected or unexplained sudden death before age 50 (including drowning, unexplained car accident, or sudden infant death syndrome)?			40. Have you ever become ill while exercising in the heat?		
14. Does anyone in your family have hypertrophic cardiomyopathy, Marfan syndrome, arrhythmogenic right ventricular cardiomyopathy, long QT syndrome, short QT syndrome, Brugada syndrome, or catecholaminergic polymorphic ventricular tachycardia?			41. Do you get frequent muscle cramps when exercising?		
15. Does anyone in your family have a heart problem, pacemaker, or implanted defibrillator?			42. Do you or someone in your family have kidney or liver disease?		
16. Has anyone in your family had unexplained fainting, unexplained seizures, or near drowning?			43. Have you had any problems with your eyes or vision?		
<b>BONE AND JOINT QUESTIONS</b>	Yes	No	44. Have you had any eye injuries?		
17. Have you ever had an injury to a bone, muscle, ligament, or tendon that caused you to miss a practice or a game?			45. Do you wear glasses or contact lenses?		
18. Have you ever had any fracture or bruising bones or dislocated joints?			46. Do you wear protective eyewear, such as goggles or a face shield?		
19. Have you ever had an injury that required x-rays, MRI, CT scan, injection, therapy, a brace, a cast, or crutches?			47. Do you worry about your weight?		
20. Have you ever had a stress fracture?			48. Are you trying to or has anyone recommended that you gain or lose weight?		
21. Have you ever been told that you have or have you had an x-ray for neck instability or atlantoaxial instability? (Down syndrome or basilar invagination)			49. Are you on a special diet or do you avoid certain types of foods?		
22. Do you regularly use a brace, orthosis, or other assistive device?			50. Have you ever had an eating disorder?		
23. Do you have a bone, muscle, or joint injury that bothers you?			51. Do you have any concerns that you would like to discuss with a doctor?		
24. Do any of your joints become painful, swollen, feel warm, or look red?			<b>FEMALES ONLY</b>		
25. Do you have any history of juvenile arthritis or connective tissue disease?			52. Have you ever had a menstrual period?		
			53. How old were you when you had your first menstrual period?		
			54. How many periods have you had in the last 12 months?		

I hereby state that, to the best of my knowledge, my answers to the above questions are complete and correct.

Signature of athlete \_\_\_\_\_ Signature of parent/guardian \_\_\_\_\_ Date \_\_\_\_\_

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# PREPARTICIPATION PHYSICAL EVALUATION PHYSICAL EXAMINATION FORM

Name \_\_\_\_\_ Date of birth \_\_\_\_\_

## PHYSICIAN REMINDERS

- Consider additional questions on more sensitive issues
  - Do you ever feel stressed out or under a lot of pressure?
  - Do you ever feel sad, hopeless, depressed, or anxious?
  - Do you feel safe at your home or residence?
  - Have you ever been cigarette, chewing tobacco, snuff, or dip?
  - During the past 90 days, did you use chewing tobacco, snuff, or dip?
  - Do you drink alcohol or use any other drugs?
  - Have you ever taken anabolic steroids or used any other performance supplement?
  - Have you ever taken any supplements to help you gain or lose weight or improve your performance?
  - Do you wear a seat belt, use a helmet, and use condoms?
- Consider reviewing questions on cardiovascular symptoms (questions 5-14).

EXAMINATION		Sex <input type="checkbox"/> Male <input type="checkbox"/> Female	
Height	Weight	Vision H PDV	Corrected <input type="checkbox"/> Y <input type="checkbox"/> N
BP	Pulse	1-20/	
<b>MEDICAL</b>		<b>NORMAL</b>	<b>ABNORMAL FINDINGS</b>
Appearance • Marfan stigmata (hyperostosis, high-arched palate, pectus excavatum, brachydactyly, arm span > height, hyperostosis, myopia, MVP, aortic insufficiency)			
Eyes/ears/nose/throat			
• Pupils equal			
• Hearing			
Lymph nodes			
Heart*			
• Murmurs (auscultation standing, supine, +/- Valsalva)			
• Location of point of maximal impulse (PMI)			
Pulses			
• Simultaneous femoral and radial pulses			
Lungs			
Abdomen			
Genitourinary (males only)			
Skin			
• HSV lesions suggestive of MSA, Urea carapace			
Neurologic*			
<b>MUSCULOSKELETAL</b>			
Neck			
Back			
Shoulder/arm			
Elbow/wrist/hand			
Wrist/hand/fingers			
Knee			
Ankle			
Foot/toes			
Functional			
• Duck-walk, single leg hop			

\*Consider ECG, echocardiogram, and referral to cardiology for abnormal cardiac history or exam.

\*Consider GU exam if in private setting. Having third party assist is recommended.

\*Consider leg pain evaluation or baseline neurophysiologic testing if a history of significant weakness.

- ☐ Cleared for all sports without restriction
- ☐ Cleared for all sports without restriction with recommendations for further evaluation or treatment for \_\_\_\_\_

- ☐ Not cleared
- ☐ Pending further evaluation
- ☐ For any sports
- ☐ For certain sports \_\_\_\_\_
- Reason \_\_\_\_\_

Recommendations \_\_\_\_\_

I have examined the above-named student and completed the preparticipation physical evaluation. The athlete does not present apparent clinical contraindications to practice and participate in the sport(s) as outlined above. A copy of the physical exam is on record in my office and can be made available to the school at the request of the parents. If conditions also after the athlete has been cleared for participation, the physician may rescind the clearance until the problem is resolved and the potential consequences are completely explained to the athlete (and parents/guardians).

Name of physician (print/type) \_\_\_\_\_ Date \_\_\_\_\_

Address \_\_\_\_\_ Phone \_\_\_\_\_

Signature of physician \_\_\_\_\_ MD or DO

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# When to do more?

- Prior injury in the previous season
- Continued or intermittent pain with activity
- Abnormality on history or physical examination
- Parental concerns or Athlete concerns

# Classification on Contact

- **Contact/Collision**

- Boxing, Basketball, Diving, Field/Ice Hockey, FB, Lacrosse, Martial arts, Soccer, Ski Jumping, Water polo, Wrestling

- **Limited Contact**

- Baseball/Softball, Bicycling, Canoeing, Fencing, Field events, flag FB, Horseback riding, Gymnastics, Skiing, Handball, Racquetball, Snowboarding

- **Noncontact**

- Archery, Badminton, Body building, Canoeing (flat water), Crew, Dancing, Field events (discus, javelin, shot put), Golf, Race walking, Power lifting, Rope jumping, Swimming, Running, Tennis, Track, Scuba diving, Sailing, Curling



# Classification by Strenuousness

- **High to Moderate Dynamic and High to Moderate Static**
  - Boxing, Crew, Cross-country Skiing, Downhill Skiing, FB, Ice Hockey, Sprinting, Wrestling, Speed Skating, Rugby
- **Low Dynamic (isotonic) and Low Static (isometric)**
  - Bowling, Cricket, Curling, Golf, Riflery

# Classification by Strenuousness

- **High to Moderate Dynamic (isotonic) with Low Static**
  - Badminton, BB, Baseball, Field Hockey, Lacrosse, Soccer, Swimming, Tennis, Volleyball, Race Walking
- **High to Moderate Static (isometric) and Low Dynamic**
  - Archery, Auto Racing, Diving, Horseback Jumping, Throwing Field Events, Gymnastics, Motorcycling, Rodeo, Sailing, Ski Jumping, Water-skiing, Weight Lifting

# Heart Health Questions

- Have you ever passed out or nearly passed out During or After exercise?
- Have you ever been told you have high blood pressure, high cholesterol, Kawasaki disease, a heart murmur or heart infection?
- Has a doctor ever ordered a test for your heart?
- Have you ever had discomfort, pain or pressure in your chest during exercise?
- Does your heart race or skip beats during exercise?
- Do you get more SOB or tired than friends with exercise?
- Do you get light headed or feel more SOB than expected during exercise?
- Have you had an unexplained seizure?

# Family Cardiac History

- Has anyone in your family ever died for no apparent reason?
- Has anyone in your family died of heart problems before the age of 50?
- Does anyone in your family have Marfan syndrome, HCM, arrhythmogenic RV CM, long QT etc?
- Anyone have heart problem, pacemaker, implantable defibrillator?

# Evaluation (PPÉ): Hypertension

- Significant Essential HTN: restrict high static activities (weight lifting, body building)
- Severe Essential HTN or secondary HTN (HTN caused by a previous identified disease) need evaluation before clearance to participate

# Hypertension

- Adults
  - NL = SBP < 120 and DBP < 80
  - Prehypertension = 120-139 and/or 80-89
  - **Stage 1** = 140-159 and/or 90-99
  - **Severe/Stage 2** = SBP>160 and/or DBP>100)
- Children & Adolescents
  - NL = < 90<sup>th</sup> percentile for age, sex & height
  - High NL = 90<sup>th</sup>-95<sup>th</sup> percentile
  - **Significant HTN** = > 95<sup>th</sup> percentile +5mmHg
  - **Severe HTN**= > 99<sup>th</sup> percentile +5mmHg

# Hypertension

- **Significant Essential HTN:** restrict high static activities (weight lifting, body building)
- **Severe Essential HTN or secondary HTN** (HTN caused by a previous identified disease) need evaluation before clearance to participate

**Table 163. 90th Percentile of Blood Pressure in Boys 2 to 17 Years of Age According to Height Percentile**

90 <sup>th</sup> % Systolic BP for Height Percentile of:						90 <sup>th</sup> % Diastolic BP for Height Percentile of:				
Age	5 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	95 <sup>th</sup>	5 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	95 <sup>th</sup>
2	98	100	102	104	105	55	56	57	58	59
4	102	105	107	109	110	62	63	64	65	66
6	105	108	110	111	113	67	69	70	70	71
8	107	110	112	114	115	71	72	73	74	75
10	110	113	115	117	118	73	74	75	76	77
12	115	117	119	121	123	75	76	77	78	78
14	120	123	125	126	128	76	77	78	79	80
16	125	128	130	132	133	79	80	81	82	83
17	128	131	133	134	136	81	82	83	84	85



# Cardiac PPE

- Cardiology Evaluation
  - Heart Health Questions on PPE
  - 8 Personal and 4 FHx related
  - PE components
    - Auscultation, Palpation Pulses, Stigmata Marfan, BP sitting
  - ECG not required at present

# Cardiac PPE

- Cardiology Evaluation
  - Syncope or Near Syncope with exertion
  - Chest pain/discomfort on exertion
  - Palpitations (even at rest)
  - Unexpected dyspnea with exercise
  - Irregular rate, weak/delayed femoral pulses, fixed split S2, systolic murmur 3/6, HCOM (or FHx), Prolonged QT, Marfan (Ghent Criteria) characteristics, and/or FHx of sudden premature death (<50 y.o.)

# Cardiovascular screening in the PPE should include which of the following?

1. An ECG
2. A history and 12-element question
3. A history, 12 element question and PE
4. A history, 12 element question, PE, and ECG
5. A Cardiology Consult

# Preparticipation Cardiovascular Screening of Young Competitive Athletes: Policy Guidance (June 2012)

The AHA recommends the following with regards to preparticipation screening of young competitive athletes:

Competitive athletic prescreening should consist of a targeted **personal history, family history and physical examination**. This includes **12 key prescreening elements** such as a history of *elevated systemic blood pressure*, knowledge of certain *cardiac conditions in family members*, and the presence of a *heart murmur* that are designed to identify, or at least raise the suspicion of cardiovascular diseases that place certain athletes at risk. Those athletes with positive findings should be referred for further evaluation and testing.

# **Preparticipation Cardiovascular Screening of Young Competitive Athletes: Policy Guidance (June 2012)**

**The AHA recommends the following with regards to preparticipation screening of young competitive athletes:**

At this time, the AHA does not recommend the use of tests such as a 12-lead ECG or echocardiogram in mandatory preparticipation screening programs. Instead, these tests should be used as follow-up if an initial screening raises suspicions about the presence of a cardiovascular disease.

# Cardiovascular screening in the PPE should include which of the following?

1. An ECG
2. A history and 12-element question
3. A history, 12 element question and PE
4. A history, 12 element question, PE, and ECG
5. A Cardiology Consult

# Congenital Heart Disease

- Those with mild disease may participate fully, those with moderate to severe disease or those who have had surgery need further evaluation

# Cardiac Congenital Aortic Stenosis

Sports participation — The 2015 scientific statement of the American Heart Association and American College of Cardiology (AHA/ACC) provides competitive athletic participation guidelines for patients with congenital heart disease (CHD), including valvar AS:

- **Mild AS** (mean gradient  $<25$  mmHg or maximum instantaneous gradient  $<40$  mmHg): Patients can participate in all sports if they have a normal electrocardiogram (ECG), normal exercise tolerance, and no history of exercise-related chest pain, syncope, or tachyarrhythmia.
- **Moderate AS** (mean gradient 25 to 40 mmHg or maximum instantaneous gradient 40 to 70 mmHg): Patients may participate in low-intensity static or low- to moderate-intensity dynamic sports (class IA, IB, and IIA) if they have only mild or no left ventricular (LV) hypertrophy on echocardiogram, no evidence of LV strain on ECG, and a normal maximum exercise stress test without evidence of ischemia or tachyarrhythmia, with normal exercise duration and blood pressure response.
- **Severe AS** (mean gradient  $>40$  mmHg or maximum instantaneous gradient  $>70$  mmHg): Patients can participate only in low-intensity
- (class IA) sports •



# Marfan Syndrome

- **In the absence of family history:**
- **Aortic Root Dilatation Z score  $\geq 2$  AND Ectopia Lentis = Marfan syndrome** - The presence of aortic root dilatation (Z-score  $\geq 2$  when standardized to age and body size) or dissection and ectopia lentis allows the unequivocal diagnosis of Marfan syndrome, regardless of the presence or absence of systemic features except where these are indicative of [Shprintzen Goldberg syndrome](#), [Loeys-Dietz syndrome](#), or [vascular Ehlers Danlos syndrome](#).
- **Aortic Root Dilatation Z score  $\geq 2$  AND FBN1 = Marfan syndrome** - The presence of aortic root dilatation ( $Z \geq 2$ ) or dissection and the identification of a bona fide FBN1 mutation are sufficient to establish the diagnosis, even when ectopia lentis is absent.
- **Aortic Root Dilatation Z score  $\geq 2$  AND Systemic Score  $\geq 7$ pts = Marfan syndrome** - Where aortic root dilatation ( $Z \geq 2$ ) or dissection is present, but ectopia lentis is absent and the FBN1 status is either unknown or negative, a Marfan syndrome diagnosis is confirmed by the presence of sufficient systemic findings ( $\geq 7$  points, according to a [scoring system](#)) confirms the diagnosis. However, features suggestive of Shprintzen Goldberg syndrome, Loeys-Dietz syndrome, or vascular Ehlers Danlos syndrome must be excluded and appropriate alternative genetic testing (TGFB1/2, SMAD3, TGFB2, TGFB3, collagen biochemistry, COL3A1, and other relevant genetic testing when indicated and available upon the discovery of other genes) should be performed.
- **Ectopia lentis AND a FBN1 mutation associated with Aortic Root Dilatation = Marfan syndrome** - In the presence of ectopia lentis, but absence of aortic root dilatation/dissection, the identification of an FBN1 mutation previously associated with aortic disease is required before making the diagnosis of Marfan syndrome.

# Marfan Syndrome

- In the presence of family history:
- **Ectopia lentis AND Family History of Marfan syndrome (as defined above) = Marfan syndrome** - The presence of ectopia lentis and a family history of Marfan syndrome (as defined in 1-4 above) is sufficient for a diagnosis of Marfan syndrome.
- **A systemic score  $\geq 7$  points AND Family History of Marfan syndrome (as defined above) = Marfan syndrome** - A systemic score of greater than or equal to 7 points and a family history of Marfan syndrome (as defined in 1-4 above) is sufficient for a diagnosis of Marfan syndrome. However, features suggestive of Shprintzen Goldberg syndrome, Loeys-Dietz syndrome, or vascular Ehlers Danlos syndrome must be excluded and appropriate alternative genetic testing (TGFB1/2, SMAD3, TGFB2, TGFB3 collagen biochemistry, COL3A1, and other relevant genetic testing when indicated and available upon the discovery of other genes) should be performed.
- **Aortic Root Dilatation Z score  $\geq 2$  above 20 yrs. old,  $\geq 3$  below 20 yrs. old + Family History of Marfan syndrome (as defined above) = Marfan syndrome** - The presence of aortic root dilatation (Z  $\geq 2$  above 20 yrs. old,  $\geq 3$  below 20 yrs. old) and a family history of Marfan syndrome (as defined in 1-4 above) is sufficient for a diagnosis of Marfan syndrome. However, features suggestive of Shprintzen Goldberg syndrome, Loeys-Dietz syndrome, or vascular Ehlers Danlos syndrome must be excluded and appropriate alternative genetic testing (TGFB1/2, SMAD3, TGFB2, TGFB3, collagen biochemistry, COL3A1, and other relevant genetic testing when indicated and available upon the discovery of other genes) should be performed.

<https://www.marfan.org/dx/rules>

## Classification of sports based on peak static and dynamic components during competition

Increasing static component ↑	III. High (>30%)	Bobsledding/luge Field events (throwing) Gymnastics * ¶ Martial arts Rock climbing Sailing Water skiing * ¶ Weight lifting * ¶ Windsurfing * ¶	Body building * ¶ Downhill skiing Skateboarding * ¶ Snow boarding * ¶ Wrestling *	Boxing Canoeing Kayaking Cycling * ¶ Decathlon Rowing Speed skating Triathlon * ¶
	II. Moderate (10-20%)	Archery Auto racing * ¶ Diving * ¶ Equestrian * ¶ Motorcycling * ¶	American football * Field events (jumping) Figure skating Rodeoing * ¶ Rugby Running (sprint) Surfing Synchronized swimming ¶ "Ultra" racing	Basketball * Ice hockey * Cross-country skiing (skating technique) Lacrosse * Running (middle distance) Swimming Team handball Tennis
	I. Low (<10%)	Bowling Cricket Curling Golf Riflery Yoga	Baseball/softball Fencing Table tennis Volleyball	Badminton Cross-country skiing (classic technique) Field hockey * Orienteering Race walking Racquetball/squash Running (long distance) Soccer *
		A. Low (<50%)	B. Moderate (50-75%)	C. High (>75%)
		Increasing dynamic component →		

This classification is based on peak static and dynamic components achieved during competition; however, higher values may be reached during training. The increasing dynamic component is defined in terms of the estimated percentage of maximal oxygen uptake ( $VO_{2max}$ ) achieved and results in an increasing cardiac output. The increasing static component is related to the estimated percentage of maximal voluntary contraction reached and results in an increasing blood pressure load. The lowest total cardiovascular demands (cardiac output and blood pressure) are shown in the palest color, with increasing dynamic load depicted by increasing blue intensity and increasing static load by increasing red intensity. Note the graded transition between categories, which should be individualized on the basis of player position and style of play.

\* Danger of bodily collision (see UpToDate content regarding sports according to risk of impact and educational background).

¶ Increased risk if syncope occurs.<sup>[1]</sup>

### Reference:

1. Mitchell JH, Haskell W, Snell P, Van Camp SP. Task force 8: Classification of sports. *J Am Coll Cardiol* 2005; 45:1364.

Reproduced from: Levine BD, Baggish AL, Kovacs RJ. Eligibility and disqualification recommendations for competitive athletes with cardiovascular abnormalities: Task force 1: Classification of sports: Dynamic, static, and impact: A scientific statement from the American Heart Association and American College of Cardiology. *J Am Coll Cardiol* 2015; 66:2350.

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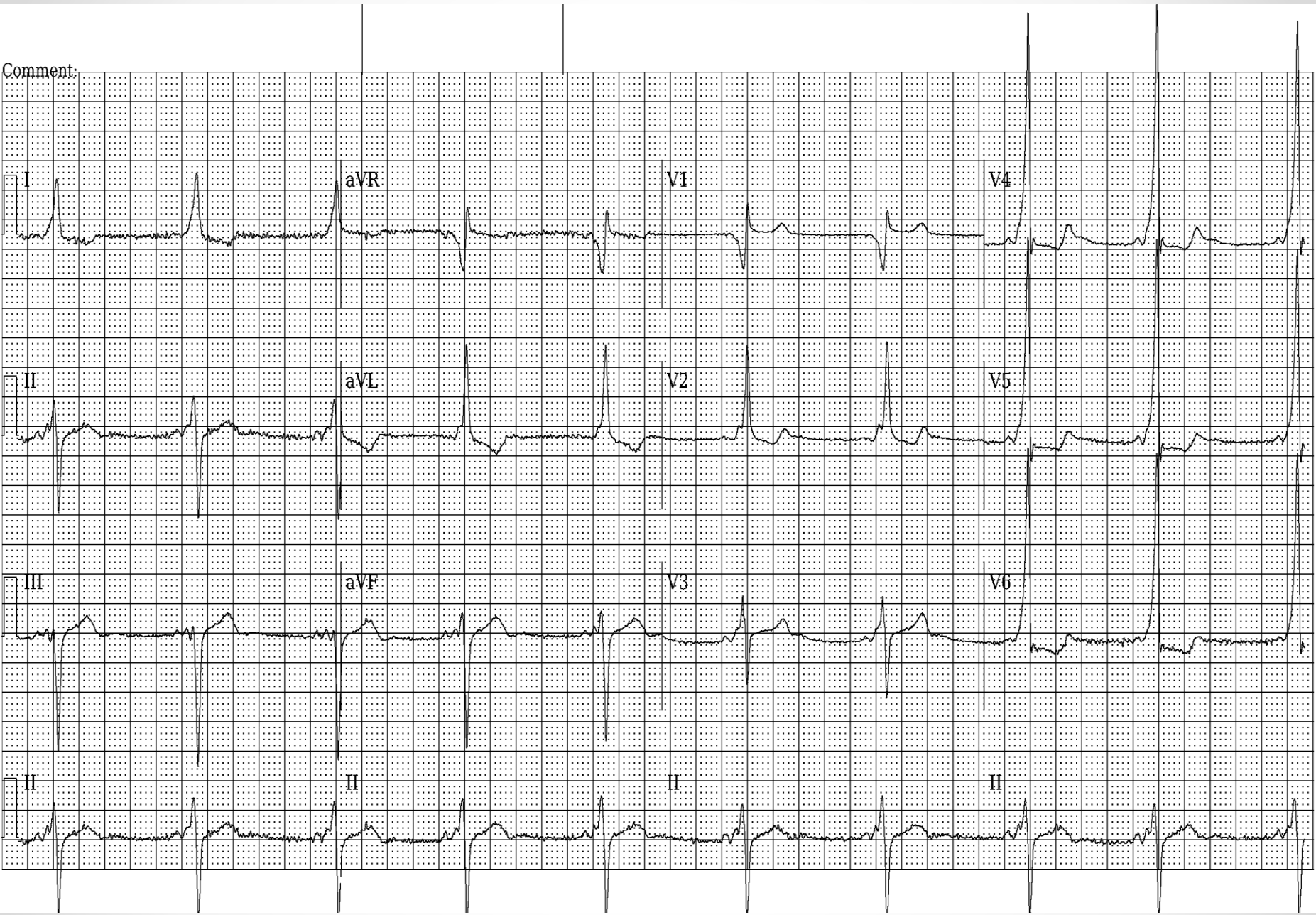
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# Cardiology Consult

- **Abnormal History**
  - Heart Health Questions
  - Family Cardiac History
- **Abnormal Exam**
  - Diastolic Heart Murmur
  - Heart Murmur grade IV and above
  - Increase in murmur with valsalva (Decrease in venous return, less left ventricle filling- & louder murmur)
  - Decrease in murmur with hand grip
  - Stigmata of Marfan's
  - Murmur from MVP (midsystolic click w or w/o late systolic murmur)
  - Absence of the physiologic S2 split

17 year old here for PPE, on history reports palpitations, 12 element question, PE, are normal. You decide to order an ECG. It is as follows, what do you recommend?

Comment:



# Physical Examination

- **Temperature, BP, HR, RR**
- Height/Weight
- **Eyes:** visual acuity and differences in pupil size
- **Cardiovascular System:** *Minimal two positions, pulses (radial, femoral), heart (rate, rhythm, murmur), PMI location, inspection for stigmata of Marfan's*
- **Genitalia** (Males only): single or undescended testicle, testicular mass, hernia
- **Skin:** rashes, lesions
- **Musculoskeletal & Neurological System:** contour, ROM, stability and symmetry of neck, back, shoulder/arm, elbow/forearm, wrist/hand, hip/thigh, knee, leg/ankle, foot

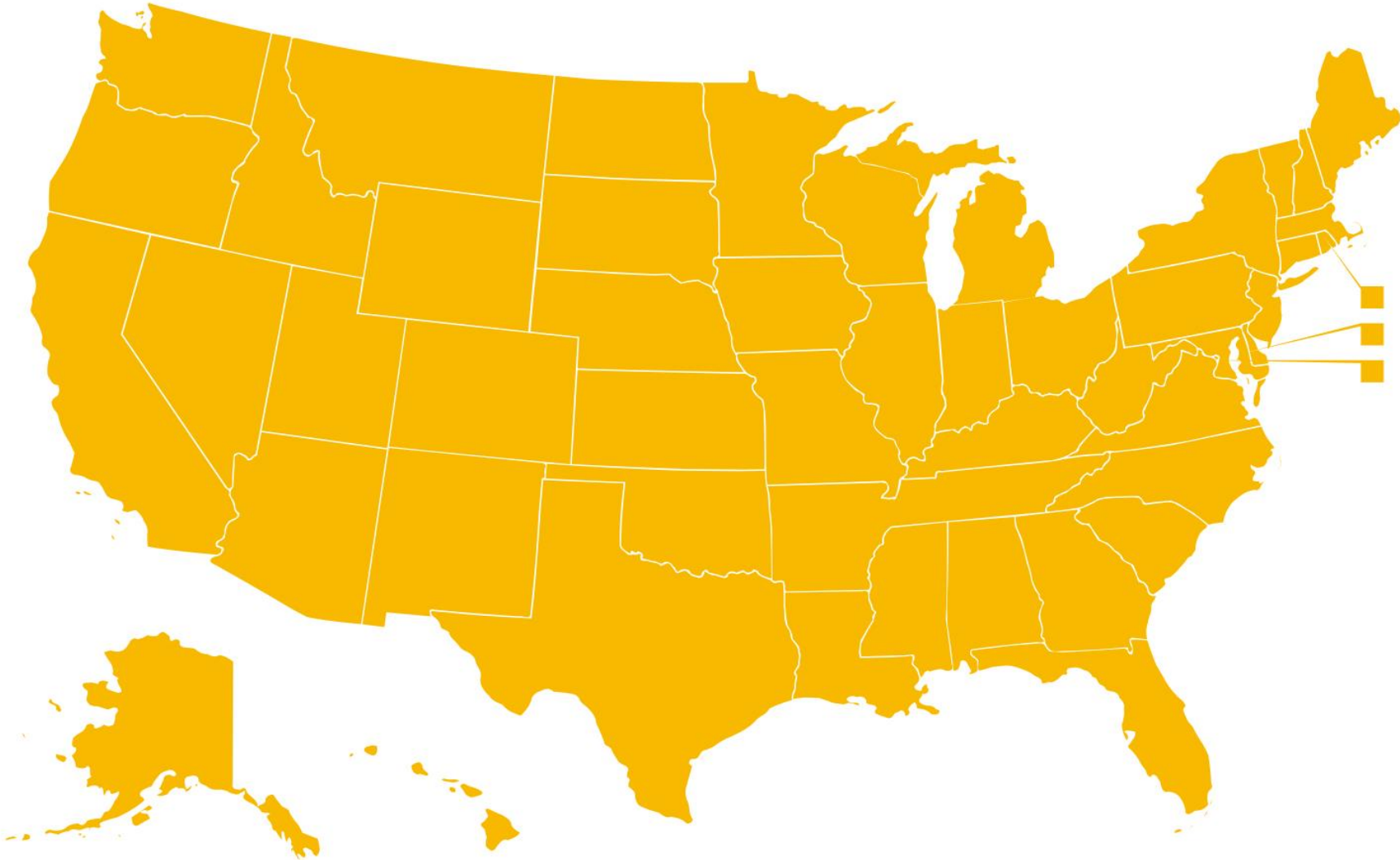




# Epidemiology Sport Concussion

- Est. 1.5 million youth, 300,000 College, semi-pro, professional and other participants.
- Girls have greater risk and rates of concussion in similar sports with cognitive impairment more frequent in girls than boys
- **HS athletes' recover more poorly compared to collegiate athletes, latter more severe**
  - Younger brain, thinner skull, more easily torn blood vessels, fewer medical available staff, poor body control/technique, weaker necks.

2014-2015



2009

2010

2011

2012

2013

2014-15

# Concussion Legislation GA

- Georgia Assembly: 2013-2014 Regular Session -  
HB 284 Return to Play Act of 2013; enact

# Concussion Legislation GA

- Georgia Assembly: 2013-2014 Regular Session -  
HB 284 Return to Play Act of 2013; enact
  - <http://www.legis.ga.gov/legislation/en-US/display/20132014/HB/284>
  - Required education at beginning of athletic season
  - Required removal from activity if symptomatic
  - Required clearance provided from health care provider
  - But removes liability-to all volunteers, government, school board, officers and employees

# of State Legislatures, 2013.

## Most Concussion in Sports Laws Include

### 1. **Educate Coaches, Parents, and Athletes:**

Inform and educate coaches, athletes, and their parents and guardians about concussion through training and/or a concussion information sheet.

### 2. **Remove Athlete from Play:**

An athlete who is believed to have a concussion is to be removed from play right away.

### 3. **Obtain Permission to Return to Play:**

An athlete can only return to play or practice after at least 24 hours and with permission from a health care professional.

Zackery Lystedt Law, became effective and Law May 2009, State of  
Washington.







# Symptoms

- Headache
- “Pressure in head”
- Neck Pain
- Dizziness
- Blurred vision
- Balance problems
- Sensitive to light
- Sensitive to sound
- Feeling slowed down
- Feeling like “in a fog”
- Anxious
- “Don’t feel right”
- Difficulty concentrating
- Difficulty remembering
- Fatigue or low energy
- Confusion
- Drowsiness
- Trouble falling asleep
- More emotional
- Irritable
- Sadness
- Nervous

# ACUTE CONCUSSION EVALUATION (ACE)

## PHYSICIAN/CLINICIAN OFFICE VERSION

Gerard Gioia, PhD<sup>1</sup> & Micky Collins, PhD<sup>2</sup>

<sup>1</sup>Children's National Medical Center  
<sup>2</sup>University of Pittsburgh Medical Center

Patient Name: \_\_\_\_\_  
DOB: \_\_\_\_\_ Age: \_\_\_\_\_  
Date: \_\_\_\_\_ ID/MR#: \_\_\_\_\_

**A. Injury Characteristics** Date/Time of Injury \_\_\_\_\_ Reporter:   Patient     Parent     Spouse     Other  

### 1. Injury Description

- 1a. Is there evidence of a forcible blow to the head (direct or indirect)?   Yes     No     Unknown    
1b. Is there evidence of intracranial injury or skull fracture?   Yes     No     Unknown    
1c. Location of Impact:   Frontal     Lt Temporal     Rt Temporal     Lt Parietal     Rt Parietal     Occipital     Neck     Indirect Force    
2. **Cause:**   MVC     Pedestrian-MVC     Fall     Assault     Sports (specify) \_\_\_\_\_   Other \_\_\_\_\_  
3. **Amnesia Before (Retrograde)** Are there any events just BEFORE the injury that you/ person has no memory of (even brief)?   Yes     No   Duration \_\_\_\_\_  
4. **Amnesia After (Anterograde)** Are there any events just AFTER the injury that you/ person has no memory of (even brief)?   Yes     No   Duration \_\_\_\_\_  
5. **Loss of Consciousness:** Did you/ person lose consciousness?   Yes     No   Duration \_\_\_\_\_  
6. **EARLY SIGNS:**   Appears dazed or stunned     Is confused about events     Answers questions slowly     Repeats Questions     Forgetful (recent info)    
7. **Seizures:** Were seizures observed?   No     Yes   Detail \_\_\_\_\_

### B. Symptom Check List\* Since the injury, has the person experienced any of these symptoms any more than usual today or in the past day?

Indicate presence of each symptom (0=No, 1=Yes)

\*Lovell & Collins, 1998 JHTR

PHYSICAL (10)		COGNITIVE (4)		SLEEP (4)	
Headache	0 1	Feeling mentally foggy	0 1	Drowsiness	0 1
Nausea	0 1	Feeling slowed down	0 1	Sleeping less than usual	0 1 N/A
Vomiting	0 1	Difficulty concentrating	0 1	Sleeping more than usual	0 1 N/A
Balance problems	0 1	Difficulty remembering	0 1	Trouble falling asleep	0 1 N/A
Dizziness	0 1	<b>COGNITIVE Total (0-4)</b> _____		<b>SLEEP Total (0-4)</b> _____	
Visual problems	0 1	<b>EMOTIONAL (4)</b>		<b>Exertion:</b> Do these symptoms <u>worsen</u> with: Physical Activity <u>  Yes  </u> <u>  No  </u> <u>  N/A  </u> Cognitive Activity <u>  Yes  </u> <u>  No  </u> <u>  N/A  </u>  <b>Overall Rating:</b> How <u>different</u> is the person acting compared to his/her usual self? (circle) Normal 0 1 2 3 4 5 6 Very Different	
Fatigue	0 1	Irritability	0 1		
Sensitivity to light	0 1	Sadness	0 1		
Sensitivity to noise	0 1	More emotional	0 1		
Numbness/Tingling	0 1	Nervousness	0 1		
<b>PHYSICAL Total (0-10)</b> _____		<b>EMOTIONAL Total (0-4)</b> _____			
(Add Physical, Cognitive, Emotion, Sleep totals)		<b>Total Symptom Score (0-22)</b> _____			

### C. Risk Factors for Prolonged Recovery (check all that apply)

Concussion History? Y <u>  </u> N <u>  </u>	✓ Headache History? Y <u>  </u> N <u>  </u>	✓ Developmental History	✓ Psychiatric History
Previous # 1 2 3 4 5 6+	Prior treatment for headache	Learning disabilities	Anxiety
Longest symptom duration Days <u>  </u> Weeks <u>  </u> Months <u>  </u> Years <u>  </u>	History of migraine headache <u>  Personal  </u> <u>  Family  </u>	Attention-Deficit/ Hyperactivity Disorder	Depression
If multiple concussions, less force caused reinjury? Yes <u>  </u> No <u>  </u>		Other developmental disorder <u>  </u>	Sleep disorder
			Other psychiatric disorder <u>  </u>

List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures) \_\_\_\_\_

### D. RED FLAGS for acute emergency management: Refer to the emergency department with sudden onset of any of the following:

- \* Headaches that worsen
- \* Looks very drowsy/ can't be awakened
- \* Can't recognize people or places
- \* Neck pain
- \* Seizures
- \* Repeated vomiting
- \* Increasing confusion or irritability
- \* Unusual behavioral change
- \* Focal neurologic signs
- \* Slurred speech
- \* Weakness or numbness in arms/legs
- \* Change in state of consciousness

**E. Diagnosis (ICD):**   Concussion w/o LOC 850.0     Concussion w/ LOC 850.1     Concussion (Unspecified) 850.9     Other (854)    
  No diagnosis  

### F. Follow-Up Action Plan Complete ACE Care Plan and provide copy to patient/family.

  No Follow-Up Needed  

  Physician/Clinician Office Monitoring: Date of next follow-up \_\_\_\_\_

  Referral:

  Neuropsychological Testing  

  Physician: Neurosurgery \_\_\_\_\_ Neurology \_\_\_\_\_ Sports Medicine \_\_\_\_\_ Physiatrist \_\_\_\_\_ Psychiatrist \_\_\_\_\_ Other \_\_\_\_\_

  Emergency Department  

ACE Completed by: \_\_\_\_\_

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This form is part of the "Heads Up: Brain Injury in Your Practice" tool kit developed by the Centers for Disease Control and Prevention (CDC).





# Pocket CONCUSSION RECOGNITION TOOL™

To help identify concussion in children, youth and adults



FIFA®



## RECOGNIZE & REMOVE

Concussion should be suspected **if one or more** of the following visible clues, signs, symptoms or errors in memory questions are present.

### 1. Visible clues of suspected concussion

Any one or more of the following visual clues can indicate a possible concussion:

Loss of consciousness or responsiveness  
Lying motionless on ground/Slow to get up  
Unsteady on feet / Balance problems or falling over/Incoordination  
Grabbing/Clutching of head  
Dazed, blank or vacant look  
Confused/Not aware of plays or events

### 2. Signs and symptoms of suspected concussion

Presence of any one or more of the following signs & symptoms may suggest a concussion:

- |                          |                            |
|--------------------------|----------------------------|
| - Loss of consciousness  | - Headache                 |
| - Seizure or convulsion  | - Dizziness                |
| - Balance problems       | - Confusion                |
| - Nausea or vomiting     | - Feeling slowed down      |
| - Drowsiness             | - "Pressure in head"       |
| - More emotional         | - Blurred vision           |
| - Irritability           | - Sensitivity to light     |
| - Sadness                | - Amnesia                  |
| - Fatigue or low energy  | - Feeling like "in a fog"  |
| - Nervous or anxious     | - Neck Pain                |
| - "Don't feel right"     | - Sensitivity to noise     |
| - Difficulty remembering | - Difficulty concentrating |

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## 3. Memory function

Failure to answer any of these questions correctly may suggest a concussion.

- "What venue are we at today?"*  
*"Which half is it now?"*  
*"Who scored last in this game?"*  
*"What team did you play last week / game?"*  
*"Did your team win the last game?"*

**Any athlete with a suspected concussion should be IMMEDIATELY REMOVED FROM PLAY, and should not be returned to activity until they are assessed medically. Athletes with a suspected concussion should not be left alone and should not drive a motor vehicle.**

It is recommended that, in all cases of suspected concussion, the player is referred to a medical professional for diagnosis and guidance as well as return to play decisions, even if the symptoms resolve.

## RED FLAGS

**If ANY of the following are reported then the player should be safely and immediately removed from the field. If no qualified medical professional is available, consider transporting by ambulance for urgent medical assessment:**

- |                                                |                                 |
|------------------------------------------------|---------------------------------|
| - Athlete complains of neck pain               | - Deteriorating conscious state |
| - Increasing confusion or irritability         | - Severe or increasing headache |
| - Repeated vomiting                            | - Unusual behaviour change      |
| - Seizure or convulsion                        | - Double vision                 |
| - Weakness or tingling/burning in arms or legs |                                 |

Remember:

- In all cases, the basic principles of first aid (danger, response, airway, breathing, circulation) should be followed.
- Do not attempt to move the player (other than required for airway support) unless trained to do so
- Do not remove helmet (if present) unless trained to do so.

from McCrory et. al, Consensus Statement on Concussion in Sport. Br J Sports Med 47 (5), 2013

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# Concussion

- Same-Day RTP
  - Any player with diagnosed concussion should not be permitted to play on the day of injury
- Post-Game Day RTP
  - Graduated RTP Protocol
    - No activity
    - Light aerobic exercise
    - Sport specific (aerobic) exercise
    - Non-contact training drills
    - Full contact practice
    - RTP

# Concussion

- Same-Day Return to Learn (RTL)
  - Evaluation before decision to return to learn, typically prudent to avoid same day return to learn.

# Diabetes Mellitus

- All sports can be played with proper attention to diet, blood glucose concentrations, hydration and insulin therapy
- Monitor during continuous activity every 30 minutes and 15 minutes after completion of activity

A 12 year old girl wants to play basketball and comes in for a SPPE. On her screening history you find out that at the age of 8 she had eye surgery after a trauma to the eye. Her right eye now is best corrected to 20/60. What are your recommendations?

1. Clearance to participate no restrictions
2. Clearance to participate with eye protection
3. Clearance to participate in non-contact sports
4. No clearance to participate in any sport
5. Referral to Ophthalmology



# Eye

- Functionally 1-eyed athlete ( $<20/40$ ), loss of an eye, detached retina, serious eye surgery/injury
- Eye protection that passes American Society for Testing and Materials (ASTM) standards or for Hockey, HECC (Hockey Equipment Certification Council) or CSA (Canadian Standards Association)

# Eye

Sports needed:

- Baseball/Softball (ASTM F910 for youth batter or base runner, otherwise ASTM F803)
- Basketball, Field Hockey (goalie: full mask), Women's and Men's Lacrosse, Soccer (ASTM F803)
- Paintball,
- Racket sports

Restricted sports:

- Boxing, Full-contact Martial Arts

Polycarbonate lenses in swimming, no standard for wrestling, any street wear for biking

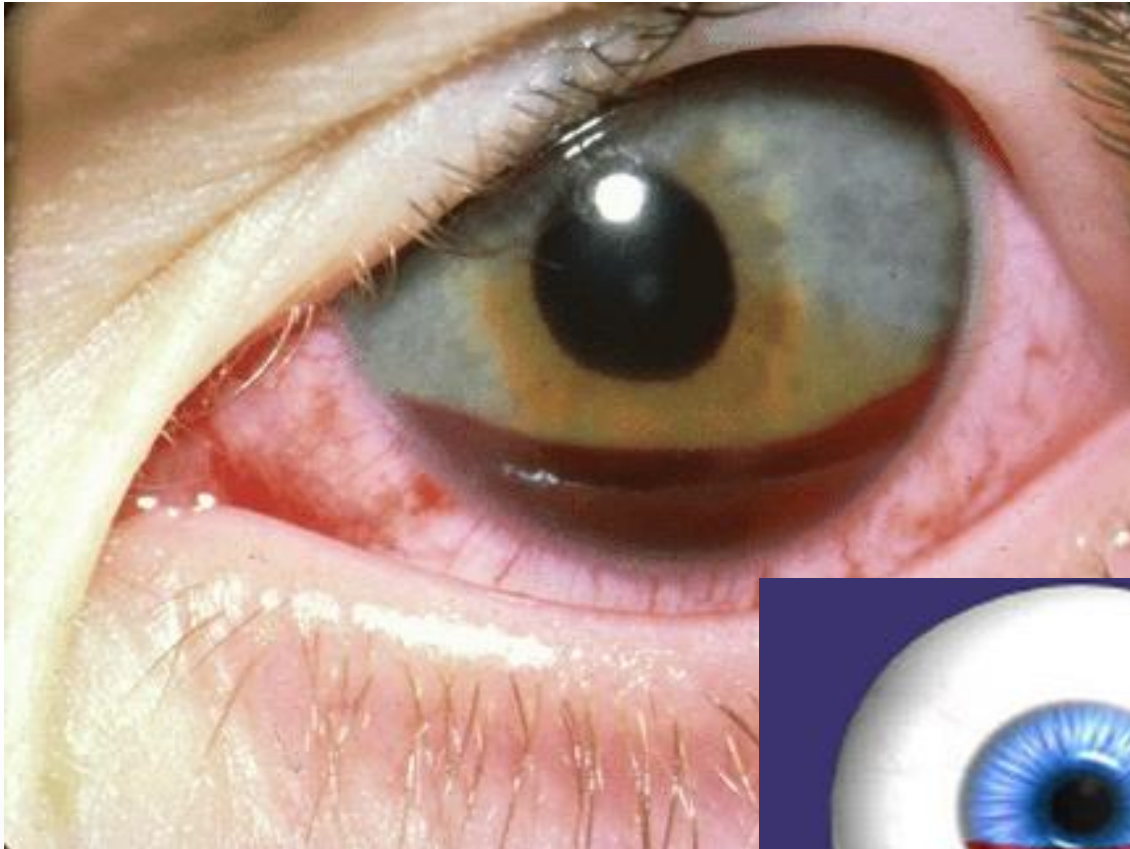
# American Society for Testing Materials



# Hyphema

- Hyphema is blood in the anterior area of the eye between the iris and the cornea, usually caused by trauma to the eye
  - Pt should have ophthalmological evaluation
  - Protect eye with shield
  - Eye examination after trauma

# Hyphema



# Recommendations for Mouth Guards

- **All High Collision Sports**
  - Hockey, Football etc.
- **Most Collision Sports**
  - Baseball, Basketball, Diving, Lacrosse, Martial Arts, Rodeo, Rugby, Ski Jumping, Soccer, Softball, Team Handball, Volleyball, Water Polo, Wrestling
- **Participants who wear braces**
  - Most sports

A 14 year old who wants to play HS basketball and start training in a competitive boxing club, comes in for a PPE. On her screening history you find out that at the age of 8 she had eye surgery after a trauma to the eye. Her right eye now is best corrected to 20/45. What are your recommendations?

1. Clearance to participate, in all sports with no restrictions
2. Clearance to participate, in Basketball with eye protection, no clearance for boxing
3. No Clearance to participate in Basketball nor boxing, but clearance in all non-contact sports.
4. No clearance to participate in any sport
5. Referral to Ophthalmology



A 14 year old who wants to play HS basketball and start training in a competitive boxing club, comes in for a PPE. On her screening history you find out that at the age of 8 she had eye surgery after a trauma to the eye. Her right eye now is best corrected to 20/45. What are your recommendations?

1. Clearance to participate, in all sports with no restrictions
2. Clearance to participate, in Basketball with eye protection, no clearance for boxing
3. No Clearance to participate in Basketball nor boxing, but clearance in all non-contact sports.
4. No clearance to participate in any sport
5. Referral to Ophthalmology



13 year old with history of epilepsy wants to join the swim, soccer and track teams. The last seizure occurred 6 months prior when she refused to take her medications due to side effects. Adjustment of medications has commenced without recurrence. What is the best recommendation?

1. Clearance to participate, no restrictions
2. Clearance to participate in soccer and track but not swimming.
3. Clearance to participate in track but not soccer and swimming.
4. No clearance to participate in any sport
5. Referral to Neurology

# Neurological

- Seizure disorder, well controlled:
  - No restrictions
- Seizure disorder, poorly controlled:
  - Warning/restriction for collision, contact or limited contact sports
  - Complete restriction from archery, riflery, swimming, power weight lifting, strength training and sports involving heights

13 year old with history of epilepsy wants to join the swim, soccer and track teams. The last seizure occurred 6 months prior when she refused to take her medications due to side effects. Adjustment of medications has commenced without recurrence. What is the best recommendation?

1. Clearance to participate, no restrictions
2. Clearance to participate in soccer and track but not swimming.
3. Clearance to participate in track but not soccer and swimming.
4. No clearance to participate in any sport
5. Referral to Neurology

# Respiratory

- Patients with pulmonary disease (including CF) can participate in all sports if oxygenation remains satisfactory during a graded exercise test.
- CF patients need good acclimatization and hydration to decrease risk of heat illness.
- Asthma: Only those with severe disease or very poor control need exercise modification

12 yr old with asthma (EIB), allergic rhinitis, and atopic dermatitis comes for her PPE in February in preparation for softball. The previous season she had two ER visits for asthma exacerbation. She takes albuterol 20 minutes before activities. You recommend which of the following?

1. Clearance to participate no restrictions
2. Clearance to participate with addition of LABA.
3. Clearance to participate with addition of inhaled steroid
4. Clearance to participate in non-contact sports
5. No clearance to participate in any sport and referral to Pulmonary

The mother of a 8 year old boy with sickle cell trait comes for information about team sport recommendations. He would like to play football on a team with his friends in August.  
What do you recommend?

1. Clearance to participate no restrictions
2. Clearance to participate with appropriate hydration
3. Clearance to participate in non-contact sports
4. No clearance to participate in any sport
5. Referral to Hematology/Oncology

# Hematology

- **Sickle cell trait**
  - No restrictions



# Hematology

- **Sickle cell trait**

- No restrictions
- Careful conditioning, acclimatization and hydration
  - Pretzlaff, '02, in ordinary conditions, no increased risk
  - Kark et al '87 and Drehner et al '99 in US Armed Forces found 20 fold increase in risk of death among recruits

- **Sickle cell disease**

- If status of illness permits
- Restrict from high exertion, collision and contact sports



# Heat Illness

Heat Stress----→

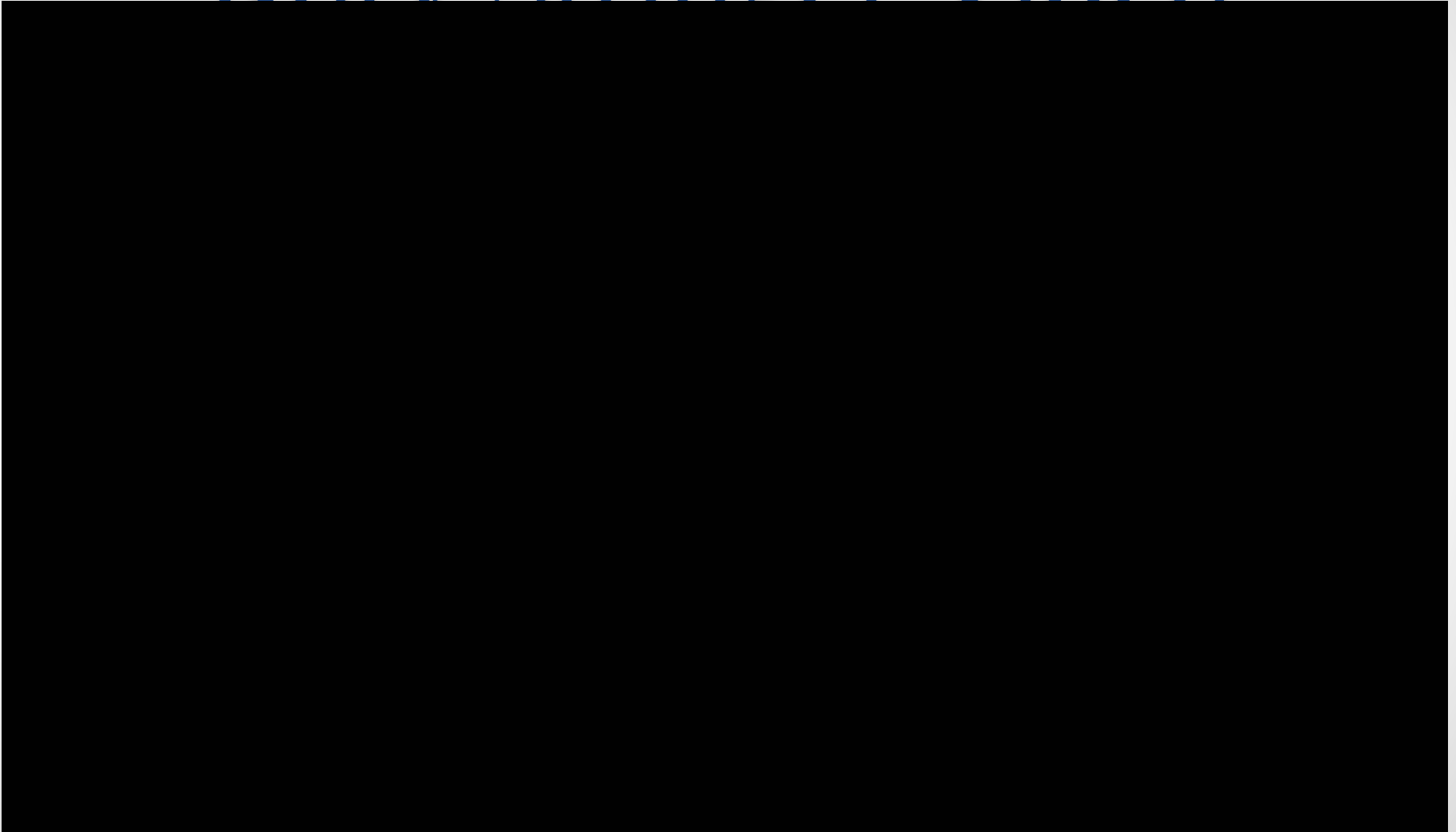
Heat Exhaustion--→

Heat

Stroke



# Kory Stringer Video



# Signs and Symptoms

- Heat Exhaustion- T 98.6-104 F (**core temperature**), anxiety, feels faint , flushing, hypotension, tachycardia, nausea, vomiting, confusion, profuse sweating, thirst, headache, mild dehydration.

# Signs and Symptoms

- Heatstroke-  $T > 104$  F (**core temperature**), DIC, cardiac arrhythmias, hyperventilation, hepatic failure, ataxia, seizures, coma, syncope, confusion, irritability, shock, renal failure, rhabdomyolysis, usually severe dehydration.
  - **The Patient's inability to transfer normally produced heat to the environment**

# Risk Factors

1. Increased Endogenous Heat Load
2. Increased Exogenous Heat Load
3. Decreased Heat Dissipation (exogenous and endogenous)
4. Drugs/Medications
5. Medical Conditions

# Heat Illness

- Cooling
  - conduction - heat loss during direct contact with cooler object
  - convection - dissipation when cool air passes over skin
  - radiation - release of heat directly into environment
  - evaporation - through perspiration
  - Outside temperature greater than body temperature increases the risk

# Heat Exhaustion Management

- Prompt removal and stabilization in a cool area
- Hydration
- Evaporative cooling initiated by wetting the skin
- Monitor core temperature for resolution
- Symptoms should resolve within 20-30 minutes



# Heatstroke Management

- ABC's
- Initiate EMS
- Removal from heat
- **Rapid aggressive cooling process**

# Prevention

- Adequate hydration (fluids 24-48 hrs before event)
- Avoiding heat exposure
- Monitor the Heat Index or Wet Bulb Globe Temperature Index ( $= 0.7(WB) + 0.2(GT) + 0.1$  (dry bulb)) (WBGT 64-72 Mod Risk, 73-82 High, >82 Hazardous)

# Prevention

- Adequate Conditioning
- Educate Athletes, Coaches and Officials
- Acclimation to environment (3-4days)
- Wearing loose fitting, light clothing
- Monitoring exertion levels

# Skin

Boils, HSV, Impetigo, Scabies, Molluscum Contagiosum: participation is restricted while contagious in all mat sports, contact and limited contact sports

# Infectious Disease

Fever:

- No participation is permitted

Hepatitis/HIV:

- No restrictions for otherwise healthy individuals
- Always use universal precautions

# Nephrology and Genitourinary

- Single Kidney:
  - No restriction for non-contact sports
  - Some believe restriction from contact sports if the kidney is pelvic, iliac, multicystic, shows evidence of hydronephrosis or has ureteropelvic junction abnormalities
  - Individual assessment for contact, collision and limited-contact sports and evaluation by a nephrologist or urologist is recommended
  - Risk assessment and discussion about available protection should be included

# Nephrology and Genitourinary

- Inguinal Hernia
  - Asymptomatic
    - Participation permitted
  - Symptomatic
    - Frequently require treatment and need to be individually evaluated
- Single or Undescended Testicle:
  - No restriction but must wear a cup in some contact sports
  - Risk assessment and discussion about sperm banking

# Questions?





# References

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